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Credibility and Validation through Syntheses of Customary and Contemporary Knowledge

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The double vowel has been used for all te reo Maaori words in the thesis because that is the kawa or protocol of the Kiingitanga.

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	E. Pai Maarire Karakia.		

Abbreviations

AB	beta amyloid protein
ALA	linolenic acid
ANHMRC	Australian National Health and Medical Research Council
APEC	Asia Pacific Economic Co-operation Process formed in 1987
CE	Crown Entities
CVD	cardiovascular disease
DHA	docosahexaenoic acid
EECA	Energy Efficiency and Conservation Authority
EFA	essential fatty acids
EPA	eicosapentaenoic acid
HF	Heart Foundation of New Zealand (National)
HRCA	Health Research Council of Australia
HRCNZ	Health Research Council of New Zealand
IAPP	islet amyloid protein
MEDC	Maori Economic Development Commission
MLGS	Maori Land Grievance Settlements by the Waitangi Tribunal
MOF	Ministry of Fisheries
MOH	Ministry of Health
MRP	Mighty River Power
n-3	omega-3 fatty acid (an essential unsaturated fatty acid)
n-6	omega-6 fatty acid (an essential unsaturated fatty acid)
NIWA	National Institute of Weather and Atmosphere (New Zealand)
NZLC	New Zealand Law Commission
OECD	Organisation for Economic Co-operation and Development
PHC	Public Health Commission
PUFA	polyunsaturated fatty acids
TKB	Tuupuna Knowledge Base
TKBHI	Tuupuna Knowledge Base Health Intervention
TOW	Treaty of Waitangi 1840 (the English version)
TOW	Tiriti o Waitangi 1840 (the Maaori version)
TVNZ	Television New Zealand
US/USA	United States of America
TKB	Tuupuna Knowledge Base
TMTB	Tainui Maaori Trust Board
WT	Waitangi Tribunal

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Mihimihi

Teena koutou

Tuatahi e mihi ki te Atua.

Tuarua e mihi ki Te Kūini Te Atairangikaahu te kaahu Arikini,
raua ko Te Kiingi Tuheitia.

Teena koutou, i o taatou tini mate, teena koutou, i o taatou tini mate,
haere e ngaa mate, haere, haere, haere.

Haere ki te wakina, haere ki te kainga tuuturu o taatou matua.

E hoa maa, ngaa hau e whaa, e te iwi tau nei, teena koutou, ara taatou.

Te whare e tu nei teena koe, te paapaa e takoto ki waho, teena koe.

Te whare e tu nei, te waonui o taane e tu, e tu.

Tonu te paapaa e taka hia ngaa tapuwae, o raatou ma, teena koe.

ko waka o Tainui tooku waka,

Ko Taupiri tooku maunga,

ko Taupiri tooku urupa,

ko Waikato tooku awa,

ko Marae o Tuurangawaewae tooku Marae,

ko Ngaati Mahuta raua ko Ngaati Pou tooku Hapuu,

Ko McKay raua ko Marshall tooku Whaanau,

Ko ahau teetehi a ngaa uri o Pootatau he Kiingi tuatahi, ko Maarie ahau.

Kua huihui mai i runga i te kaupapa o te raa.

Teena koutou, teena koutou, teena koutou katore.

Abstract

This ground breaking doctoral thesis brings together science, history and the values derived from lore and tikanga to address a significant health issue for contemporary Maaori. The specific contribution of this research thesis is the combination of knowledge bases from two perspectives. The thesis first presents a scientific view, then a Maaori view, discovered through an interface of customary and contemporary knowledge. The method first examines Western academic theoretical methodologies, then, Kaupapa Maaori methodologies, then introduces and develops the concept of inherited knowledge supported by the mandatory Standards required in an academic context. Therefore the major findings present the syntheses of the two approaches. The framework used is reproducible through an accepted or approved example of something against which others are judged or measured. At this point the thesis explores the theoretical framework for a health intervention by surveying whether it is possible to combine knowledge traditions in a contemporary setting. Thus the accessed inherited traditional and scientific knowledge discovered in this thesis has been adapted for the nine point health intervention designed for Maaori participation. This thesis hypothesises that the staple long finned eel diet contained the essential fatty acid omega-3 and is presented as a metaphor for Hauora, thus being consistent with modern scientific knowledge where the scientific findings presented. The long finned eel was chemically assayed for the presence of the unsaturated essential fatty acid omega-3, and assayed again to assess the stability and quality of fresh and smoked eel. Type II diabetes mellitus is offered as a story and why it has suddenly occurred in Maaori subsequent to urban migration and thereafter. In addition a ten year study of Waikato hapuu supports the research that regular consumption of the long finned eel prevents Type II diabetes. And that prior to urban migration holistic practice, through established lifestyle choices and inherited knowledge, provided nutritional, other physiological benefits and broader wellness outcomes.

The double vowel has been used for all te reo Maaori words in the thesis because that is the kawa or protocol of the Tainui Kiingitanga.

Chapter one

Background and Introduction

Why this doctoral thesis has been undertaken?

I spent most of my adult life in Australia where I had a successful career in the global pharmaceutical industry as a Pharmacologist predominantly studying and researching Western-style medical pharmaceutical drugs. As a result of clinical trials and research during the 1970/80s it was suggested that omega-3 found in finfish oil may provide protection against some chronic non-communicable diseases: including Type II diabetes, hypertension, coronary heart disease, cancers and mental illness. Since the 1980s medical and scientific research has been more conclusive about the long chain omega-3 polyunsaturated fatty acids benefits.

As a child our family regularly attended the annual regatta race at Ngaaruawaahia, and I attended Koroneihana celebrations with my maternal grandmother Alexandra but everyone called her Maa. She was born beside the Waikato River at a Kiingitanga Marae and was raised with the old Kiingitanga customary knowledge given to her by kuia until her marriage at aged twenty-two years when she moved away after being widowed. Then out of necessity she became very successful in business by applying her inherited Kiingitanga values and principles. I spent many hours with Maa fishing out on the Manukau Harbour where she taught me to read the sky, the clouds, the wind and the sea, as she had been taught. I spent school holidays with her and her younger sister Aunty Emily listening to many discussions about our Maaori heritage and some visitors actually spoke in te reo Maaori, and I often wondered why they had so much to talk about. Then at aged 13 years I was horrified when another sister of Maa's had her legs amputated because of complications from Type II diabetes. She passed on shortly after the amputation. In fact she was the only sibling of my grandmother's generation that developed Type II diabetes and the only one that denied her Maaoritanga heritage.

I returned to New Zealand in 1994 and attended Aunty Emily's funeral that was unexpectedly in te reo Maaori and more a tangihanga than a Western-style funeral. It has been since this occasion that I have had a very strong desire to establish a connection

with my Maaori heritage and began participating in my Maaoritanga through the Kiingitanga Poukai. We attended many Poukai and I began to link up with whaanau and hapuu through my whakapapa research and became very aware of many health issues afflicting contemporary Maaori. It became clear to me that there had been a very sudden onset of a number of chronic non-communicable diseases with the most common being Type II diabetes mellitus. I listened carefully to what the kuia and the old people were saying about how the Waikato River had become polluted and that the long finned eel/tuna was no longer as plentiful as it had been. And that the taste had changed as the river had become more polluted. Thus I began searching for a reason why there was such a prevalence of Type II diabetes in Maaori and what role the long finned eel/tuna had played at a time when non-communicable diseases did not exist. It was very apparent to me that there was a definite connection between good health and the lifestyle choices such as diet, exercise, participation in Maaoritanga, and chronic diseases. This doctoral thesis has evolved from listening to what the old people were saying, listening to what the whaanau and hapuu were saying and then searching for a cause and then a solution of the Type II diabetes epidemic.

What this doctoral thesis is going to do?

This doctoral thesis is going to bring together science, history and the values derived from lore and tikanga to address a significant health issue for contemporary Maaori. Working at the interface of customary and contemporary knowledge it will synthesise knowledge bases from two perspectives. It is going to combine traditional Maaoritanga knowledge and scientific knowledge and this is how it is going to be completed.

- Through the validation of traditional Maaoritanga knowledge that is historically traditionally benchmarked from a Kiingitanga and Tainuitanga viewpoint.
- Through establishing mana and credibility for the inherited Kiingitanga and Tainuitanga health and science knowledge.
- Through using a Tainuitanga viewpoint to test the topic as a feasible scientific model.
- Through validating the Kiingitanga knowledge reference in a contemporary society.

This is not a thesis about Type II diabetes mellitus and this thesis does not attempt to develop a pharmacotherapeutic formula for Type II diabetes mellitus prevention through dietary omega-3 intake. Therefore this proposition is not a pharmacological medical science approach focusing on the action of omega-3 ingestion or on the properties or characteristics of an omega-3 diet. Indeed pharmaceutical drugs do play an important role in treating diseases especially communicable infectious diseases, recent medical research suggests that chronic non-communicable diseases could be prevented through diet and lifestyle choices. However the long finned eel could be used in a controlled clinical trial project to assess the pharmacotherapeutic benefits at some future time but that investigation is not part of this assertion. But this thesis has examined scientific and medical clinical trials for omega-3 derived through a finfish diet to establish the importance that a regular intake of dietary omega-3 extracted from finfish oils. This thesis draws a distinction that the staple long finned eel was pivotal in protecting traditional hapuu Maaori against the non-communicable disease Type II diabetes mellitus because of the omega-3 fatty acid nutrient and lethicin they contain. I originally speculated that the long finned eel/tuna contained the essential fatty acid omega-3 so chemically acid tested to establish scientifically whether or not the long finned eel/tuna contained omega-3. The assay testing confirmed that the long finned eel/tuna oil was omega-3 and it remained stable over time, exposure to light and being smoked. The AgriQuality Reports are attached as Appendices B *AgriQuality* Eel Omega-3 Chemical Assay Report 310956 and C. *AgriQuality* Eel Omega-3 Chemical Assay Report 209174.

How this thesis sets out to prove this?

The specific contribution of this thesis is the combination of knowledge context bases from two perspectives. The thesis first presents a scientific view, then a Maaori view, discovered through an interface of customary and contemporary knowledge. It is an intervention which is cognisant of holistic knowledge; demonstrating the benefits and practice of combining knowledge-bases, awareness, access, validation and utility. The research and customary knowledge focus is primarily from Tainui waka hapuu but with an emphasis on the Kiingitanga because of the whakapapa connections.

This doctoral thesis research tested whether the selected research methodology is suitable for gathering and managing indigenous knowledge and this is how it was done:

- By this research culminating in the pursuit of a doctoral thesis.
- By the examination of a suitable cultural method to acquire knowledge data.
- By developing and then using the Tuupuna Knowledge Base Research Methodology as an academic model.
- By extending the established academic Kaupapa Maaori Research Methodology.
- By the development of a theoretical health intervention Tuupuna Knowledge Base research methodology.
- By the design of Tuupuna Knowledge Base health intervention through the combination of both scientific and Tainuitanga viewpoints, this aimed to improve Maaori hauora participation.

There are three viewpoints to reach a conclusion, firstly from an historical perspective that explored past records through various karakia, many types of waiata, whakairo, whatu, raranga, tukutuku and moko. Secondly from a scientific standpoint to establish credibility and recognition of the customary knowledge handed down to subsequent generations. Then thirdly based on the research, findings and conclusions of the ancestor's customary knowledge a health intervention for implementation has been designed with a nine point health intervention demonstrating the traditional customary holistic practice adapted from the past but developed for a contemporary setting.

The long finned eel/tuna is presented as a metaphor because as a Tainui staple food it was regularly consumed but with numerous lifestyle choices such as regular exercise to gather the eel/tuna. Type II diabetes has been used as a case in point because Type II diabetes is the most prevalent in Maaori but there is also a global epidemic and the findings may be useful from a global indigenous stance.

Therefore allowing the establishment of new knowledge through an investigatory analysis, from which findings are presented and drawn by exploring these questions.

- Can this thesis demonstrate the benefits and practice of combining knowledge-bases through awareness, access, validation and utility?

- Could an omega-3 eel/tuna dietary intake explain the absence of the diabetes mellitus Type II symptoms from the historical record?
- What are the frameworks and details of the research methodology?
- What are the methods used for data collection and quality assurance?
- Does tuupuna knowledge form a credible basis for a contemporary Maaori research procedure in a global world?

The Nine Point Health Intervention Tuupuna Knowledge Base Health Intervention



The carving is from (*Tainui Annual Report/He Riipoata–A–Tau–1998*) and was carved in 1886 for the people of Tukorehe o Ngaati Raukawa (p. 28).

Introducing the Thesis Chapters

Chapter one divides into *five parts*, firstly *Part one* provides the historical outline from origins of the Maaori as tangata whenua in around 1350 AD with the arrival of the three waka to furnish a brief history of hapuu Maaori from migration to colonisation. *Part two* identifies the non-communicable chronic disease Type II diabetes mellitus addressing the symptoms and the regime recommended by Western medical practitioners. *Part two* also reveals Type II diabetes prevalence in relation to contemporary Maaori, and its predicted future. *Part three* provides an in-depth analysis of the long finned eel/tuna, a detailed study of the long finned eel gathering and the cultural significance to hapuu Maaori. It

then discusses the Hydro-electricity resource development having a profound effect on the availability of the long finned eel as a staple food. *Part four* validates and establishes the significance of omega-3 initially from a comprehensive literature review of Medical Clinical Trials specific to the omega-3 benefits. Next it produces scientific analysis from the chemical assay testing of the freshwater long finned eel. The results from the *AgricQuality* Laboratory in Auckland are annexed in the appendices. *Part four* finally examines the long finned eel from an aquaculture perspective and long finned eel farming for future dietary consumption. *Part five* scrutinises the status of Maaori health, discusses traditional Maaori health and healing methods; then firmly establishes that Maaori were healthy until the abrupt dietary changes emanating from the Maaori Urbanisation. The question of longevity is discussed in tandem with the consequences of the Maaori Urbanisation dietary and lifestyle changes, and finally Maaori health development strategies.

Chapter two is a review of research paradigms and methodologies including Positivist and Kaupapa Maaori theoretical research methodologies. This chapter establishes that inherited knowledge accessed primarily through whakapapa in a Maaori context can be a valid academic research methodology and is appropriate for indigenous knowledge research. It introduces the concept of inherited knowledge followed by a research framework called Tuupuna Knowledge Base Research Methodology that is supported by *Standards* required in an academic context and they are as follows:

- The whakapapa qualifies the source and validation of *old knowledge*.
- Where possible kuia or kaumaatua will authenticate that the old knowledge or inherited knowledge derived from the tuupuna.
- The knowledge is visionary based *old knowledge* for the future benefit and tribal strength through an unselfish commitment to knowledge.
- That it has been directed and acquired in partnership with a wairua experience such as physical visit to sacred mountain, river/sea/lake, urupa, historical significant place in connection to the hapuu knowledge being sought.
- That the knowledge is validated by several repeated experiences.
- That the research method can actually stand analytically investigation.
- That it can be accepted as Peer Review by hapuu and academic institutions.

This chapter includes a ten year Interview Data Gathering Key Informant Study (from 1996 to 2006) that initially commenced when I was searching for my whakapapa with approximately fifty hapuu and whaanau. Then it became apparent to discover the actual cause of Type II diabetes I would need to ask specific structure questions to each of the fifty original participants. But with a smaller group so I selected two groups of nine that were willing to participate, one group that regularly gathered and ate the long finned eel/tuna and one group of nine that never ate the long finned eel/tuna. The purpose of the structured questions through interviews was to sample to saturation and method used was initially informal discussions, but then there was a need for specific detailed data, so questionnaires were designed. The precise questions were asked at more formally structures interviews and all Key Informant Participants were each asked the same questions because a pattern was sought for verification. Throughout the entire ten year period all research undertaken was within Tainui and Kiingitanga tikanga boundaries; with direction sought from kuia and kaumaatua at Tuurangawaewae Marae. It should be noted that as a group they are discretely very influential within Maaoridom. Moreover a Kiingitanga Kuia is respected as the knowledge gatekeeper for Tainui and Kiingitanga knowledge serving a separate role to a kaumaatua.

Chapter three as the first output again introduces the Tuupuna Knowledge Base research methodology and provides a way of understanding the holistic long finned eel/tuna practice as a framework for an intervention design using Type II diabetes. Chapter four is divided into two segments first *Part one* presents a Western health intervention methodology framework Literature Review with a classification of intervention research models. *Part one* examines the theoretical framework for health intervention using the theorist Rothman, surveying if it is possible to combine knowledge traditions and to apply Rothman's theoretical framework in a contemporary Maaori setting. Then *Part two* adapts Rothman's 1994 theoretical health intervention model and converts the framework into an acceptable Maaori health intervention framework called the Tuupuna Knowledge Base Health Intervention. It reflects the lifestyle choices made at a time when Type II diabetes did not exist and this knowledge is contained in the health intervention primarily from a Tainuitanga perspective but with easily adaptable concepts.

Finally, Chapter five presents a Summary of this thesis, a Conclusion with questions answered that may have arisen from the thesis, and finally Recommendations.

Thus the logical research from which the conclusion for this thesis is drawn has been initially through an extensive literature review in tandem with traditional inherited knowledge provided from my late maternal grandmother and extensive Kiingitanga traditional knowledge made available to me that were unavailable to the public.

King Taawhiao *the second Maaori King* (n.d.), stated, “Ko Arekahanaraa tooku haaona kaha, Ko Keemureti tooku oko horoi, Ko Ngaaruawaahia tooku tuurangawaewae. Alexandra will be the symbol of my strength; Cambridge will be my washbowl, Ngaaruawaahia my standing place”. King Taawhiao was Pootatau Te Wherowhero I first born son but second born child.

Whakapapa:

Ko ahau teetehi a ngaa uri o Pootatau Te Wherowhero I, he Kiingi tuatahi. Ko te kaupapa o taaku koorero i teenei wa, he whakapapa. Me timata au ki a Te Rauangaanga Ngaati Mahuta Ariki. Ka moe a Te Rauangaanga kia Parengope II (tuarua) Ngaati Koura noo te kaawai ariki ia o Ngaati Mahuta, i heke iho I ngaa kaiaarahi a runga i a Tainui raaua ko Te Arawa. E whai ake nei te whakapapa noo ngaa mooteatea.

I moe a Pootatau kia Hinepau Hahau noo Ngaati Pukeko, ko raaua ngaa maatua a Irihapeti Te Peeti o Ngaati Mahuta. Ka moe a Irihapeti kia John Horton McKay noo Sydney, Ahatereiria. Tekau maa tahi a raaua tamariki: Ko Marian, to muri ko Annie, to muri ko Kate, to muri ko John, to muri ko Benjamin, to muri ko Henry, to muri ko Clara, whai ake ko Clara, ko Albert, ko Harriet, ko Maria ko te whakamutanga ko te potiki ko Mary taatou Ngaati Mahuta. Ko te tamaahine tuarua a Annie MacKay Ngaati Mahuta i moe kia William Hitchens Tukorehu Marshall Ngaati Pou Waikato. Ko raaua ngaa maatua o te tamaahine tuarua ko Katherine, ka moe a Katherine kia Mathew Gibb noo Albury New South Wales Ahatereiria. Ko raaua ngaa maatua a Alexandra te tamahine tuarua noo Churchill Rangiriri. I moe a Alexandra kia William Andrew Foster o Ngaati Pou noo Rangiriri Waikato. Ko raaua ngaa maatua o taaku maamaa ko Zillah Eileen Foster. Ka moe taaku maamaa ki taaku paapaa ko Raymond Robinson noo Parnell me Taupaki o Tamaki Makaurau. Ko Marie ahau, ko Simon taaku taane, ko Simon raaua ko Royston, raaua ko Celeste taaku tamariki. Ko Chester raaua ko Robinson raaua ko Warley taaku mokopuna.

Hoturoa o Te Tainui waka
 Hotu-hope
 Hotu-matapu
 Motai
 Ue
 Raka-maomao
 Kataki=Uruangi (Karaaapo waka)
 Tawao
 Turongo=Mahinarangi (Horouta waka)

Raukawa
 Rereahu
 Maniapoto
 Te Kawa-iri-rangi

Rereiao(Aotea)=Pikiao	Rungaterangi
Hekemaru(Arawa)=Heke-te-rangi(Mataatua)	Uruhina
Uerata	Te Kawa-iri-rangi II
Tapauae	Te Kanawa
Te Putu	Parengaope
Tawhia-ki-te-rangi	Rangiahora Pukeko=Rangimamao
Tuata	Te Kaaahurangi Hore=Takina
	Te Raunganga=Parengope II Tamamutu

(Tuwharetoa)=Hahau

Pootatau Te Wherowhero (Ngaati Mahuta)=Hinepau (Ngaati Pukeko)
(first born a daughter) Irihapeti Te Peeti=John Horton McKay (Scotland)
 (second daughter) Annie McKay = William Hitchens Tukeorehu Marshall (Ngaati Pou)
 (second daughter) Katherine Marshall=Mathew Gibb (Sydney)
 (second daughter) Alexandra Gibb=William Andrew Foster (Rangiriri/Ballance/Tararua)
 (first daughter) Zillah Eileen Foster=Raymond Robinson Nixon (Parnell/Taupaki)
(second daughter) Marie Ann Zillah=Simon William Benton (Scotland)
 (three children) Simon William Todd=Felicity(Sydney)/Royston Robinson Foster/Katie-Celeste Alexandra Marie
 (two children) Chester John Fairfax/Robinson Simon William (one child) Warley William Hepeeti

This visual is mu tuupuna Pootatau Te Wherowhero's personal tiki and has been copied from the *Tainui Maaori Trust Board Annual Report He Riipoata-A-Tau-(1998)* p. 15.



Pootatau Te Wherowhero I he Kiingi tuatahi the first Maaori King

This visual is from the *Tainui Maaori Trust Board Annual Report He Riipoata–A–Tau–* (1998) Pootatau Te Wherowhero (cover).



Kotahi te koowhao o te ngira, e kuhuna ai te miro maa,te miro pango, te miro whero. I muri, ka mau ki te aroha, ki te ture, me te whakapono.

There is but one eye of the needle through which the white, black and red threads must pass. After I am gone, hold fast to the love, to the law and to the faith.

Part one — The Historical

Origins of Tainuitanga as tangata whenua

i. Migration of the ancestral Tainui Waka

The Pacific Ocean covers at least one third of the globe's surface, where many Pacific Islands form part of what is known as Polynesia. The Polynesian people with a curiosity about their surrounding world developed a sophisticated science in navigation. This science was based on cloud formation, astronomy, the wind, ocean currents, the drifting vegetation with ocean swells and the movements of migratory birds. There was a group of Polynesian people from Raaiatea Island near Tahiti that were very curious about their surroundings but also needed to expand because of a growing population and limited resources. In short this situation was the catalyst for the development of new society that evolved from the migration of a number of waka from various Polynesian Islands around 1350 AD to the land now known as Aotearoa New Zealand.

The Tainui waka hapuu of Ngaati Mahuta oral history (n.d.) claims that a Polynesian explorer called Toi arrived in Aotearoa around 1150 AD not by chance but through a very well planned and navigated sea journey of exploration. Toi stayed for a short time and then returned to his home but carefully recorded the navigational route taken for future generations to journey. Then around 1325 AD the great Polynesian navigator Kupe journeyed by sea to the land known as Aotearoa in the waka named Aotearoa following Toi's route. After landing at Whakataane and living in the area for a short time he returned to home to what he called Hawaiiki. Although the name Hawaiiki is a mythical location it is also referred to as the island of Raaiatea near Tahiti for those people from the Tainui ancestral waka.

At Raaiatea Island a Tootara tree had been planted on the burial site of a child named Tainui and when the tree matured around 1349 AD it was selected to carve out a purpose built migratory waka that was also called Tainui. Because trees and death were (and are) tapu ceremonial incantations and prayers were performed before the commencement and throughout the construction of the Tainui. Two waka with similar design were also constructed at the same time, one called the Arawa and the other the Mataatua. These

three waka journeyed to Aotearoa together around 1350 AD following both Toi and Kupe's navigation pathway thus these three waka formed a special bond that still exists today. This union provided the three original Paramount Chiefs as the Arikitunga hierarchical basis for the tangata whenua Maaori society that evolved.

The Tootara tree for the Tainui waka was felled by Taikehu, Rakaiuru (Rakataura), Hoturoa, Whakatoa, Potiki and Rata; then eight experts or tohunga under the leadership of Hoturoa constructed it. Then Te Aoterangi, the Tainui's priest said that the hull was built up with the edition of sideboards fitted to one side as an outrigger, in the form of a smaller canoe, named Takere-aotea meaning a shelter from the waves. There were three masts and three sails to supplement the usual supply of paddles (Kelly, 1949, pp.35-49).

Tainui Oral History (n.d.) says that when the Tainui waka attempted to leave the sands of Raaiatea Island it was immediately hindered by rough seas as it tried to pass through the gap in the reef that surrounded Pikopiko-i-whiti lagoon. It was the season of Tatauruora, on the day known as Orongonui (28th day), with the corresponding moon phase Tama-tea, a time of constant gales and continuous bad weather at sea. Ngatoroirangi, the Chief who had command of the Tainui waka, chanted an ancient karakia to calm the sea so that the waka was able to make progress, and it soon reached open sea on the third attempt. This historical event of the Tainui leaving the homeland of Hawiiki is incorporated into the ancient Tainui tribal teachings providing an example of how turbulent waters can be navigated successfully by persistence.

The journey from Raaiatea Island was guided by the Tohunga Ngatoroirangi's expert knowledge of the seas and stars navigated but also using Toi and Kupe's knowledge. Many fish also surrounded and accompanied the waka and the journey was without serious incident, landing near Cape Runaway in the Bay of Plenty. The Tainui waka then traveled to Whangaparoa and to the Waitemata Harbour near Rangitoto Island.

The Tainui joined the Arawa waka in the Waitemata where they traveled together to the Bay of Plenty, back to Whitianga and then to the west side of the Hauraki Gulf and finally to the Taamaki River at Otahuhu where they separated. The Tainui waka was dragged across the portage between the Taamaki River and the Manukau Harbour assisted by the gods through karakia, and then traveled to Kawhia on the West Coast following the waterways and their tributaries of the Waikato and Waipa Rivers. The

Tainui waka was sixty-six feet long and this fact has been verified from measurements taken from the two limestone pillars at Maketu Bay, Kawhia, marking the final resting place of the Tainui waka and still visible.

Based on the theory of occupation, surviving evidence and both oral and written history, New Zealand has been occupied for at least 1,000 or even 2,000 years (King, 1997, p. 7).

To sum up, Ngaati Mahuta's oral history (n.d.) claim that the journey by the Polynesian people who settled in Aotearoa/New Zealand from approximately 1350 AD was very well planned with its crew well prepared. The ancestral waka voyage provided a basis for a traditional hapuu Maaori society that still exists today and linked through hapuu, and whaanau. Ngaati Mahuta hapuu takes a leading role in contemporary Maaoritanga because it was Mokotorea from Ngaati Mahuta who was the first man to sight the North Island on Kupe's historic voyage in the Aotearoa waka.

ii. Historical settlement background to New Zealand

Colon (1986) says that Captain Abel Janszoon Tasman did not set foot on the land in 1642 when he claimed discovery of both the North and South Islands but chartered the West Coast calling the area Staten Landt. Tasman believed this land might be joined to the Staten Landt near the southern tip of South America but when he realised it was an island he renamed it Nieuw Zeeland, after the Dutch province. The French and the Portuguese both claim the honour of discovering New Zealand.

In October 1769 Captain James Cook from the British Navy in the ship Endeavour sighted the East Coast of New Zealand calling it Poverty Bay. Cook circumnavigated the main islands and remained in New Zealand until mid 1770. On the 30 January 1770 he erected a flag post on the summit of a hill in Queen Charlotte Sound where he hoisted the Union Jack claiming formal possession in the name of His Majesty King George III.

In 1792 Captain Raven the master of the Briannia left a sealing gang at Luncheon Cove on Anchor Island at Dusky Sound (near Queen Charlotte Sound in the Marlborough area) becoming the first European to set foot on New Zealand. In fact they were the first temporary residents to New Zealand followed in the 1800s by the whalers' that also settled in this area. Then in 1814 Samuel Marsden, the Chaplain for New South Wales,

established the first Missionary settlement in the Bay of Islands initiating a close relationship between two countries (p. 7).

Tainui oral history (n.d.) claims that when the European arrived a hapuu structure was strictly hierarchical with three distinct and separate social groups. Society was a collective social structure linked to an ancestor's whakapapa that determined an individual's identity within the larger sociological structure. An association with a particular sacred mountain, a river (or alternatively a sea, lake or waterway); a hapuu, a marae (known as one's tuurangawaewae or *home turf*), and a whaanau, further defined a person's identity within the structure. Tikanga ensured security and survival that was established by each hapuu defined as kawa and led by a Chief. In a traditional Maaori society the Chief (could be male or female) looked after the people connected to that hapuu for their benefit and betterment. The survival and development of the hapuu was rewarded by the people through what was called 'mana'. But an individual could also contribute to the well being of the collective hapuu, for example the male warrior in battle, or acquired skill and knowledge. As a result that individual's mana developed and added any inherited mana from whakapapa.

It was the power through the mana of the hierarchical Chief that the hapuu respected that enabled the collective ownership of land (and other assets) to be controlled by the Chief. In traditional times the hapuu owned the land collectively but with the *Hapuu Chief* controlling the ownership like a modern Chief Executive Officer where the role (usually a male but not always and usually inherited) could be challenged but with the outcome collectively decided by all the hapuu members. Then co-operatively the means of production was through the existing permanent whaanau and hapuu groups and networks, usually with slaves undertaking the menial and labour intensive work.

iii. Traditional Maaoritanga Society

First the dominant group in the *top-down* model came from the high ranked families and they were well educated and provided the visionary strategy for the collective hapuu. This Arikitanga group were considered tapu or *sacred* and were responsible for the survival of the ancient Maaoritanga knowledge maintained through karakia, waiata and

whakataukii. The second or middle group known as ‘the commoner’s’ were devoted to the tasks of hapuu protection and growth, through the warrior’s expertise. Other middle group members preserved their history through highly developed visual arts of carving; tattoo and weaving with the hapuu knowledge entrenched. As the tangata whenua tribal-hapuu Maaori society developed and competition for land and food resources evolved captured people became slaves, as the third and lowest ranked undertaking the menial labouring tasks.

Community life required several buildings for each family and activities were quite separate with rules known as noa or unrestricted and tapu or restricted. There were buildings for sleeping and were very well built to keep out the cold where the whole family slept together. The cooking facilities had open end walls to let out the smoke, a shallow oven pit and pile of cooking stones. The storage houses were well elevated and constructed on poles to enable ventilation and safety from scavengers or other rival hapuu. Hapuu boundaries were precisely defined usually by natural water-course but as the population increased and natural waterways changed course arguments and disputes over territory eventuated.

Collective Capitalist Economic Model

The traditional Maaori society was very effective from an economic perspective and I describe this as a Collective Capitalist economic model. It was very effective both within the groups and across them through strong kinship unity and solidarity of purpose strengthened by a spiritual union of togetherness. Indeed it was this type of economic model that the Tainui waka hapuu utilised and developed to trade with the European Settler in particular from 1830 until the early 1860s when their land was confiscated.

- All the hapuu are included through the established and integrated network groups with a role and a place for everyone.
- All hapuu members are very well educated especially in their history.
- All hapuu members are fully aware of the long-term strategic vision and share and understand of the overall strategy communicated from the Chief through Hui.
- All hapuu members support and share the collective identity and belonging.

- All leaders and their periphery of advisers are selected for their mana through their presence, with wisdom and visionary prophecy.¹

Rout (1926) comments that there was communal ownership of food, and communal management and distribution of supplies. The Maaori had certain personal rights in the produce of their own allotments, but the community had a prior claim to the whole of the food supply. By this system unlucky fishers or hunters or cultivators were not penalised, nor the unlucky ones unduly rewarded; the whole community shared fortunes and misfortunes. A loss to one was a loss to all. But the individual benefited sufficiently to enable him to feel a zest in fishing, hunting, gardening, and the possession of a private share enabled the community to impose penalties on the individual for social misconduct. Thus the community flourished, individual endeavour was stimulated, and good social order maintained (p. 30).

iv. Identity unique to Maaoritanga

Tainui oral history (n.d.) says that the most important aspect of Maaoritanga is the people. Those that are deceased are known as tuupuna and those living are linked to the tuupuna through their whakapapa. In the traditional society a hapuu kuia was able to judge the character of babies and young children by physical appearance, gestures and attitude through the wairua connection. The characteristics displayed in conjunction with the whakapapa determined what role a new born would play within the hapuu society.

An integral part of traditional Maaori society was recording the history, significant occurrences and what made one hapuu or whaanau different from the rest was through waiata, karakia, carvings and weavings. These differences or uniqueness known as traditions or customs were always recorded (and any changes were also recorded) through waiata, karakia, carvings and weavings to ensure subsequent generation understood what previous generations were about.

In fact for tangata whenua Maaori all knowledge and history were preserved orally in the traditional way through a variety of methods or ways and each having its own whakapapa and mythology, connected to a particular waka or iwi, a hapuu or whaanau. Such as:

- The haka is a fierce or aggressive rhythmical dance.

- The waiata that had a whakapapa of its own originally through nga mooteatea being a traditional chant consisting of only three sounds and sung as a lament. Specific waiata were written and sung for example:
- the oriori a lullaby or a bed-time chant
- the pakiwaitara is a fairy story
- the himene is a hymn derived from the English language
- the patere is a modern rap or rhythmical song.

Maaori carvings were also used as a written language where the hapuu history with ancestral whakapapa connection depicted in elaborate and ornate carvings that adorned buildings. Carving was usually done with adzes having greenstone blades, for more intricate work fragments of obsidian or volcanic glass was also used. The native timbers especially the Tootara tree with its straight grained durable wood that was relatively easy to work with stone tools, bone and stone were also used but more for weapons or tools. Wood carving was most common on door lintels, the exterior whare apex, waka or canoe prows, and the working of stone or bone produced beautiful ornaments such as necklaces, pendants, earrings and the tiki, a type of neck pendant.

The tattoo or moko was a feature of Maaori art that illustrated the ranking of the person as well as their whakapapa and history. Men were tattooed primarily on the face and women on the chin and lips; probably the most elaborate anywhere in the world, providing a personal identity within Maaori society. A straight blade was used and patterns revealed both positive and negative aspects. Towards the end of the nineteenth century only women were tattooed and darning needles were used. Tattoos were first done when the girl or boy reached puberty and Warriors later received further tattoos, usually on the face and buttocks.

Whaanau, hapuu and iwi were bound by the common thread of whakapapa that linked the individual to the wider outside world and guided his or her behaviour within that world. It was the basis of group affiliation and therefore fundamental to social organisation. It was an important determinant in customary land tenure and therefore the use of tribal resources (O'Reagan, 2001, p. 50).

Thus the whakapapa set out one's role and place within a hierarchical society, therefore acting as a determining factor in leadership. As a symbol of identity whakapapa was unsurpassed. It told a person who they were and where they came from, clearly establishing their relationship with those around them and the world in which they lived. Without this knowledge in today's contemporary society an individual will usually experience a sense of a *loss of identity* unable to live in harmony holistically with the environment, manifested in poor health and a lack of well-being, often compensated by alcohol, smoking, food addiction and drug addiction. Therefore education of the traditional components that provide the individual's identity are absolutely essential even today because the spiritual connection of the wairua through the spiritual bond of the tuupuna.

History preserved as taonga knowledge

The Tohunga was pivotal in ensuring knowledge was handed from one generation to the next especially the sacred knowledge that had also been gained from inheritance where he or she was required to practise it throughout their active life. In a metaphysical sense, sacred knowledge was enshrined in stones known as whatukura and which were contained in the *baskets of knowledge*. There are three baskets of knowledge the first containing te kete-aronui as the sum of beneficial knowledge; the second te kete-tuauri as the full range of ritual and inaction and the third te kete-tuatea as the knowledge of evil and black magic.

The three baskets of knowledge were brought to earth by the god of Taane, who was chosen to ascend in quest for the sacred lore. He had the foresight to select a suitable site for the first earthly *Whare Kura* in which the baskets were to be enshrined. He then ascended to Rangi-tamaku, the second underworld, where he found a pattern for the whare wananga, which he copied on his return to earth. Taane ascended on swaging ropes that were the rising whirlwinds of Tawhiri-matea. Whiro, who also aspired to the honour, followed his brother by a more circuitous route along the fringes of the several over worlds. On his arrival at Rangi-tamaku he learnt that Taane was in the next over world and sent his *hordes* to attack him. It was a combined operation of mosquitoes, sand flies, owls, bats, and other nocturnal creatures. It would have gone badly with Taane if Tawhiri-matea's whirlwinds had not scattered them in the far corners of heaven. It was not clear how far Taane had to travel to reach the baskets and the stones in which the sacred knowledge was enshrined. But the mana of the first of these stones, the Whatukura-a-Tangaroa,

was subsequently conveyed to other stories in the many Whare Kura of Aotearoa, where they were used to seal the teaching of the tohunga, impressing the teaching on the minds of their pupils and adding mana to the recipients (Reid, 1997, p. 10).

v. Colonisation from the Treaty of Waitangi 1840

The arrival of European whalers, sealers and early traders' from 1810 enabled many hapuu Maaori to successfully trade the native flax called Harakeke as a raw material for the lucrative rope trade required for sailing ships. The hapuu quickly adapted to the technological techniques and equipment introduced by the European trader's and early settlers' in 1825, primarily for farming. Hapuu from the Tainui waka developed secondary industry from the successful farming and agricultural activities, for example flourmills providing the rapidly growing Auckland settlement. They acquired numerous assets including trading ships simultaneously developing primary agriculture through dairy and horticultural production on their -collectively owned land, handed down from successive generations.

Tainui oral history (n.d.) claims that in an attempt to protect their ancestral tribal lands tribal-hapuu formed the United Tribes Confederation of Aotearoa signing the Declaration of Independence in 1835 (created under the auspices of the respected British resident James Busby). Over a five-year period the influential hapuu Chiefs who possessed the mana, power and authority of the time signed the Declaration of Independence. Equally important was the *genuine unity* of Maaori supporting the principles of the Declaration, but the position was neither understood nor respected by the Imperial British colonists.

Pootatau Te Wherowhero (as the future first Maaori King) did not sign the Declaration of Independence until 22 July 1839 signing at Hauraki. His reluctance to sign was in protection of his mana and an expression of suspicion he was not prepared to cede his power for the inevitable demand of the rich fertile Kiingitanga land desired by the *white settler's* for pastoral farming. The Kiingitanga was established in the 1850s by the thirty-three hapuu from the Tainui waka in an attempt to preserve their fertile land that was highly sought after by the European Settler. Pootatau Te Wherowhero was crowned as the first King and leader of the Kiingitanga in 1858.

The Treaty of Waitangi Te Tiriti o Waitangi

As a result of the British Empire expansion policy through colonisation by Maaori assimilation, two treaty documents were signed in 1840, one in English called the Treaty of Waitangi (TOW), and one in Maaori called te Tiriti o Waitangi (TOW), the latter drafted by the Missionaries. In fact the most influential Chiefs with the greatest mana in Maaori society did not sign either of these two documents. However about five hundred *wellborn* Chiefs with mana did sign the Maaori version, but significantly less signed the English version, and they had considerably less mana.

In brief the English version provided that all hapuu cede to her Majesty the Queen of England absolutely and without reservation simultaneously all the rights and powers of sovereignty. In return the Crown confirmed and guaranteed to the Chiefs the full, exclusive, and undisturbed possession of their lands and estates, forest, fisheries, and other properties that they may collectively or individually possess. Finally Maaori were awarded all the rights and protection of British subjects. However the Tiriti or Maaori version was drafted by Missionaries and was not able to be translated literally to have the same meaning as the English version. In short Maaori agreed to cede the kawanatanga or governance of their lands, but not sovereignty, *not tino rangatiratanga* or the full chieftainship of their lands, their villages and all their taonga. In fact kawanatanga is not a usual Maaori word but was invented by the Missionaries when drafting the Maaori version meaning *government*.

In common with other indigenous peoples, Maaori have placed increasing importance on greater autonomy and self-determination, *tino-rangatiratanga*. Although this concept can be interpreted in different ways, ranging from total independence and a separate nation state to simply a greater say in decision making at national and local levels; there is a measure of agreement that at the very least self-determination is about the right of Maaori people to exercise authority in the development and control of resources that they own or are supposed to own and, to interact with the Crown according to their own needs and inclinations. Self-determination is about taking control of those resources and activities that impact on Maaori lives – the management of land, the delivery of services, the generation of wealth, and the development of human capital – and doing so in a way that strengthens personal and collective identity (Durie, 2001, p. 256).

Graham (1995) comments that tino rangatiratanga means the right of Maaori to run their own structures and their own internal structures without interference; as far as can reasonably be done in a modern society where some constraints might be required in the national interest. The kaitiaki aspects of rangatiratanga need not frighten people as they are concepts of trusteeship which most people would have in common with Maaori. It is more pronounced in indigenous people (p. 119).

It should be noted that the two most influential people of the time were the Ariki's Te Heuheu I from Ngaati Tuuwharetoa hapuu of the Arawa waka and Pootatau Te Wherowhero I from Ngaati Mahuta hapuu of the Tainui waka did not sign the TOW.

vi. The unratified Treaty not respected

Tainui Maaori Trust Board Postal Referendum (1995) says that the exceptional astute leader Pootatau Te Wherowhero I, saw the flaws in the TOW and the *white settlers* "greed and need for more land. The TOW required voluntary sale of land to the Crown, when land sales were resisted, this led to the shortage of land for settlement. This meant that land had to be acquired by other means. A means was found in 'confiscation'. To confiscate Maaori land the Governor needed to classify them as 'rebels'. On rumour that Auckland was going to be attacked, the Crown passed the legislation of the New Zealand Settlements Act 1863 and the Suppression of Rebellion Act 1863 to classify the Kiingitanga as *rebels*, violating the TOW. As expected the Kiingitanga aggressively defending their land became the victims of British law, allowing the confiscation of 1.2 million acres of the country's best agricultural land. The Waikato River was also confiscated through the same process of the New Zealand Settlements Act 1863 and the Suppression Rebellion Act 1863. The Kiingitanga's history clearly signifies that the Waikato from the 1830s to the 1850s was a progressive period of economic development, and the contributing factor was the fertility of the valleys, in particular those South Auckland lands that were in close proximity to the fast sprouting town of Auckland (p. 5).

Tainui Maaori Trust Board Postal Referendum (1995) states, "We have continually been told it was the TOW of 1840 that gave the Queen of England the rights of sovereignty over Aotearoa" (p. 5).

Waikato rejected an initial compensation offer as inadequate and an agreement with the government was not made until 1946. Between 1944 and 1949 compensation was paid to a number of tribal trust boards for lands confiscated or unfairly purchased in the past. Sometimes compensation was paid in a lump sum, sometimes in annual payments either for a fixed period or in perpetuity (Orange, 1996, p. 71).

Webster (1998) comments that production of flour, flax and timber was substantial even in the remote districts by 1847. This produce was transported to Auckland by canoes but also in 45 vessels ranging from 9 to 25 tons owned by Maaori, some of which were used to trade across the Tasman Sea to Australia. It was the confiscation of Maaori land taken from 1865 then resold to the white settler farmers that was the foundation for the *Sim Commission* that was set up in 1925 to inquire into the confiscation of Maaori land in Taranaki and Waikato. Its findings in 1927 were that the government had been at fault in 1860 in taking up arms over a dispute concerning title to land and forcing the Maaori to defend their possessions. The report also said that Maaori were not rebels and that the Waikato War of 1865 had grown out of the Taranaki war of 1861 (p. 15).

Finally, almost a century and a half since its first beginnings, the Kiingitanga is a continuing force in New Zealand society, finally securing redress from the government, through positive leadership and mana. On 3 November 1995 Queen Elizabeth II signed into law the Waikato Tainui Raupatu Claims Settlement Bill (1994), formalised a settlement between the Government and Tainui. The Crown reparations included some land, funds to the value of \$170 million and a formal apology for the confiscation's and devastation, caused by the British military warfare in 1863 and the Waikato Raupatu of 1865; through New Zealand legislation known as the Waikato Tainui Raupatu Settlement Act 1995.

vii. European Westminster Constitutional status

New Zealand's Constitution is not contained in a single document like the United States of America's (US) Constitution, but the following legislation has established a type of constitution through evolution with each law contributing to form it. These include:

- The Bill of Rights 1688 the basis of the rights of Parliament.

- The Habeas Corpus Act 1689 protects unreasonably imprisonment.
- The Treaty of Waitangi 1840 (Te Tiriti o Waitangi 1840 the Maori version).
- The New Zealand Constitutions Act 1846.
- The Constitution Act 1852 created New Zealand's Parliament.
- The Legislature Act 1908 created Parliamentary powers and privileges.
- The Judicature Act 1908 set up Courts.
- The Acts Interpretation Act 1924 established how statute law is to be read.
- The Electoral Act 1956 Members of Parliament forms the election procedure.
- The Local Government Act 1976 to empower local body By-laws.

The New Zealand Constitutions Act 1846 was devised by an Act of the Imperial Parliament, but those parts providing for a representative government never became operative. The Act provided for the division of the country into two provinces, New Ulster and New Munster, each led by a lieutenant governor and nominated legislative council. Consequently the Constitution Act 1852 was largely based on the recommendations by the Governor Sir George Grey, establishing a central legislature called the General Assembly with the power to legislate for the 'peace, order and good government of New Zealand'. It consisted of a Governor, Legislative Council appointed by the Governor, and an elected House of Representatives. When New Zealand's first Parliament met in 1854 as the House of Representatives they passed a motion to establish ministerial responsibility for the conduct and proceedings of the legislative and executive. The Colonial Office sent a new Governor, Sir Thomas Gore Browne in 1855, with responsible government introduced in 1856.

As a result New Zealand became a double-tiered parliamentary structure with the Legislative Chamber as second chamber of Parliament from 1852 until 1950 when it was abolished, with Council members as current government appointees. Strict voter eligibility for citizen's existed making entry to Parliament selective as follows:

- Male householders over the age of 21 occupying a dwelling with an annual value of ten pounds if in a town of five pounds if in the country.
- Male householders over the age of 21 owning a freehold estate with an annual value of fifty pounds.

- Male householders over the age of 21 with leasehold estate with an annual value of ten pounds if in a town or five pounds if in the country.
- All women and most Maaori were excluded (as land was communally owned).

viii. Treaty relating to Article II Fisheries

The constitutional argument of the TOW *Article II* provisions and the lack of compliance and respect for the protection of reserved taonga such as lands, forests and fisheries remain questionable. The TOW English version was not ratified by the British government but the intention to allow hapuu Maaori to have undisturbed access to taonga and for the purposes of this thesis the native long finned eel known as tuna is classified in *Article II* as both a taonga and fisheries.

Sometimes a battle for a fishery right would go on for years, such as in the Wairarapa Lakes. The two lakes were a very important source of food to local Maaori. Eels were caught in large numbers at the shingle bar which dammed the seaward end of the lower lake. Dried eels were given away as gifts or were exchanged with other tribes for preserved birds and shellfish. In 1853 the government purchased some adjacent land and recognised Maaori fishing rights. But in the 1860s local settlers pressured the government to open the shingle bar to the lands surrounding the lakes would not be flooded. Piripi Te Maari, who himself was a successful farmer in the area, together with others appealed to the government to uphold the original agreement. Settlers wanted the government to buy the lakes and quash Maaori rights. The struggle continued through the 1870s, 1880s and 1890s. Te Maari agreed to a compromise in 1886: the lake's bar would be opened ten months of the year and only closed during the height of the fishing season in February and March. The Raamahanga River Board objected and twice forced the bar to open. Te Maari petitioned the government twice, secured a commission of enquiry (which was non-committal), took a case to the Court of Appeal (it was dismissed), threatened to go to the Privy Council. Then finally in 1895, secured a favourable decision from the government that the lakes' owners should receive compensation for lost rights, granting the owners land in distant Mangakino (Orange, 1996, p.87).

The Law Commission (1989) said that in 1868 the Government established several Maaori fishing reserves in Canterbury to honour a promise made in the Kemp Deed when land was purchased from Kaai (Ngaai) Tahu. However, the effectiveness of the reserves

was limited by the Government's insistence that eel weirs and fisheries should not interfere with the general settlement of the land (p. 9).

The Waitangi Tribunal (1988) *Ngai Tahu Report* comments that in 1873 the Timber Floating Act was passed over protests from several Maaori Members of Parliament that it would permit damage to Maaori eel weirs. Nationally, ten eel fisheries protests were registered from 1881 to 1895. The main concerns were:

- reserving eel fishing areas
- protecting traditional fishing rights and eel weirs
- the return of various lakes and rivers to Maaori ownership (p. 45).

For about twenty years after 1840 fishing rights, confirmed by the TOW were given some recognition by the government, although there were no set policies. People writing about Maaori life before and after 1840 talked of the importance of fisheries of all kinds to the Maaori, both for food and for trade. Certain fishing grounds were often exclusively used by particular hapuu. Others could use them, perhaps, but only with permission. Sometimes rights could be transferred.

On the West Coast between high and low water marks there exists a bed of toheroa that is highly valued by Maaori. At present, the value of the fishery as food has been discovered by the Europeans, and large quantities are carried away for the use of the workman on the European stations (William Wainson, The Resident Magistrate at Kaipara, north of Auckland, personal letter to Attorney General, 1855).

Orange (1996) comments that Ngaati Whatua, the local tribe, was seeking a rental to be paid for such use; but the Europeans were claiming the land below high water mark was the property of the Crown. William Swainson was appointed by Governor Hobson to adjudicate land sales but was not too sure how to handle this matter. In 1872 a ruling by another attorney general agreed with the Europeans' claim. It was one step of many which gradually whittled away recognition of Maaori fishing rights. By 1910 the Crown was claiming that it had absolute ownership of beds of lakes too. The Maaori people guarded fishing grounds with as much care as they did their land. But the supplies of fish were expensive in New Zealand that it was only as settlement expanded that tension

between Maaori and Paakehaa developed. Some acknowledgement of Maaori rights was made under an 1877 Fisheries Act which dealt with salt and fresh water fisheries and states the following (p. 89).

Nothing in this Act contained shall be deemed to repeal, alter, or affect any of the provisions of the TOW, or to take away, annul or abridge any of the rights of the aboriginal natives to any fisheries secured by them thereunder. In practice it did not make Maaori fishing rights secure under law. Some special enactment or provision was needed before Maaori rights could be asserted (Orange, 1996, p. 91).

ix. The ‘Sealord’s’ Deal

Tainui oral history (n.d.) says that the TOW’s of 1840 were supposed to establish equality and partnership for all Maaori hapuu by legitimating the collective social structure through the specific *Articles*. It should be noted that Tainui hapuu influential and high ranked chiefs did not sign either version of TOW. As I have noted Pootatau Te Wherowhero I saw the flaws in the TOW and the *white settlers’* greed and need for more land. And the TOW required voluntary sale of land to the Crown.

The Muriwhenua hapuu (Far North) and Kaai (Ngaai) Tahu hapuu (South Island) lodged a Fisheries Claim to the Treaty of Waitangi Claims Tribunal in 1986, with an interim fisheries settlement establishing the Maaori Fisheries Commission in 1989. Assets included 60,000 tonnes of fishing quota, 68 per cent interest in Moana Pacific Fisheries Limited, about \$50 million cash with tribal-hapuu Maaori organisations and the Crown signing a final deal known as the ‘Sealord’s’ Deal, with more quotas, and a half share in ‘Sealord’s’ products.

Then in 1992 the Maaori Fisheries Commission was renamed Treaty of Waitangi Fisheries Commission being responsible for ensuring allocation of assets that benefit all Maaori with the distribution through traditional tribal-hapuu Maaori organisations.

- In 1995 two Urban Authorities challenged the Treaty of Waitangi Tribunal’s *right to rule on allocation*.
- In 1995 the New Zealand High Court favours the Tribunal’s right.
- In 1996 the Urban Authorities took the decision to the Court of Appeal.

- The Appeal Court upheld the decision but rules that *City-based* Maaori with non-tribal links can receive a share of fisheries settlement assets.
- Then the Urban Authorities took the Appeal Court Decision to the Privy Council seeking clarity on – ‘whether allocation must be to *Iwi* and if that means *only traditional tribes*’.
- The Privy Council referred it back to the New Zealand Courts a ‘*for full debate*’.
- In 1997 further action is lodged with the Auckland High Court by individuals alleging the Fisheries Commission is biased.
- In 1998 High Court rules defining *Iwi* as the traditional tribal-hapuu organisations.
- In August 2000 the Maaori Affairs Minister, Parekura Horomia, restructured the Fisheries Commission appointing more prominent Urban Maaori personnel (as well as the existing tribal hapuu tangata whenua Maaori) in an attempt to settle the existing Fisheries Waitangi Claim.
- In December 2000 Nissui (the Japanese company involved in food processing, pharmaceuticals and fishing and with a \$10 billion annual turnover purchased a quarter of ‘Sealord’s’ in a joint venture with the Fishing Commission from Brierley’s (BIL). With all ‘Sealord’s’ fishing quota as 23 per cent of the country’s total quota remaining in the Commissions hands. Nissui was chosen to partner the Commission because it brings opportunities for growth in overseas market, smart technology and an interest in New Zealand.
- In 2001 the Privy Council upheld the decision on the definition of allocation and meaning of the term *Iwi* and that it is not a traditional Maaori word.
- In 2002 the Fisheries Commission agrees with tribal-hapuu/Urban Authority representatives on how the ‘Sealord’s’ Deal should be divided to benefit all Maaori.
- In 2003 the ‘Sealord’s’ Deal is overshadowed by the Foreshore and Seabed Ownership Issue that divided many Maaori even further from resolution. It also had the effect of Maaori joining more as a united group to prevent further loss of assets and ownership status.
- In September 2004 an amicable settlement is reached and a settlement made.

Since 1986, the most commercially important marine species have been fished under the Quota Management System, in which catch limits for each stock are set by Government and allocated to commercial fisheries through individual quota.

A Quota Management System provides for the sustainability of fisheries resources. In 1996 the Fisheries Act was introduced to implement a system for ensuring sustainability of New Zealand's fishing resources, aiming to provide for the use, conservation, enhancement and development of fisheries resources.

The intention was to ensure provision for people's social, economic and cultural well-being while protecting the resources for future generations and minimising negative environmental impacts from commercial fishing through "quotas".

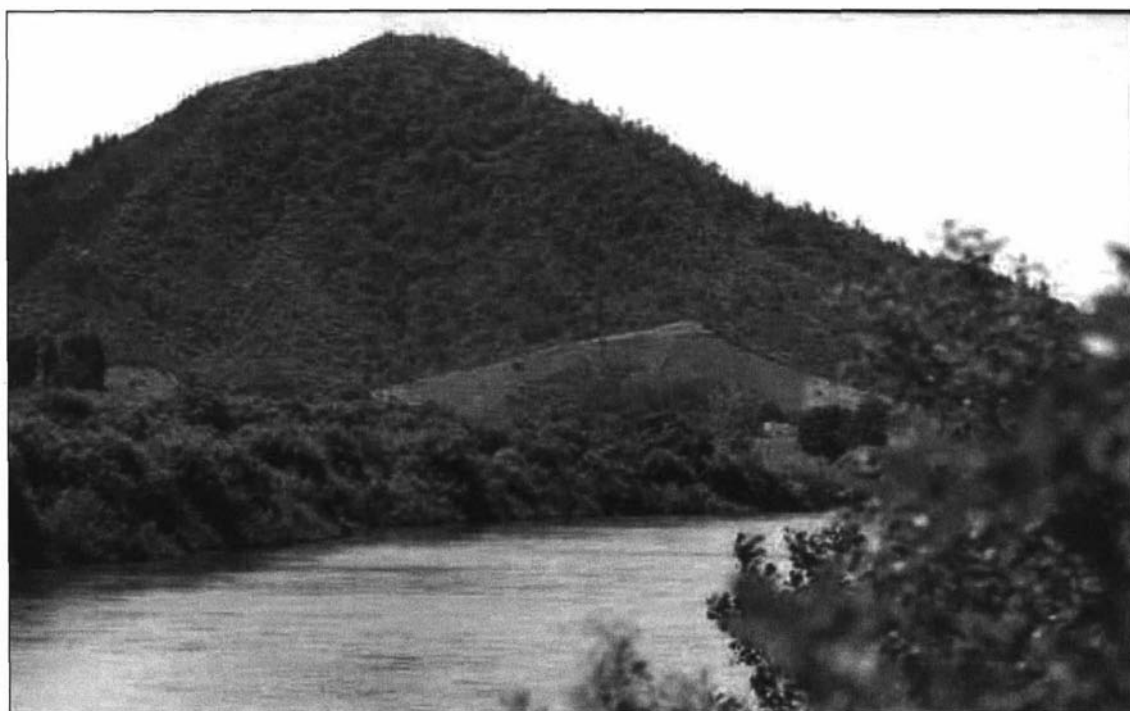
Under this system, the Minister of Fisheries can put in place fishing quotas for specific stock. Also a Total Allowable Catch is set for species managed under the Quota Management System (covering commercial, recreational and traditional Maaori fishing activity). This is reviewed annually for each species covered under by the system.

From this, a Total Allowable Commercial Catch is established and commercial fishers acquire the right to harvest fish by purchasing or leasing Individual Transferable Quotas that increase or decrease in response to the health of the fishery (The Ministry of The Environment, 1997, p. 9).

Conclusion

In conclusion, the European settlement and subsequent colonisation of New Zealand produced many negative aspects and for the Tainui-Waikato hapuu because much of their land was confiscated. It was immediately following the passing of the Kiingitanga leader Pootatau Te Wherowhero I in 1860 that the Waikato hapuu were invaded by the British Army and then their land confiscated through legislation. It was the mana of Pootatau Te Wherowhero I together with the personal relationship that he had with Governor Grey as the Governor General to New Zealand that prior to his death prevented any invasion. As a result and to ensure survival many of the Waikato hapuu took refuge in the land owned by other Tainui hapuu in particular Ngaati Maniapoto around Te Kuiti.

The people from the Kiingitanga led by Pootatau Te Wherowhero's eldest son Taawhiao gathered together and ensured that the traditional knowledge was kept intact. As a result most of the knowledge survived and still remains intact forming the platform for the Kiingitanga (that has not only survived to this day but has developed into a philosophy).



***Ki aku tuupuna, mai i te poo ki te aoturoa,
Rangi Matua, Rangi Tiipuna, Rangi Whakahiringa Matua,
Papa Ahurewa, Papa Whenua, Papa Aahuru moowai.***

The sky has always been there, he is my inspiration,
the land has always been there, she nurtures me.

Part two — Diabetes the Aetiology

Type II diabetes mellitus

Two types of diabetes mellitus have been distinguished and they are identified as *juvenile-onset* known as Type I (develops in people younger than age 20) and *maturity-onset diabetes* known as Type II (more common and representing more than 90 percent of all cases and occurring in people who are over 40 years and overweight). Type II is non-insulin dependent diabetes caused by a resistance of the body's cells to insulin and a comparative insulin shortage. Diabetes damages the body's tissues and organs responsible for heart disease, kidney failure, lower limb amputation, and a risk factor for strokes and is the leading cause of blindness.

i. The descriptive through a Literature Review

Pyke (1999) reports that in the fourth century AD Indian scholars described the clinical features of diabetes and noted that ants clustered around the urine of diabetics. Similar observations about sweet urine were made in China in the seventh century AD by Chen Chuan and later by Avicenna an Arab physician of the eleventh century. An English physician Thomas Willis rediscovered the sweetness of diabetic urine in 1674 and was the first to use the Latin word *mellitus* (honeyed). A hundred years later another English doctor, Mathew Dobson, also identified sugar in the urine of diabetics but he also made the crucial observation of an excess of sugar in the blood.

Diabetes was rampant during the 15th, 16th and 17th centuries in the middle classes of the northern European countries where diets consisted of many courses of roast meats dripping with fat, rich sugary pastries and plenty of butter and cream, though lacking coarse red or green leafy vegetables. Two schools of thought then emerged: one believed in replacing the sugar lost in the urine and the other thought it best to restrict the intake of carbohydrates. None of the physicians of those times knew what they were treating and they believed diabetes was a disease of the blood, kidney, liver or stomach or a combination of these. Eating as little as possible seems to have been the most effective therapy with the French physician Bouchardat noting that the limited availability of food in Paris during the Franco-Prussian War of 1870-71 resulted in a reduction in sugar in the

urine of his diabetic patients. Medical scientists slowly homed in on what might be causing diabetes. The liver remained the chief suspect, then in the nineteenth century, scientist and medico, Frenchman Claude Bernard discovered that the liver stored glycogen and secreted a sugary substance into the blood. He assumed an excess of this secretion caused diabetes (p. 14).

Diabetes mellitus is caused by disturbances in the metabolic regulatory systems responsible for the storage and utilization of the chemical energy released from food. It is a disease of raised blood glucose or *sugar* where the principal product of carbohydrate digestion and the principal circulating sugar is *glucose* insulin a hormone produced by the pancreas controls the level of blood sugar required for the body. An absolute or relative deficiency of insulin results in a number of clinical symptoms referred to as diabetes mellitus. Diabetes was first recognised as a disease by Demetrius of Apameia in the third century BC and described in the Ebers Papyrus from Egypt, which dates from 1550 BC. Though his writings have been lost, the Byzantine physician Caelius Aurelianus (fifth and sixth century AD) cites him as using the name diabetes to identify a form of dropsy without odema in which all of an excessive water intake is excreted (Rudnicka and Birch, 2000, p. 1).

van Urk, Duin, and Sutcliffe (1992) say that although the symptoms of diabetes had been known for thousands of years, the first diagnostic description of the disease (then invariably fatal) was made in the mid seventeenth century. Thomas Willis, personal physician to Charles II, advised colleagues: "Taste thy patient's urine. If it be sweet like honey, he will waste away, grow weak, fall into sleep and die". In about 1775, Matthew Dobson found sugar not only in the urine but also in the blood, thus suggesting that diabetes was not a disease of the kidneys but one of *metabolism*. A century later, Richard Bright, Queen Victoria's physician noticed that the pancreas of patients who had died of diabetes often contained small crystals (calculi), indicating that this organ was somehow involved. But it was not until Minkowsky and von Mering presented research in 1889 showing total pancreatectomy produced diabetes mellitus (p. 104).

van Urk et al. (1992) argues that earlier in the nineteenth century, the physiologist Paul Langerhans had described distinct clusters of tissues scattered throughout the pancreas. In 1901, Eugene Opie of John Hopkins, Baltimore, showed that in diabetes these islets of Langerhans partly or completely degenerated. Following the 1902 pancreas research

work of William Bayliss and his brother-in-law Ernest Starling scientists realised that diabetes must be a hormone-deficiency disease. The race was on to extract and isolate the active substance produced by the islets of Langerhans, a substance which Edward Scafer dubbed 'insuline' from the Latin insula ('island').

In 1921 a Canadian orthopedic surgeon Frederick Banting (awarded the 1923 Nobel Prize in medicine for the discovery) and Charles Best presented a theory published in the American Journal of Physiology in 1922. To experiment they injected themselves with extracted insulin from a large number of immature pancreases and then at the General Hospital, Toronto on 11 January 1922, they gave injections to 14 year old Leonard Thompson, who was dying of diabetes. Almost immediately his blood sugar fell, within days he was out of bed; and within weeks, he was home and well, although dependent on insulin injections. When Banting and Best's insulin began to produce toxic reactions, their mentor and teacher Professor MacLeod turned to a talented biochemist, James Collip, for help. In 1923, Collip devised a method of further purifying the extract and it was this purified insulin that made the control of diabetes (Type I) possible.

Type II is a completely different illness than Type I diabetes (also known as juvenile or insulin-dependent diabetes or IDDM), an auto-immune disease (relating to an immune reaction developing in response to antigens from the person's own tissues). Since Type II diabetes is a disease of insulin resistance, rather than no insulin, it is usually managed through diet and exercise, without insulin injections. For this reason, Type II diabetes was also known as non-insulin-dependent diabetes (NIDDM) and was officially labeled as Type I and Type II in 1979. Type II diabetes cannot turn into Type I but when someone with Type II diabetes who does actually require insulin this is referred to as – insulin – requiring Type II diabetes. In fact about one-third of all people with Type II diabetes will eventually need insulin therapy. Then the high blood sugar that results from insulin resistance can lead to other diseases as I have previously noted, including heart disease, stroke, and periphery vascular disease where the blood does not flow properly to other part of the body and they can become gangrene. The goal in managing Type II diabetes is to control the blood sugar levels and weight through diet and exercise and to prevent long-term complications of the disease. These strategies will assist with weight loss (if

required) as well as distribute an even amount of calories to the body throughout the day. Exercise makes insulin much more available to the cells, while the muscles use sugar as a fuel (p. 105).

Type II diabetes, is the most common type of diabetes, and is also one of the most prevalent chronic diseases around. World-wide, more than 150 million suffer from the disease; the International Diabetes Federation projects that this population will double globally by the year 2025 (Ford-Martin & Blumer, 2004, p. 21).

Ford-Martin & Blumer (2004) then comment that while weight is a major risk factor for Type II diabetes, ethnic background, family history, and certain components of your health profile also play an important role. They say that the known risk factors include:

- being overweight or obese
- family history of diabetes
- low HDL cholesterol (less than 35mg/dl, or 1.9 mmol/L) and high triglycerides (higher than 250 mg/dl)
- high blood pressure (consistent reading of 140/90 mmHg or higher)
- history of gestational diabetes
- giving birth to a baby weighing more than 9 pounds (4.4 kg)
- belonging to one of the following minority groups:

African-Americans, Native American Indians, Hispanic, Americans/Latinos, Asian-American, Pacific Islanders, Maaori (p. 54).

Tortora and Anagnostakos (1984) say that insulin is a major player in our bodies where cells within the islets of Langerhans are small islands of cells afloat in your pancreas. The pancreas is a bird beak-shaped gland situated behind the stomach. Type II diabetes means that your pancreas is functioning, and plenty of insulin is being made, probably too much insulin (a condition called hyperinsulinemia) with more details in the Endnotes section of the Bibliography of the thesis (p. 630).ⁱⁱ

One of the most important functions is to regulate blood sugar levels. It does this by acting as a sort of courier, knocking on the cell's door and announcing, "Sugar's here; come and get it!" Then the cells open the door to let sugar in from your blood stream. That sugar is vital to good health and provides the body with the

energy needed to function. But what happens if the cells don't answer the door?

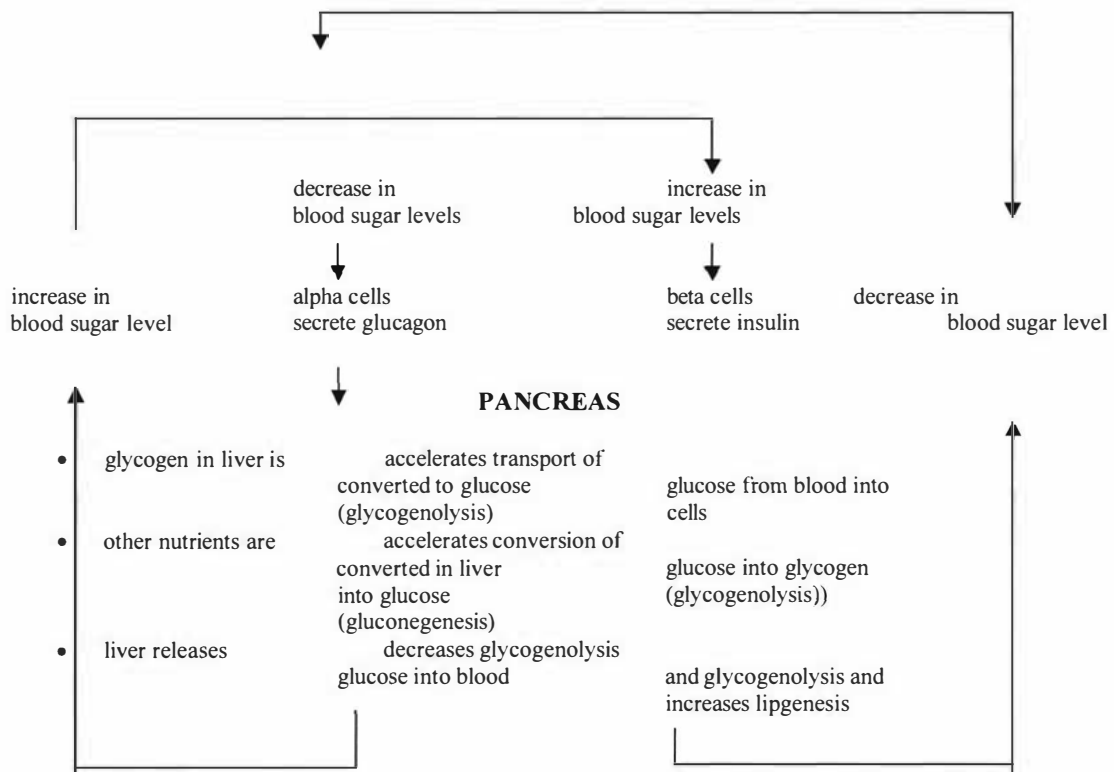
Two things, first, the sugar in the bloodstream accumulates and has no where to go. It's like having the newspapers pile up outside your front door when you are away. Second, the pancreas will keep sending out more couriers to try to get the cells to open the door and take in the "newspapers".

The result of the cells' not complying is a pile of newspapers and a lineup of unsuccessful couriers by your door. When the cell does not open the door, this is called insulin resistance; the cell is resisting insulin. The end result is diabetes, which means "high blood sugar".

A synonym for diabetes is hyperglycemia, which also means "high blood sugar". If insulin resistance goes on for too long, the pancreas can become overworked and eventually not make enough, or any, insulin. In effect, it's like a courier strike.

And finally, the liver, being the good neighbour that it is, will lend a bowl or two of sugar to the sugar-deprived cell. But this can exacerbate existing high blood sugar (Rosenthal, 2001, p. xii).

Table 1. Tortora & Anagnostakos (1984). The following table demonstrates regulation of the secretion of glucagon and insulin (p. 443).



Rosenthal (2000) argues that knowing the symptoms of both high and low blood sugar is crucial in managing Type II diabetes with the following symptoms could be signs of high blood sugar also called hyperglycemia or diabetes. These are:

- Weight gain when the body is not using insulin properly with an excess of insulin which can increase the appetite is a classic symptom.
- Blurred vision or any change in sight where the prescription eyewear has become weak.
- Drowsiness or extreme fatigue at times when there is no actual reason for drowsy or being tired.
- Frequent infections that is slow to heal (women should be alert for recurring vaginal infections or vaginitis, which means vaginal inflammation, characterised by itching and/or foul smelling discharge).
- Tingling or numbness in the hands and feet.
- Gum disease because high blood sugar affects the blood vessels in the mouth, causing inflamed gums; the sugar content can get into the saliva, causing cavities in the teeth.
- Irregular periods in women, such as changes in a cycle length or flow but this could also be a sign of menopause.
- Depression, which could be a symptom of either low or high blood sugar.
- Headaches (from hypoglycemia).
- Insomnia and/or nightmares (from hypoglycemia).
- Spots on the shin (known as necrobiosis diabetorum).
- Decaying toe nails.
- Muscle pains after exercise (high blood sugar can cause lactic acid to build up, which can cause pain that prevents exercise continuation).

Diabetes may also occur if diagnosed with the following:

- high cholesterol
- high blood pressure
- anemia
- cataracts
- salivary-gland stones (pp. 1-5).

Rosenthal (2000) comments that the early signs of high blood sugar are extreme thirst, dry and flushed skin, mood swings, or unusual fatigue – but many people notice no

symptoms at all. Before September 1998, many people with Type II diabetes were told they had impaired glucose tolerance (IGT), which was more widely known as *borderline diabetes*. But with the new guidelines announced in 1998 (from the World Health Organisation), many people diagnosed with IGT will now be diagnosed with diabetes. IGT was what many doctors referred to as the *gray zone* between normal blood sugar levels and full-blown diabetes ‘Normal fasting blood sugar levels and full blown diabetes’. Normal fasting blood sugar levels (what they are before you have eaten) are between 60 milligrams per deciliter (mg/dl) and 90 mg/dl (or, on the metric system, 3.3 to 5.0 millimoles per litre–mmol/L). (To convert mg/dl to mmol/L divide by 18). In the past, three fasting blood glucose levels between 90mg/dl (5.0 mmol/L and 140mg/dl (7.8 mmol/L) meant that a person had IGT. A fasting blood glucose level over 140 mg/dl (7.8 mmol/L) or a random (any time of the day) blood glucose level greater than 200 mg/dl (or 11.1 mmol/L) meant a person had diabetes. But that has all changed. Today, anyone with a fasting blood sugar level higher than 126 mg/dl (7.0 mmol/L) is considered to be in the diabetic range and is officially diagnosed with Type II diabetes. A new term has also been introduced, impaired fasting glucose (IFG), which refers to blood glucose levels between 110 mg/dl and less than 126 mg/dl (6.1 mmol/L and 7.0 mmol/L). The term IGT is now used only when describing people who have a blood glucose level between 140 mg/dl and 200 mg/dl (7.8 mmol/L and 11.1 mmol/L) two hours after an oral glucose test. If the fasting blood sugar levels cannot be maintained below 126 mg/dl (7.0 mmol/L), then an anti-diabetes or hypoglycemic medication may be required (pp 15-18).

Katz (2003) Assistant Professor of Medicine, Department of Endocrinology and Metabolism at Weill Medical College of Cornell University in New York City, comments that with diabetes, the most recognisable symptoms result from fluid loss. Katz says that the body has to do something with the extra glucose that is floating around the bloodstream unable to get into cells. Its solution is to eliminate the glucose in the urine, which means tapping into the body’s water supply and this sets the stage for the following symptoms:

- frequent urination
- unusual thirst

- unexplained weight loss
- persistent fatigue for no apparent reason
- slow healing of cuts and bruises
- tingling or numbness in the hands and feet
- recurring skin; gum; and/or bladder infections.

Unfortunately, too many people overlook their symptoms until it is too late. By one estimate, for every two people who know they have diabetes, another is unaware of his or her illness. Collectively, the symptoms of diabetes are unmistakable. Individually, they could point to other ailments, notes Florence Brown M.D., (senior staff physician at the Joslin Diabetes Centre at Harvard University) such as:

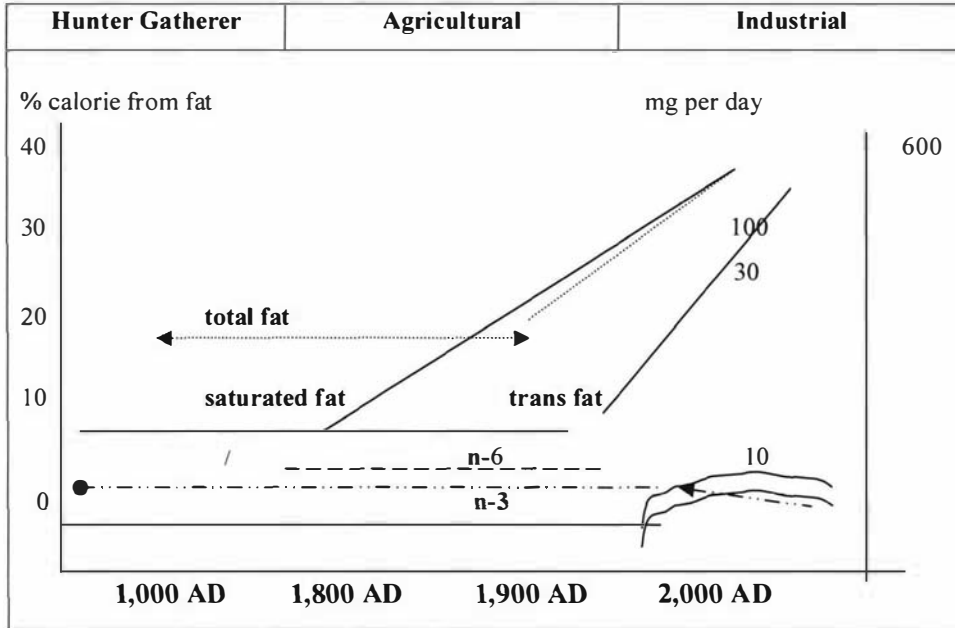
- sudden weight loss may indicate an overactive thyroid gland
- or excessive urination could suggest a urinary tract infection
- blurry vision, particularly after age 40 (but might be a byproduct of the aging process itself).

That is why everyone over age 45 should be tested for diabetes every three years whether or not they notice any symptoms, advises Lynne Kirk M.D., associate chief of the division of internal medicine at the University of Texas Southwestern Medical Centre in Dallas. Likewise, if you have just one or two symptoms, you should be checked for diabetes, particularly if you have any risk factors for the disease [Web site <http://www.med.edu/education>].

Simopoulos (1998) comments that our genetic profile has not changed over the past 40,000 years, major changes have taken place in our food supply and in energy expenditure/physical activity. Our current diet (Western diet) is characterised by an increase in total fat, saturated fat, *trans* fatty acids, and the n-6 essential fatty acids (EFA), but a decrease in the n-3 EFA.

The ratio of n-6 to n-3 fatty acids is 10-20/1, whereas during evolution it was 1/1. Evolutionary considerations are not (yet) a basis on which to make nutritional recommendations, but insights derived from this perspective may nevertheless provide valuable adjunctive understanding about human dietary needs and about the relation of diet to adult health and chronic illnesses (pp. 1-10).

Table 2. Simopoulos (1998) forms the base for the following table as a hypothetical scheme of dietary fat intake (p. 9).



In conclusion, the evolutionary aspects of dietary change would appear to be the major contributing factor for the significant increase in most of the non-communicable diseases in Western lifestyles such as Type II diabetes, heart and respiratory diseases. The above graph depicts a hypothetical scheme of fat as dietary intake (as percent of calories from fat) with data extrapolated from cross-sectional analyses of contemporary hunter-gatherer populations and from longitudinal observations. And their putative changes during the preceding 1,000 years. As I have noted Type II diabetes became rampant in the 16th, 17th, and 18th centuries with the European middle classes directly reflected in the change in dietary intake to a consumption of high saturated fat from domestic animals (and less coarse green and red leafy vegetables).

ii. Type II diabetes Western Medical treatment regime

There is no single cause of Type II diabetes but there is a range of contributing factors: food choices, age, ethnicity, obesity or over-weight, sedentary lifestyle often reflected from an inherited family lifestyle. In the treatment of Type II diabetes dietary intake is a major contributing factor in maintaining appropriate blood sugar levels to control the

disease. Together with minimising the risk factors: such as obesity, lack of regular exercise, smoking, high blood pressure, excessive alcohol consumption and recreational drugs. In other words life style choices contribute to its maintenance and control, and whether or not the diabetes is causing other health problems. Therefore the first line of therapy is usually a dietary and exercise programme (generally to address any obesity and high blood pressure) where the General Practitioner as the primary point of treatment and provides a range of services. The treatment is personalised depending on a number of factors that include the severity and progression of the disease but medication may be prescribed and in some instances insulin but not usual. Therefore foods high in saturated fat and salt need to be minimised and replaced with foods that are unsaturated fat, vegetables, fruits and generally a well-balanced healthy diet. Getting and staying physically active is also important to use up the carbohydrates to enable the insulin to be generated naturally by the body. However if the regime of diet, exercise and weight loss is not successful in addressing the diabetes then the modern chemical prescription drug treatment is available and mostly funded by the government as an integral part of health services offered to the community. However it must be remembered that these chemicals do have side effects and will not cure the disease.

Farmer, Pearson and Strong (2004) say that regular physical exercise is good for all people, and it is the cornerstone of managing Type II diabetes. Regular amounts of physical activity (or exercise) help with weight control and improve blood glucose, blood pressure and cholesterol levels; being physically active means two things. Being as active as you can throughout the whole day (increasing the baseline activity) and having 30 minutes or more of activity every day that makes you breathe harder and gets you warm (moderate activity). This can be split into several smaller bits, for example, three 10 minute chunks to equal 30 minutes (called snacking on the moderate activity) (p. 15).iii

Farmer (2004) comments that the Green Prescription is a national programme run by the Sport and Recreational Council New Zealand (SPARC) to help and support people while they increase their levels of physical activity. It is free of charge and is operated by the General Practitioner, practice nurse or diabetes nurse educator who writes a prescription *Green Prescription* for exercise and is sent to the local green prescription agency. Then a

person trained in exercise and support for exercise will personally discuss the local activity group options available for the diabetic and support them for three months. It is important for anyone who is starting to increase their level of physical activity to do so in a way that is safe but particularly for Type II diabetics because of complications from the disease. To illustrate, Type II diabetes contributes to the risk of developing heart and blood vessel problems with damage to the nerves and blood vessels in the feet. Pedometers (small devices that count the number of steps people make during the day) can help establish the usual level of daily activity and provides a tool to increase daily activity and is generally considered to be healthy to be taking 8,000 to 10,000 steps per day (p. 26).

Pyke (1999) says you can have Type II diabetes for years and not know until there is some kind of medical event such as problems with eyesight, perhaps the sensation of burning feet or infections that won't heal before a diagnosis is made. One of the insidious qualities of Type II diabetes is that half the people who have it, do not know because in the early stages there are no symptoms. In fact about one third of people who have pre-diabetes progress to Type II diabetes, one third remain with pre-diabetes and one third reverts to normal. A Recent studies have shown that with simple alterations to lifestyle, such as exercise and healthy eating, diabetes may be delayed or prevented in about 58 per cent of people with pre-diabetes. Aerobic exercise is best as the heart is raised and excess fat is burned off, but exercise needs to be regular with the ideal around 30 to 45 minutes (p. 65).

Rosenthal (2000) comments that there are four types of medication that may be prescribed, but it is crucial to note that these medications can only be prescribed to people who still produce insulin. They have no effect on people with Type I diabetes, or insulin dependent diabetes. Also that between 40 and 50 per cent of all people with Type II diabetes require insulin therapy after ten years; but the medication is meant to complement the dietary, exercise and glucose monitoring routine, they are not a substitute. Sulphonylureas and biguanides are common oral hypoglycemic agents (OHAs). Sulphonylureas are tablets that help the pancreas release more insulin and biguanides help the insulin work more efficiently. Initially, 75 percent of people with

Type II diabetes will respond well to sulphonylureas, while biguanides will lower blood sugar in 80 percent of people with Type II diabetes (p. 67).

Pharmaceutical Drug Therapy

Ford-Martin & Blumer (2004) say sulphonylureas are the oldest class of oral diabetes medication, and were first introduced in the 1950s. Brand names of these drugs include Amaryl (glimepiride), DiaBeta (glyburide), Diabinese (chlorpropamide), Dymelor (acetohexamide), Glucotrol (glipizide), Glucotrol XL (glipizide), Glynase PresTab (glyburide), Micronase (glyburide), Orinase (tolbutamide), and Tolinase (tolazamide). The oldest sulphonylurea drugs are: Diabinese, Orinase and Tolinase require the largest dosage sizes (with daily doses ranging from 100 to 3,000 milligrams). The newer or second generation, sulphonylureas are much more potent and are typically prescribed at daily dosages ranging from 1 to 40 milligrams. The newer drugs are usually taken twice daily before meals, except for Glucotrol XL and Glynase which are extended-release medications that only need to be taken once daily.

Called *hypoglycemic agents*, sulphonylurea drugs work by causing the pancreas to release more insulin, which in turn lowers the blood glucose levels. For this reason, sulphonylureas may not be effective in people with long-standing diabetes who have lost most pancreatic beta cell function. Amaryl (glimepiride), the newest of the sulphonylurea drugs also works to decrease insulin resistance by binding with insulin receptors. So in addition to increasing insulin output, this drug also allows the body to more effectively uses the insulin it produces.

However as with any drug there can be side effects with the most serious potential of the sulphonylurea drugs is a hypoglycemic reaction, or low blood sugar episode. The older sulphonylureas, in particular, are more likely to cause this reaction if they are taken in conjunction with other medications. There is some inconclusive clinical evidence that patients taking Orinase may run an increased chance of cardiovascular problems.

Other possible side effects the sulphonylurea drugs include:

- nausea
- rash and /or itching
- photosensitivity (sensitivity to sunlight)

- dizziness
- drowsiness
- headache
- weight gain.

The biguanide class of drugs or Glucophage (metformin) and Glucophage XR (metformin hydrochloride, extended release, is one of the most widely prescribed for Type II diabetes. Biguanides are often preferred over sulphonylureas because they do not cause hypoglycemia nor do they promote weight gain. They have also been shown to have a positive effect on blood lipids. Metformin is usually taken two to three times daily with meals. The extended release version is designed for once-day use, usually with an evening meal. It may also be used in conjunction with a sulphonylurea drug (Glucovance is metformin and glyburfide) or with insulin therapy.

Metformin works by suppressing the amount of glucose that the liver pumps out. It promotes weight loss and an improved cholesterol profile that can reduce the insulin resistance. The United Kingdom Prospective Diabetes Study (UKPDS), a land mark twenty-year clinical study, found that overweight patients treated with metformin experienced significant lower mortality rate than those treated with sulphonylurea drugs and had a marked reduction in strokes and heart attacks. Metformin is not recommended for people with kidney or liver problems due to the risk of lactic acidosis, a rare but potentially fatal build up of lactic acid in the bloodstream that occurs when the liver and kidneys do not adequately remove lactic acid. Biguanides are not recommended for use in patients with congestive heart failure. Other potential side effects of metformin include:

- gastrointestinal distress (gas and diarrhea)
- nausea
- metallic taste in the mouth
- depletion of vitamin B12 levels.

The Thiazolidinediones (TZD) class of drugs Actos (pioglitazone) and Avandia (rosiglitazone) are currently available but a third drug in the class Rezulin (troglitazone) was withdrawn from the market in 2000 after reports of fatalities due to liver damage. Actos can be used with insulin, metformin, or sulphonylureas and is usually taken once or twice a day, with or without food. These drugs which are also called glitazones or insulin

sensitizers, target the insulin receptors in muscle and fat cells to increase the level of insulin sensitivity in the body. They also reduce glucose production slightly, and can be effective in lowering blood pressure and triglyceride levels, and in increasing HDL, (or good cholesterol). Because they lower glucose so effectively, they also reduce hyperinsulinemia (excessive circulating insulin). Possible side effects for TZD are:

- edema (water retention) of the ankles or legs
- anemia
- weight gain
- muscle weakness
- headaches
- fatigue
- Cold-like symptoms.

The Alpha-Glucosidase Inhibitors (AG) class of drug consists of Glyset (miglitol) and Precose (acarbose), are also called ‘starch blockers’ and must be taken at each meal with the first bite of food in order to be effective. AG inhibitors may be prescribed in combination with the other drugs where Glyset and Precose work by slowing digestion. By blocking the enzymes responsible for the breakdown of carbohydrates in the intestine the blood glucose rise is slower and steadier. Because of the way they work most of the side effects of the AG inhibitors are gastrointestinal such as bloating, diarrhea, gas, and cramping.

The Meglitinides class of drugs includes Prandin (repaglinide) and Starlix (nateglinide) and they are like AG inhibitors but are taken at meal times about fifteen minutes before eating to prevent postprandial blood sugar rise. Meglitinides are short-acting oral hypoglycemic agents that bind to and stimulate the insulin-producing beta cells in the pancreas in response to the level of glucose in the bloodstream. Hypoglycemia can occur as a side effect of the meglitinide drugs where symptoms of a low blood glucose episode include sweating, shakiness, dizziness, increased appetite, disorientation, heart palpitations, nausea, fatigue and weakness. A hypo should be treated immediately with a fast acting carbohydrate (pp. 134-178).

The Statin class of drugs were introduced in the late 1980s that include the brands Zocor, Lipitor and Crestor and have been hailed as the wonder drug as a cholesterol lowering agent and according to the British Heart Foundation, reduce the risk of dying from coronary heart disease by 25 per cent. But like any chemical drug the side effects are numerous and some potentially fatal. Thus globally people are seeking treatments other than drugs with side effects and are addressing and assessing diet and lifestyle choices as an alternative.

To conclude, although modern drug therapy is convenient and time-effective to easily pop a pill, there should not be a reliance that drugs will be able to fix any health problems, rather people need to take personal responsibility for their own health.

iii. Alternative or Natural Medicine in a global context

Alternative styles of medicine

Philosophers coined the word *holism* in the twentieth century, but a holistic existence formed the basis of traditional Maaori society through the physical, the emotional, the family and the spiritual connection as one. However, the idea it expresses – that the whole is greater than the sum of its parts – is very old indeed. As applied to human beings, it appears in the teachings of Pythagoras and Hippocrates, the Indian Ayurveda and many other ancient healing systems that assert true health is attained only when body, mind, emotions and spirit are all in proper balance.

Classical Western medicine, traditional Chinese medicine and Ayurveda share the belief that the human body is a microcosm of the universe. Like their European counterparts, Indian and Chinese medical thinkers believed that the body was composed of the same materials as the cosmos; moreover they linked each organ system to a particular elemental substance. For example, the ancient Chinese astrology focused on five planets: Mars, Jupiter, Saturn, Venus and Mercury. Chinese thinkers consider the natural world to consist of five elements *or types of processes* each of which is represented by an archetypal substance: metal, wood, water, fire and earth.

Kennell (1976) claims historically cultures throughout the world have provided explanations for bodily ills and diseases tending to put the blame on gods because most

illnesses of a serious nature because they are unseen. It seemed logical to primitive man that the spirits that controlled the other great forces of the world, the wind, rain, moon, sun, the seas, the rivers, must also be responsible for the dreadful visitations on the human race. In some societies diseases of all kinds are explained by the evil workings of demons or wicked spirits and are very similar to the conceptual beliefs and superstitions of the Maaori. In other words Maaori explanations were not that different from other societies and cultures (p. 10).

Kennell (1976) also comments that even *quack medicine* finds a place in modern society, although its origins go back to the times when apothecaries and doctors were first emerging as scientific professionals. From the sixteenth century onwards, rules and regulations began to prescribe a doctor's or a chemist's training, and a set of gentlemen, more concerned with profits than cures. Scientific medicine took over well over 100 years to rid itself of the bat's wings, toad's legs, mercury and quicksilver ingredients listed in its official pharmacopoeia and quacks were unscrupulous throughout the 1700s (p. 28).

van Urk (1990) affirms that the link between the more holistic elements of alternative medicine and biomedicine in Western Democracy nations during the latter part of the twentieth century has tended to come about through the actions of the consumer, rather than the medical or allied health practitioner. Some of this consumer-led demand for alternative therapies relies on self-help routines, particularly through the use of simply acquired techniques like aromatherapy and massage, and the purchase of over-the-counter preparations. However, the most significant thrust towards the integration of alternative and orthodox practices has come about through people consulting the many tens of thousands of alternative practitioners who are not medically qualified now operating in Western societies, in parallel with their normal visits to doctors and other health personnel. In understanding the coming together of Eastern and Western traditions, therefore, it is worth exploring the organisational relationship of practitioners to the therapies concerned.

Then he says that by the middle of the twentieth century, medical science had notched up triumph after triumph in its efforts to prevent, as well as cure, disease. However, the

preventative successes almost all involved prophylactics against specific disorders, from malaria to poliomyelitis. Around a hundred years has elapsed since a more general breakthrough had been achieved, improvements in public health wrought by better sanitation and nutrition. Events were poised to change, however. As they did, the term *preventative medicine* broadened its meaning to encompass not only specific prophylaxis, but all the inter-related measures that can help to prolong the span of life and keep it disease-free. Because many of these entail choices by people about the way they led their lives, this broader prevention is sometimes called the *lifestyle* approach (p. 208).

Porter (1997) claims like the Chinese, classical and medieval European doctors associated the different elements with specific body parts, and in Ayurvedic texts. The five great Hindu elements are inseparably joined with aspects of the body and objects of the senses, but until the 1850s, Westerners were forbidden to learn Chinese. Chinese medicine recognizes five viscera:

- the heart
- the liver
- the spleen
- the lungs
- the kidneys.

This separation of mind from body also penetrated deeply into the thinking of educated people. Philosophy now had to be based not on revelation but on scientific observation and the formation of scientific laws. Yet Darwin still described his work as Natural Philosophy, Scientist was a neologism that still seemed fairly foreign. Before the revolution in science, medicine had been founded on the theory of the ‘humours’ and on astrology and alchemy. We saw in the case of Newton that histories of medicine are teleological – they single out scientific elements in the genealogy of modern medicine which later became dominant but in fact coexisted with older modes of thought for centuries. These older frameworks, though, are ignored (p. 97).^{iv}

Ernst (2002) notes that despite critical awareness, terms like ‘indigenous medicine’, ‘folk medicine’ and ‘healer’, for example, even if used in their plural forms, are still redolent of those features that they have long been thought of as lacking in comparison to their

binary opposites namely ‘Western medicine’, ‘learned medicine’ and ‘medical expert’. So much have they been seen as synonymous with ‘unscientific’, ‘superstition’ and ‘quack’ that even when they are not explicitly denigrated, their scientific status, the validity of their knowledge base and the integrity of their practitioners is almost automatically impugned *Western Medicine*. However in contrast, is not usually required to justify its status as a *scientific* procedure – it is implicitly thought of as such, even if, the basis on which the claim to scientifically is established may not be as solidly *objective* and *scientific* as it appears to Western imagination (pp. 3-4).

Western doctors and scientists today are aware of the ancient and still vital systems of medical thought and expertise that originated in India and China. Perhaps more importantly, Asian medical practices are becoming part of the popular culture of medicine in Europe and North America. The consumers as well as the practitioners of medicine are increasingly interested in these non-Western models of health and health care. Like acupuncture, mesmerism and homeopathy in the nineteenth century, Chinese and Ayurvedic therapies today are seen as potential alternatives to Western medical orthodoxy.

There has been a growing willingness among such practitioners to incorporate holistic practices within Western medicine, including Eastern therapeutic approaches. While there are some Western doctors who claim that holism has always been central to good medical practice, therefore the recent limits on this development in an age dominated by biomedicine should be recognised. Equally, however, there are encouraging signs that a more holistic approach to patients’ needs is gradually emerging out of this development as Eastern and Western approaches to health care come ever closer together in the West.

It should be noted that tangata whenua Maaori did not suffer from any chronic lifestyle diseases but with the arrival of the European came these diseases commencing with sealers’ and whalers’ bringing gonorrhoea and syphilis, then other diseases that had a negative impact on population numbers.

Natural medicine in a global context

Currently in France 30 to 40 percent of doctors use mostly botanical medicines in their practices and in neighbouring Germany, seven out of every ten doctors prescribe herbal

remedies to their patients. In fact, the German people have so embraced herbs for their therapeutic value that the German government has appointed an expert panel to review herbal medicines for their safety and effectiveness. The panel, called Commission E, is a veritable who's who of Germany's physicians, pharmacologists, and herb specialists. The United States has become increasingly depend on *Commission E* reports, as well as other key research, for reliable evaluations of an herb's healing action and possible side effects. There has been considerable discussion and some studies regarding the body's production and lessening supply with aging of alpha-lipoic acid, a little known antioxidant. Studies prove that alpha-lipoic acid prevents free radical damage to the cells, in part by recycling vitamins C and E. Scientists need to do more research into the therapeutic properties of alpha-lipoic acid. So far, one small study has shown that supplements of this nutrient help prevent 'bad' LDL cholesterol from oxidizing into a form that clogs the arteries.

Aaron Vinik, M.D., Ph.D. Director of the Sedtrelitz Diabetes Research Institute at the Eastern Virginia Medical School in Norfolk says "that alpha-lipoic acid may replenish the antioxidant deficiency. In Europe, preliminary studies of alpha-lipoic acid as a treatment for diabetic neuropathy have been very encouraging.

More information will come from a four-year clinical trial currently underway at several centres in Europe and the United States and the results due in 2007. In the meantime, a prescription form of alpha-lipoic acid marketed especially for diabetic neuropathy is already available in Germany" (as cited in *Outsmart Diabetes*, 2003, pp. 49-53).

Outsmart Diabetes (2003) note that other research has shown that alpha-lipoic acid may help regulate blood sugar. A recent well-controlled German study found that 600 milligrams of alpha-lipoic acid a day helped stabilise blood sugar levels in people with Type II diabetes. According to some preliminary studies American ginseng (*Panax quinquefolius*) may help people with Type II diabetes lower their blood sugar levels with few side effects. In fact, more than four hundred plants appear to improve blood sugar levels.

Several trials come from the Canadian researcher Vladimir Vuksan PhD., and his colleagues at St Michael's Hospital at the University of Toronto. In one of their studies, people with Type II diabetes received between three and nine grams of American ginseng

at various intervals up to two hours before eating a meal that contained 25 grams of glucose. Everyone showed notable declines in their post meal blood sugar levels. What is more, the size of the reduction did not depend on the amount of the herb or the timing of the dosage, by taking at least three grams of American ginseng within two hours of eating lowered post meal blood sugar by about 20 percent.

A Finnish study found that many people can significantly lower their blood glucose levels (and their diabetes risk) simply by making appropriate lifestyle changes, such as eating a low-fat, high fibre diet and getting regular exercise. While at the same time there is the theory that people who has genes that increase the propensity for abdominal fat also carries genes that raise their risk of insulin resistance. But a high proportion of abdominal fat to total body fat appears to reduce induce insulin resistance (pp. 234-245).

iv. Type II diabetes Prevalence and Predicted Future

Cheng (2005) comments that The International Diabetes Federation reconfirms that Type II diabetes which is the non-insulin dependent type, constitutes about 85% to 95% of all diabetes cases in developed nations and an even higher percentage in developing nations. In 1995 the global estimation was that 135 million would have diabetes and currently 194 million people have the non-communicable disease. Diabetes continues to affect increasing numbers of people from around the world while public awareness remains low. Type II diabetes is often associated with obesity in the adult population. More recently, changes in diet and reduced physical activity are most probably the contributors to the increased occurrence of this disease in children (p. 2).

In 2000 more than 151 million people in the world are diabetic. It is predicted that by 2010, 221 million people and by 2025, 324 million will be diabetic. In the U.S., for the population born in 2000, the estimated lifetime risk for diabetes is more than 1 in 3. The economic and human cost of this disease is devastating. The current cost of diabetes in the U.S. is estimated to be at \$132 billion, which includes \$92 billion of direct medical costs and \$40 billion of indirect costs such as disability, work loss and premature mortality. The outbreak of the current diabetic epidemic has been accompanied by a similarly drastic increase in obesity. The relation between the two is a matter of debate but presumably both are caused by changes in dietary habits and an increasingly sedentary modern lifestyle (Cheng, 2005, p. 9).

Joshy & Simmons (2006) say that the evolution of the burden of diabetes, its risk factors and complications in New Zealand and the current national strategies underway to tackle a condition likely to impact on the national ability to afford other health services. (p. 4).

As with many other countries, currently there are no up-to-date national diabetes prevalence data for New Zealand. To date, the data gathered relating to metabolic control and complications are patchy, however the *Get Checked* (suboptimal) programme data suggest that New Zealand needs to do more to reduce the impact on cardiovascular, renal, eye, foot and pregnancy related complications, This is particularly the case for Maaori and Pacific peoples, whose metabolic control remains poorer than that for European New Zealanders where only 27% of Maaori were participating in the *Get Checked* programme (Joshy & Simmons, 2006, pp. 2-11).^v

Joshy & Simmons (2006) then say the prevalence of diabetes (known and undiagnosed); impaired glucose tolerance/impaired fasting glucose and gestational diabetes are tabulated by ethnic group. New Zealand Health Survey (2006) result of known diabetes:

- European 2.9%
- Maaori 8%
- Pacific 10.1%

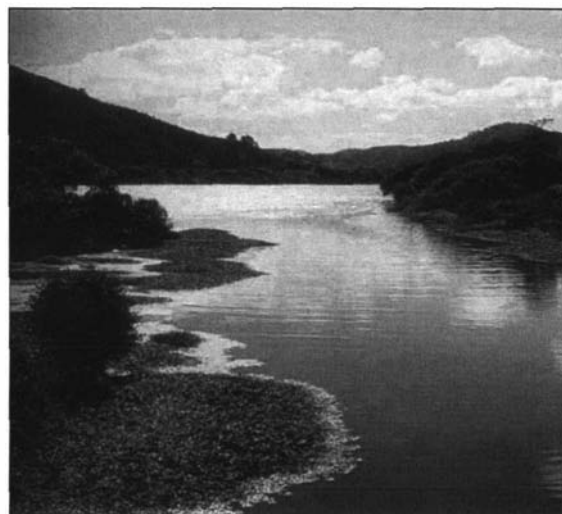
Joshy & Simmons (2006) also say that the diabetic risk factors have been examined and the reported rates have been compiled. Maaori and Pacifica people have a higher prevalence of diabetic risk factors (such as obesity, physical inactivity, insulin resistance, metabolic syndrome) compared with Europeans (p. 6).

Although this doctoral thesis is not coming from a pharmacological medical science perspective, I have noted that the long finned eel could be used in a controlled clinical trial project to assess the pharmacotherapeutic benefits at some future time. But that investigation is not part of this research thesis. However with continued clinical trials assessing the benefits of an unsaturated fat diet through the omega-3 obtained from finfish or seafood it is probable that in the near future eels would be recommended. I have also said that the aquaculture industry is a rapidly developing commercial enterprise that does include eel farming and that it is anticipated that this industry will expand in New Zealand with the introduction of the *Aquaculture Act* in 2004 to accommodate.

Shreeve (1992) comments that while clinical trials and research studies are very fulfilling academically if they extend our knowledge of a disease and its causes perhaps their most rewarding aspect is the practical application of the discoveries to which they lead. Their purpose, after all, even more than that of satisfying intellectual curiosity, is to benefit as many people as possible. There is no doubt that the research that has shown the protective action of fish oils is among the most momentous and meaningful work that has ever been done to benefit mankind (p. 93).

Haere ki te wai.

Go to the water.



The above visual of the Waikato River is from the Tainui Maaori Trust Board Annual Report-*He Riipoata-A-Tau* (1998) p. 17.

Part three — The Scientific

Eel/Tuna as the preventive catalyst

i. Introduction

This research has focused on the long finned eel/tuna because this is the preferred species of eel for Maaori and Tainui kaumaatua disclosed that the short finned eel has too many bones. However the salt water conger eel was seasonally caught and was consumed fresh, dried and smoked but not stored; as this method was only used for the fresh water eel/tuna.

B. Haggie (personal communication, August 16, 1994). There are many kinds of eels, such as the ruahine, kokopu-tuna, tarehe, karaerae, kopakopako, matamoe, matawera, haumate, and hao. The kaka is found at Waikato; it is seen sticking to waterfalls and cascades, clinging to each other, and are fat from head to tail seen in the months of December and January. They may be compared to the tuwerewere, also the maero, and the kopakopako, which is called maro because it is dried by us.

Best (1929) says that the arrival of the elvers or small eels from the sea had been known by hapuu Maaori for centuries but the fact that all eels, freshwater and marine, have a long larval life was not understood until the nineteenth century. Long before the question had begun to interest European scientists the Maaori knew that eels went to sea to spawn and they had a regular lore built up about their times and manner of migration. So accurate was their knowledge that they could tell to a day when the migration would commence, and on what nights they would be running, and so certain were they in their deductions in the latter instance that on these nights they would not set nets. The sceptical Paakehaa who doubted their knowledge soon found out from experience that he himself merely wasted time in doing so. The Maaori was interested in eels from no such abstract reason as a desire to benefit science, but for the very practical one that a close study of their habits made catching of them more certain. The elver's contact with fresh water rapidly induces pigmentation, and the young eels swarm up the rivers in thousands. As soon as pigmentation commenced the elvers took cover during the day and travelled up the rivers at night. The elvers have been observed running freely during the daytime even

during flooding, often sighted closely packed during their Waikato River annual migration (p. 78).

The elver migration records indicate the first elver run annually comes to the Waikato River, on New Zealand's west coast, indicating a westerly direction arrival. Then New Zealand eel larvae metamorphose close to the coast and begin actively swimming with the metamorphosis changes (Cairns, 1941, p. 138B).

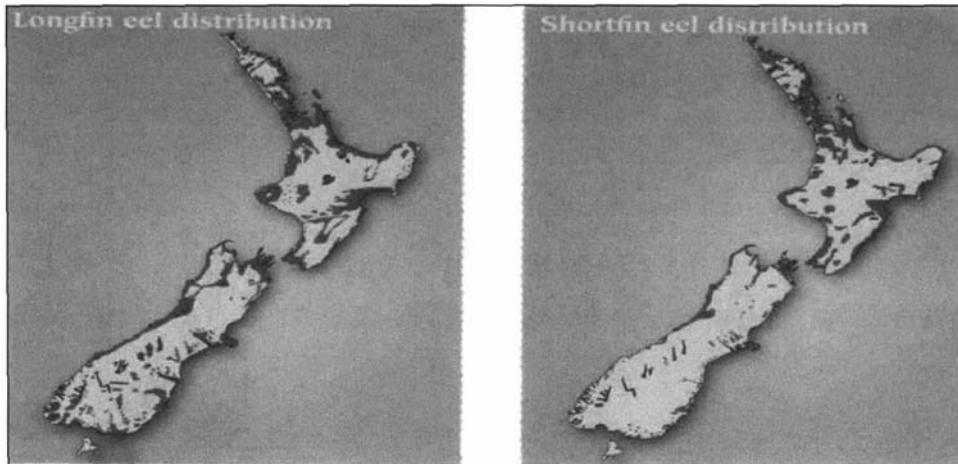
Cairns (1941) comments that New Zealand hosts five types of eel but only two species are dominant named *Anguilla dieffenbachii* and *Anguilla australis schmidtii* and the following comparison demonstrates the differences between two (p. 53B).

<i>Anguilla dieffenbachii</i> <i>long-finned eel</i>	<i>Anguilla australis schmidtii</i> <i>short-finned eel</i>
1. Dorsal fin longer than ventral fin	1. Dorsal fin equal length to ventral
2. teeth in a narrow band	2. teeth in club shaped formation
3. eye above and forward of jaw angle	3. eye directly above jaw angle
4. thick lips	4. thin lips
5. broad head	5. narrow head
6. prominent nasal organs	6. Small nasal organs
7. wide mouth gap	7. narrow mouth gap
8. strong jaws	8. small jaws
9. broad tail	9. narrow tail
10. over 180cm long	10. seldom grows over 90cm long
11. weight up to 18 kg	11. weight 1.8kg
12. skin is a dark grey colour	12. skin is a very dark olive green colour

Cairns (1941) hypothesised the larvae came down the Australian East Coast into the Tasman Sea by the ocean currents, ocean depths and salinity measurements and that either the great deep water off the Australian Great Barrier, and or near the Equator, was the most likely breeding-ground for New Zealand eel. Generally ocean currents do not provide any warm offshore spawning area for larvae to drift back to the coast. Consequently eels have never colonised in the western coasts of the southern continents,

western North America, eastern South America, with the cold currents at the bottom of Africa and South America unsuitable (p. 13B).

Jones (2005, p. 4.) Location of the short and long finned eel/tuna in New Zealand.



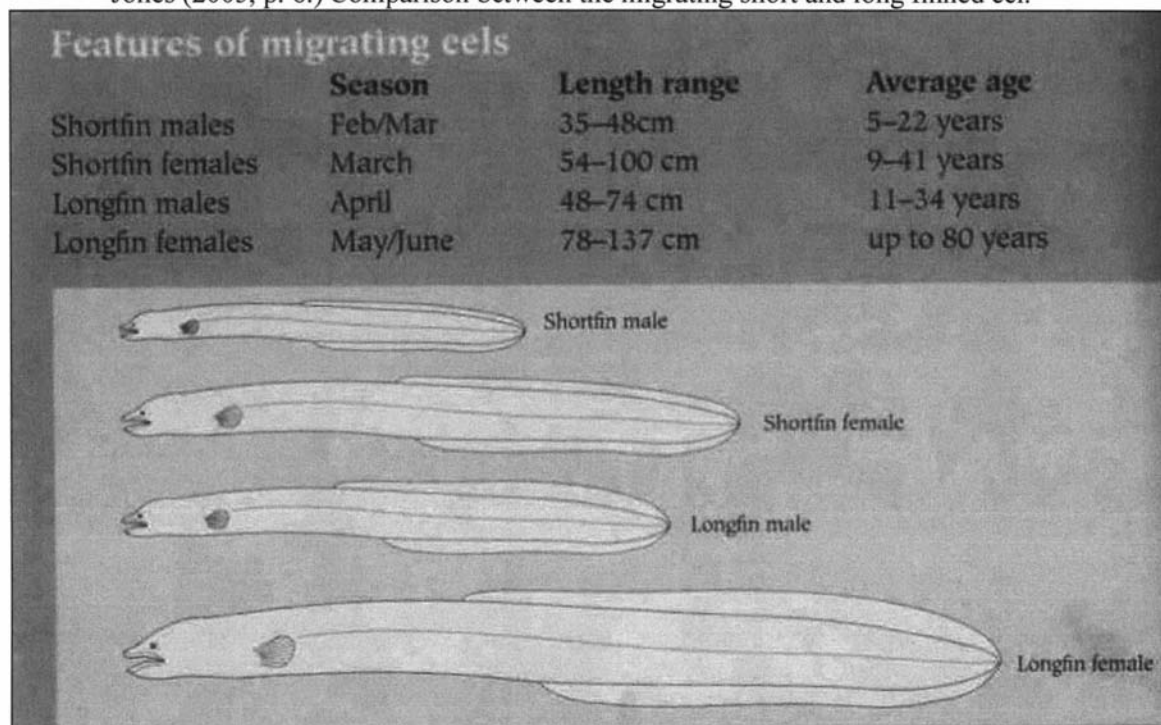
Cairns (1941) also says that eel metamorphose into the normal tubular eel shape although devoid of any pigment and so are known as glass eels; so that when the glass eels begin to migrate into fresh water they may be anywhere from one to three years old. Whilst in the estuarine waters the glass eels quickly develop into fully pigment elvers and adjust to fresh water. Subsequent migrations from the estuaries into fresh water involve both elvers and glass eels and may happen after, during or before the main migration from the sea. These migrations are known as *eel fares* from which the term *elver* is derived. Generally these occur at night and may involve as many as four different age classes. The upstream migration continues well into the upper reaches of river systems and elvers and glass eels (and adults) can overcome even large obstructions such as waterfalls and natural dams by the simple expedient of travelling overland in damp conditions, with a motion much like snakes. Eels can live for a long time and females reach the age of 36 years before feeling the urge to begin the cycle all over again. Males may live for 25 years, however females as young as 10 and males as young as 6 may begin the downstream migration to breed (p. 143).

Moriarty (1978) says eels prefer still waters such as lakes, dams, swamps but are also found abundantly in rivers or streams and in areas where the water velocity is low and

have been known to travel on land for up to several kilometres to connect with water or mud. Eels are mainly carnivorous feeders (p. 54).

Sinha and Jones (1975) stated, “Eels as being elongated, serpentine fishes with a naked skin, or with minute scales embedded in the skin and are members of the order Apodes” (p. 1).

Jones (2005, p. 6.) Comparison between the migrating short and long finned eel.



Moriarty (1978) claims that the great philosopher Aristotle provides the earliest written records about the eel claiming they were neither male nor female suggesting that they arose by spontaneous generation from mud or slime. The first eel larva on record was caught in 1763 in the Irish Sea at Holyfield, North Wales; in 1886 the scientists Calandruccio and Grassi recorded metamorphosis of freshwater eel from marine larva and in 1896 Delage observed the metamorphosis of a conger eel (p. 12).

Figure 3. Forest and Bird (1992) visuals on the next page demonstrate *the stages of eel development* for the long finned eel species, the staple Maaori food. (p. 12).

Glass eel

When approaching the coast the leptocephalus becomes much more elongated although it retains its transparency. It is in this stage, known as glass eels, that they enter our river systems.



Elver

Within days of entering the lower reaches of rivers glass eels develop a sandy-brown colouring, their stomachs form and they become known as elvers.



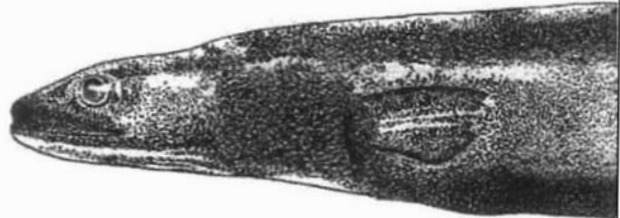
Adult longfinned eel

As eels grow the head becomes more bulbous with a prominent dome behind the eyes. Some eels will live to a great age and a great size before heading towards the ocean.



Migrating longfinned eel

Before setting off on their ocean journey, maturing eels take on a "breeding livery". The bulbous snout of female longfins becomes much more slender and streamlined and the fleshy lips become thinner. The eyes enlarge – to almost twice the size in females – and the pectoral fins become longer. Similar changes occur in shortfinned eels.



Adult female shortfinned (top) and longfinned eels, giving an indication of their relative sizes. Since eels vary widely in size depending on sex and the stage of the life cycle, the most useful distinction is the length of the dorsal fin. In longfinned eels it extends much further forward than the anal fin. Longfinned eels also have a larger mouth and are more likely to be dark grey to black while shortfinned eels tend to be olive-green.

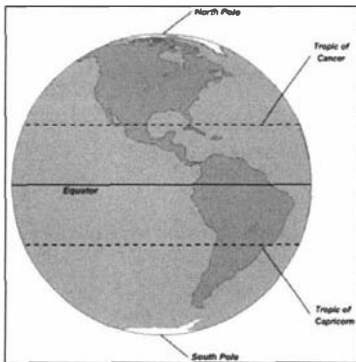


The short finned eel spawning is believed to be in the South Coral Sea off the coast of North Queensland and is quite different to the larger long finned eel. According to Tainui

oral history the females have been known to be over 100 years old and that the females are responsible for controlling the breeding. Indeed modern research indicates that the long finned eel, like its smaller cousin the European eel, also travels thousands of kilometres to breed at the Sargasso Sea in the North Atlantic Ocean being addressed in the eel's migration.

ii. Eel/Tuna migration to New Zealand

The main patterns of water movement in the oceans result from the earth's rotation and the gravitational interaction between the earth, moon and sun. The ocean's surface currents are created and driven by the winds on the earth's surface, which themselves result from differences in the temperature of the air between the equator and the poles. The earth's rotation subjects the movements of air and water on its surface to a force that causes them to move in a clockwise fashion in the Northern Hemisphere and in an anticlockwise motion in the Southern Hemisphere. This is known as the *Coriolis Effect* as an artefact of the Earth's rotation and the flow chart on the next page demonstrates the flow of the currents relating to the Pacific Ocean and the Atlantic Ocean.



Coriolis is a change in the wind due to the anti-clockwise rotation of the earth on its North axis and is demonstrated by the following visual tabulated as Figure 4(a). There is a direct relationship between the difference in pressure between two points (called the pressure gradient) and the wind. Wherever there is a pressure gradient there is a wind whose strength is proportional to the gradient. If the earth did not spin then the wind would blow directly from high pressure to low pressure, as you would expect. But the Coriolis force always achieves a balance with the pressure gradient force and makes the wind blow across the pressure gradient (except near the equator). The trade winds are a good example of the *Coriolis Effect*. Air moving south towards the equator appears to be deflected west, giving us the North Trade Winds. Northwards moving air in the southern Hemisphere is also deflected to the West giving us the South East Trades. The *Coriolis Force* disappears near the equator and is ineffective between about 8 degrees North and 8 degrees South. Tropical storms that need the Coriolis force

to start them spinning, never form in these lowest latitudes. The direction of the wind deflection is due to the Coriolis effect is best remembered using Buy's Ballot' s Law which says: – 'if you stand with your back to the wind in the Northern hemisphere you will have low pressure on your left hand side (the opposite applies to the south)
(www.answers.com/topic/coriolis-effect).

Figure 4(b). Tesch (1997). The Ocean Currents known as the Coriolis Effect (p. 54).

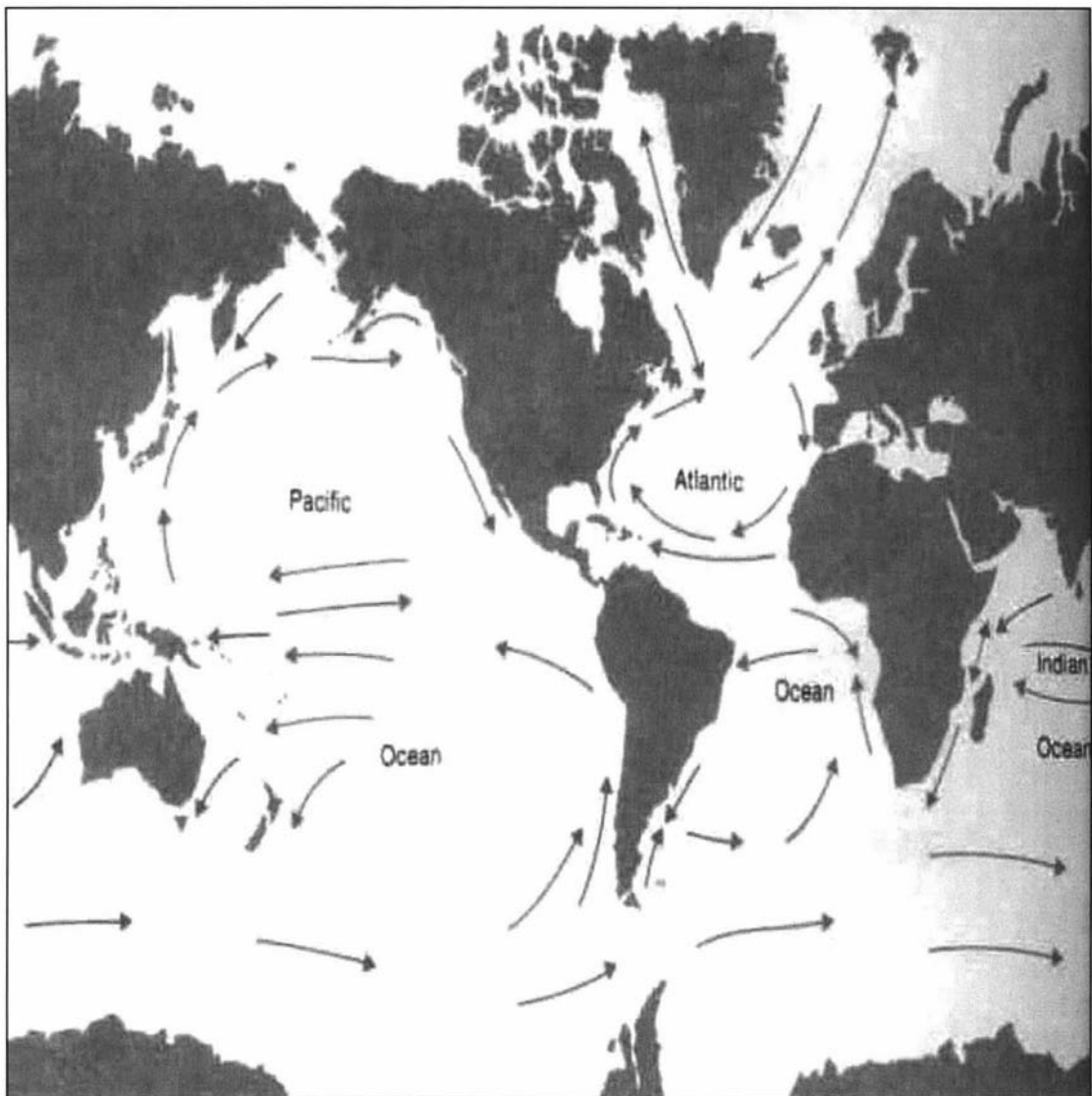
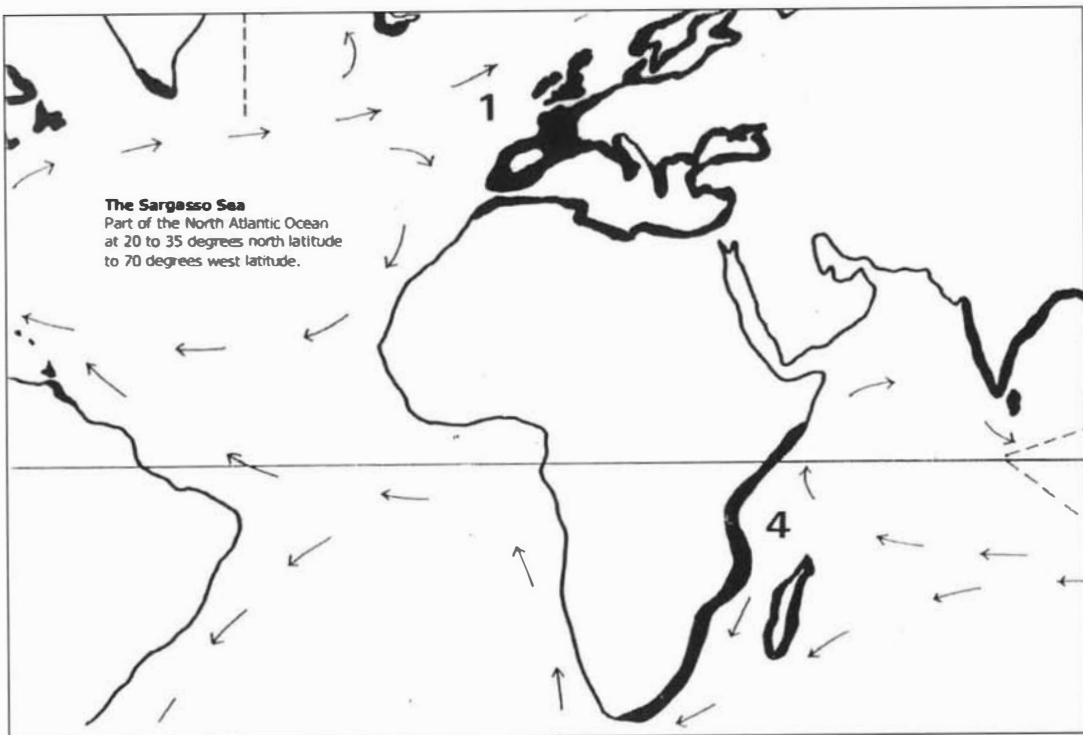
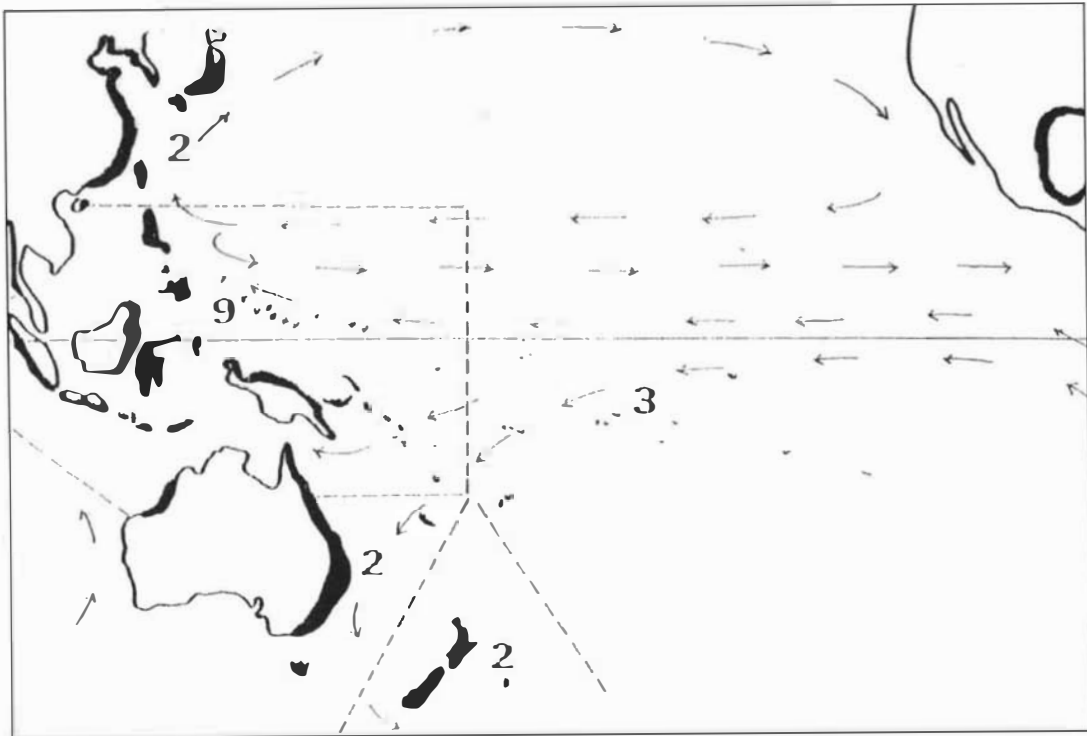


Figure 5. Tesch (1997). Eel migration Ocean(s) flow chart direction (p. 34).



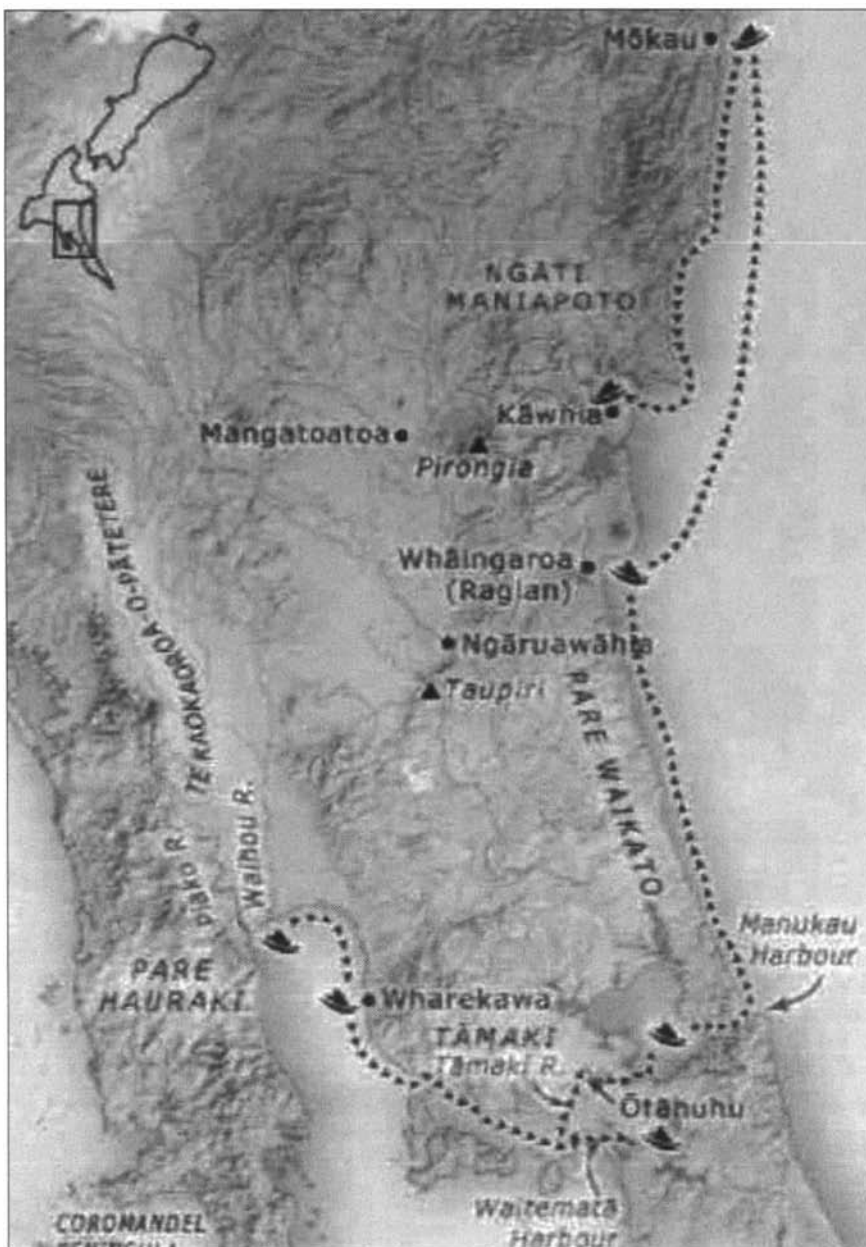


Figure 6. Tainui Trust Board (1995) identifies in the following map a visual overview of the Tainui waka Rohe (p. 6).

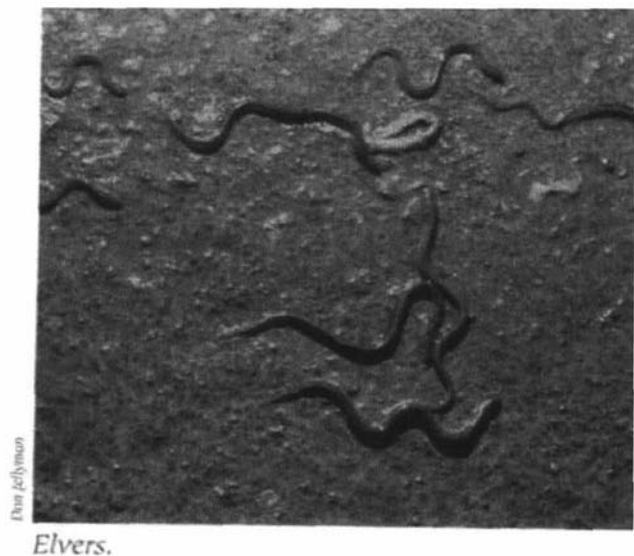
The location map identifies the settlement areas of the Tainui waka hapuu by using the map of Aotearoa New Zealand in the mythical setting with the fish that was caught by Maui.

van Ginneken and Maes (2005) say the hypothesis that all European eel (described as *Anguilla anguilla* by the scientist Linnaeus in 1758 is a species found in the waters of Western Europe) migrate to the Sargasso Sea for reproduction was through the panmixia theory. But recent studies in swim-tunnels indicate that eels can swim four to six times more efficiently than non-anguilliform fish such as trout. After a laboratory swim trial of eels over 5,500 km, the body composition did not change and fat, protein and carbohydrate were used in the same proportion. The study demonstrated for the first time that European eel are physiologically able of reaching the Sargasso Sea without feeding. Based on catches of newly hatched larvae, temperature preference tests and elementary tracking of mature hormone treated animals, it can be hypothesised that spawning in the

Sargasso Sea is collective and simultaneous, while presumably taking place in the upper 200 metres of the ocean. Successful satellite tracking of long finned female eels in New Zealand has been performed to monitor migration pathways. Implementation of this new technology is possible in this species because it is three times larger than the European eel (pp. 561-570).

Scientists from NIWA and the University of Tokyo have cooperated in a programme using new pop-up tags that record and store environmental information along the eel's journey. The tags are programmed to release (pop-up) from the fish at predetermined times, ascend to the surface, and beam the stored information to a satellite. Tags record water temperature, day length, and times of sunrise and sunset; these latter data can be used to estimate latitude and longitude of the eel each day, and hence obtain tracks of their swimming directions. The data calculated that the long finned eel swam at speeds ranging from 26 to 31 km per day and travelled long distances (Chisnall et al. 2000, p. 17).

Figures 7(a) and 7(b). Jellyman (2000) visuals show glass eel and elver stages of development during migration (p. 17).



It should be noted that the female breeds at the end of her life cycle and may live up to 100 years therefore any satellite tracking data is going to take many years to accumulate. The Sargasso Sea is where the long finned eel go to lay what become *glass eels* to return to the rivers of New Zealand to live. The Sargasso Sea is named after the kind of seaweed which lazily floats over its entire expanse; rotates slightly itself and changes position as

its surrounding currents change with the weather and temperature patterns during different seasons.

iii. Eel/Tuna cultural and mythological significance for hapuu

The fresh water long finned eel was very important to traditional hapuu Maaori because of its food supply and the mana attached to the ownership of an Eel Weir. In fact both the eel and the weir were classified in Maaori culture as a *taonga* and have been important for a Hui, tangihanga and other social activities, including gift and economic exchange. They also feature in tribal traditions and legendary mythology with the cultural significance in its celestial origin as a supernatural being and it was the eel that played the part of the serpent in the Garden of Eden in Maaori mythology.

Ngaati Mahuta traditional Maaori mythology legend (n.d.) claims that *Ranginui* or Rangi, the Sky Father and *Papatuuuanuku* or Papa, the Earth Mother, clung together with their seventy-seven sons between them with seven emerging as leaders.

- First *Taane*, the catalyst whose deed would create the world by producing people, the trees of the forest and all the birds,
- then *Tangaroa* as god of the oceans and waterways.
- *Taawhirimatea* as the creator of the winds and the natural elements,
- *Haumiatiketike* the governor of the foods of nature,
- *Tuurongo* for the cultivation's of man,
- *Tuumatauenga* for war or the fighting spirit and *Whiro*, the eldest of the seven, the balance keeper.

Taane Mahuta, the god of the forest, placed his shoulders against the earth and his feet upon the sky, gradually managing to thrust his father away from his mother. As a result there is day and night, and the rain, dew and mist are the tears of the heart-broken Ranginui and Papatuuuanuku who had no desire to be separated. However Taawhirimatea followed Ranginui to the sky and unleashed great storms to attack his brother on earth, Tangaroa fled to the ocean, Tuurongo and Haumiatiketike, the gods of plant deities were hidden by their mother, leaving Tuumatauenga the god of uncreated man, standing firmly upon the earth.

Best (1942) comments that the objects of the Whare Waananga were to preserve all desirable knowledge, and to hand it down without any change by interpolation, omission, or deterioration. The ideal was a highly pitched one for script less folk; it called for ceaseless care and vigilance on the part of the higher grade or Tohunga. Any form of change in olden teachings met with strong disapproval; any questioning of ancient teachings was held to be a grievous insult to Taane, the origin and patron of knowledge. The expression Whare Waananga denoted all high-class knowledge, esoteric lore and the higher forms of religious teachings. All of such matter represents the contents of the kete aronui, the most important of the three baskets of knowledge. There was much highly tapu ritual pertaining to the methods and conduct of these teachings. The teaching commenced at sunrise and continued until the sun reached its zenith, when it ceased. It could not be continued longer because the sinking sun is connected with decay and death. The great aim of the Whare Waananga was to pass on old-time lore unchanged by succeeding generations. According to the teaching of the Maaori there are twelve heavens and Io dwells in the uppermost one, known as Tiki-tiki-o-rangi, and also as Te Toi o ngaa rangi with the abode of Io ia at Rangiatea. The following are the names of the twelve heavens, commencing with the uppermost one: Te Toi o ngaa rangi, Tiritiri o matangi, Rangi an o na o ariki, Rangi te wawana, Rangi nui ka tika, Rangi mataura, Rangi tauru nui, Rangi matawai, Rangi maiire kura, Rangi patauri, Rangi tamaku, Rangi nui a tamaku (pp. 65-89).

Traditional tangata whenua Maaoritanga was very well structured society, with a sophisticated complex theory of knowledge and philosophy in a similar way that many of our highly respected civilizations existed. As an illustration: the Greek Aegean religion (in the second millennium BC) revolved around the cult of a mother goddess, but later the Greeks worshipped many divinities that fought, squabbled and loved just like humans as the gods of Zues, Apollo, Enos, Athena and Poseidon.^{vi}

Mitford (2000) comments that the classical religions of Europe and Egypt no longer exist as belief systems although their mythology still survives but Egyptian gods have developed from the merging of two earlier cultures. First one with gods in human form and then one with animal shaped gods of Isis, Thoth and Osiris. Dragons have also

played a mythical role in Chinese, British and Viking cultures and are very similar to the mythical Maaoritanga where a tarakona represents the dragon or a taniwha represents a monster found near water (p. 17).

iv. Eel/Tuna gathering a detailed study

Habib (1989) comments that traditional hapuu Maaori communities regulated eel harvests and controlled access to fishing areas through a system of tapu rules, usage, beliefs and ceremonies whose violation could bring retribution from both supernatural and human agents. Eel were traditionally gathered according to the Maaori season calendar dependant on the phases of the moon, and with a warm and moonless night the best time to ensure a successful catch. Therefore a detailed study of the eel and its habits were made by each hapuu generation and fishing was divided into a lunar calendar, preceded by karakia from the tohunga and waiata throughout fishing to ensure a good catch (pp. 80-83).

To illustrate the karakia placed in the Endnote would have been recited by a chant from the tohunga calling upon the gods to provide a good catch for food to feed the people.^{vii}

Oral Ngaati Mahuta history (n.d.) claims the life cycle of the long finned eel/tuna is most interesting includes where the mature adults migrate from fresh water to the sea in order to spawn after which it is believed they die. However some Maaori people do not authenticate Elsdon Best publications but Waikato kuia and kaumaatua have verified that what he has written in the publications about eels/tuna and fishing is credible and has been substantiated. While at the same time similar accounts relating to eel/tuna weirs and eel gathering are recorded in Charles Marshall's hand written diaries and focus on Ngaati Pou, Waikato. Charles Marshall is my maternal great-great-great grandfather whose second wife Te Raro II was a Ngaati Pou hapuu Chieftainess from Waikato, and he was (and is still) accepted as a Waikato Rangatira.

Charles Marshall (1872) stated, "That ownership disputes about the Eel Weirs were common along hapuu boundaries because of the food value and the associated mana that accompanied the ownership right" (hand written diaries held at the Auckland Museum Library from when he arrived in 1929 as an early trader).

Charles Marshall (1872) also stated, "To his good friend Pootatau" (hand written diaries)

Best (1986) stated, Mr. J. Ormsby from Otorohanga verifies the best nights for eeling are a warm and moonless evening – ‘as warm close night is an eel night’ – being January, February and March, but usually stopped after May in traditional times. Then following the Maaori Moon numbers: 1, 2, 3, 4, 24, 25, 26, 27, 28, 29, 30, said to be the best nights for eeling (29 is the best time for any food gathering) and 10, 14, 21, 22 are unlucky for all forms of fishing. Fish are restless on the sixth night of the moon and by the eleventh are unapproachable and difficult to take until the twenty-third night (p. 109).

Karaka Tarawhiti from Waahi Paa Waikato, stated, The best nights for taking eel with a hinaki/eel pot are on the moon phases of (4, 5, 23, 24, 25, 26, 27, 28, and 29) that the eel takes the bait. Also when many moths are seen fluttering around a fire that is an indication that – it is a good time to gather eel (as cited in Best, 1986, p. 109).

Captain James Cook’s (1770) stated, “That Maaori was somewhat partial to the rancid oil” (as cited in Wright St. Clair, 1971, p. 19).

In fact the *rancid oil* was the unsaturated fat derived from the eel that contained omega-3 that I have claimed in this thesis.

Best (1902) also says the more traditional way was to feel under banks with ones hands and grope under stones in the river-bed with ones feet and if the water is warm then eel are there. And if it is raining it is considered to be suitable called *marangai* which means eel-rain (p. 65).

Karaka Tarawhiti, stated, Weirs were not constructed in the Waikato River because of the depth of the water, but in the tributary streams usually January, February and March. The two kinds of eel-pots (made from woven Harakeke) were used, a large one for the deeper water called *hinaki tarino* and a small one with an entrance funnel at each end termed *waharua* and was used for shallow lakes and lagoons. The tuna should not be taken with a hook but: by diverting, by hand, in canals, in flood, in hand nets and nets during the daytime; with eel bobbing conducted at night and not when the water is discoloured and using worms, huhu grubs and spiders for bait (as cited in Best, 1986, p. 168).

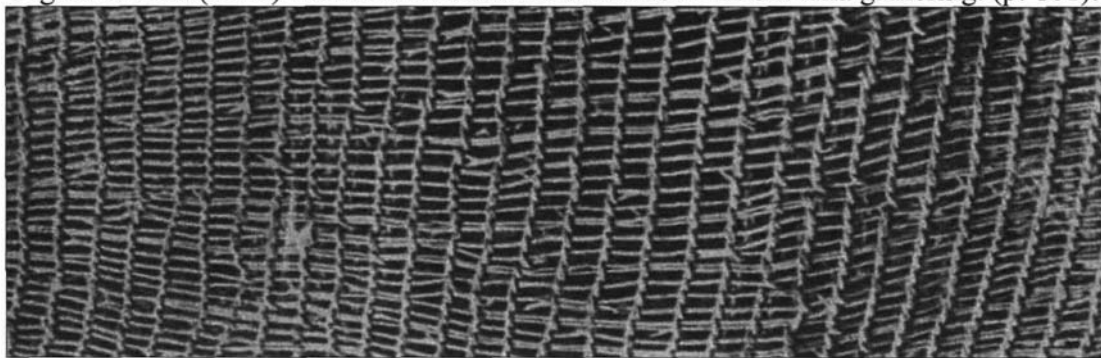
Best (1929) says the following Maatutua waka karakia used by Ngaati Awa hapuu call upon Tangaroa the god of eels for a good catch when eel-bobbing:

To poa, to poa, to poa tahuri ke, to poa karapa ke, tikina mai kumekumea, tikina mai takatakahia, tikina mai haparangitia, Tangarao kia u, Tangarao kia ngoto mai, oi whiwhia, oi rawea to poa, tahuri mai (as cited in Best, 1929, p. 89).

Best (1929) says that the following waiata was used when gathering from a waka to provide food for the people from the Ngaati Awa Whakataane River:

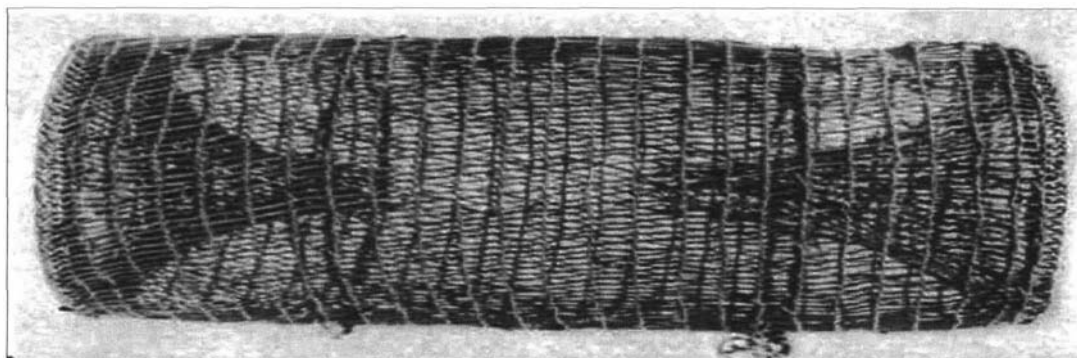
Hei kai mau te taangata, maakutu mai, mahara mai, kei reira to hara, harahara aitua, harahara a tai, i pakia ai koe, i rahua ai koe, niniko koi tara, kia u o niho, niniko koi tara koe, kei te tai timu, kei te tai pari kei Rangiriri, hau kumea, hau toia, nau ka anga atu, anga atu, nau ka anga mai, anga mai (as cited in Best, 1929, p. 21).

Figure 8. Best (1929) woven native flax *harakeke* used for eel/tuna gathering. (p. 181).



Best (1929) comments that *Eel Weirs* were erected on the rivers to catch the eels as they returned to the sea on their annual migration and said to keep them alive they were placed in large wickerwork baskets or eel-pots. Known as *hinaki* whahakatikotiko they were placed in the water and secured with a cord until they were eaten. When the eels were coming down from the swamps in great numbers it was impossible to deal with them except in bulk, so relays of men were set to emptying the eel-pots as they filled at the weirs (p. 82).

Figure 9. Best (1929) eel-pot with two entrances set in open waters (p. 169).



These were emptied regularly day and night while the eel-run continued, eels being placed alive in pits, as, dry pits in which they could not live long, this process are called tuna kope. There were two methods of drying eels, known as *kope* and *kau*i commencing in the ten month (by the traditional lunar calendar and February of today) and stopped after the twelfth month (May of today). Then in the drying process these eels were transfixed or spitted on stiff fern-stalks and in this form were leaned in long rows against rods of Maanuka fixed in a horizontal position. To such long series of rods were erected in parallel lines a little distance apart, and the two long rows of skewered eels leaned inward toward each other.

Best (1929) has said the commonest method of catching eels was with the eel-pot and the bob, spearing, netting, striking or by hand but not using with a hook or gorge or in specially designed and made eel-pots and nets called *hinaki* that were treasured as an art. The bob or mounu or tui made up of worms on a string in order to form the bob with the would-be bobber using some fibres of Harakeke flax or cabbage tree leaf, or shred the inner bark of Hoheria or ribbon wood. Then a fine piece of maanuka or a rush-culm, to which the twine like fibres were attached to lure the eels by using a twig or rush as a bodkin passing the threads through a number of worms longitudinally to produce a worm-enveloped string. A number of these joined together with the ends of the fibres tied together long enough to be utilised in tying the various doubled up strings of worms to the rods (p. 121).

The taking of all fresh-water fish was regulated in the same manner as was the snaring of rats and birds: individuals, families and sub tribes had to confine their fishing activities to such waters as they were entitled to work. Thus different families, clans, or tribes might have the right to fishing privileges of different portions of a stream or river. Reverent R Taylor (1894) claimed that the small eels are often dried by being hung up in the sun, when they become like bags of rancid oil; the larger ones are split open and dried in the usual way (Best, 1977, p. 91).

Best (1929) says traditionally when eel catches were heavy the excess were dried and preserved as food-supplies, by a fire process known as *ahi rara tuna* . The eel were cut open, cleaned with the head and backbone removed, and then lay on an elevated grating

of green rods, under which a fire burned. As a result they were dried and partially cooked by the heat, after which they would be stored by hanging or packed in baskets. Then when required the dried eel or *tuna marake* were cooked in a steam-oven to soften them (p. 96).

Figure 10. Best (1929) Diagram to demonstrate design of eel-pot (p. 158).

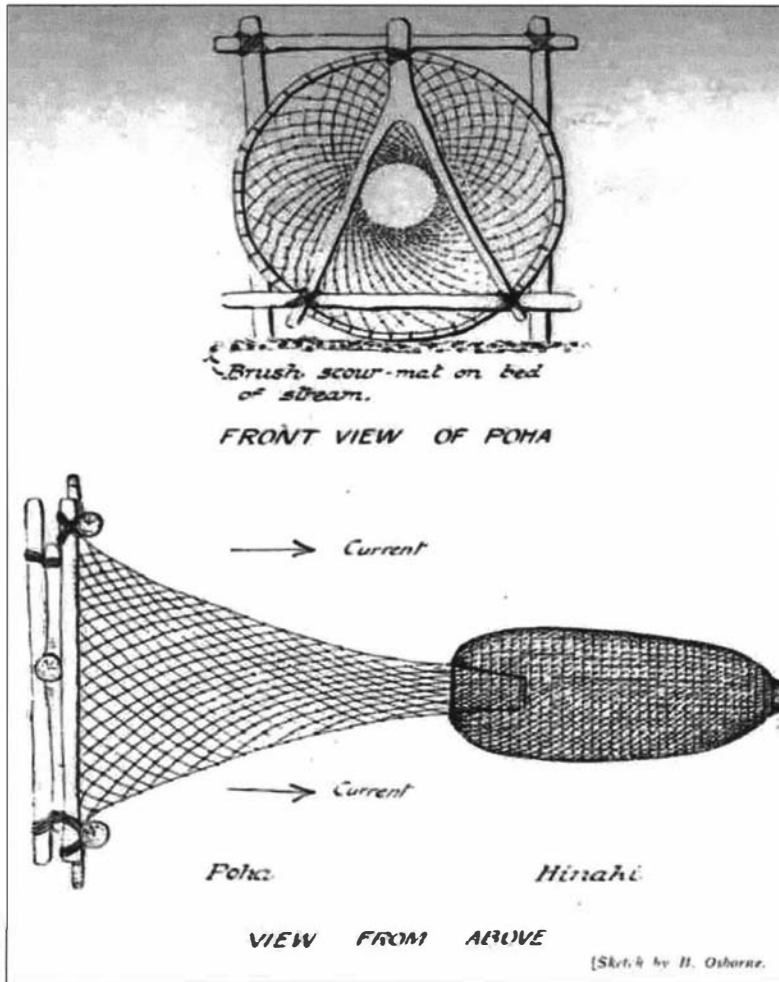


Figure 11. Best (1929) Harakeke woven eel-pot with leading-net (p. 158).

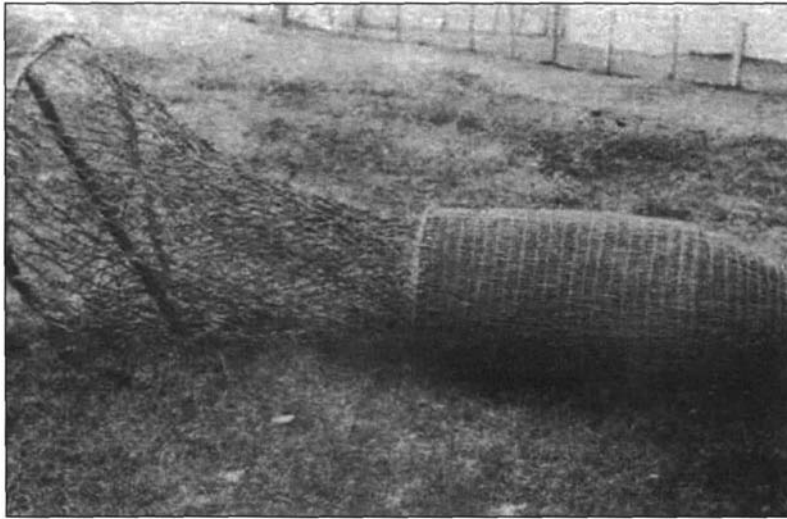
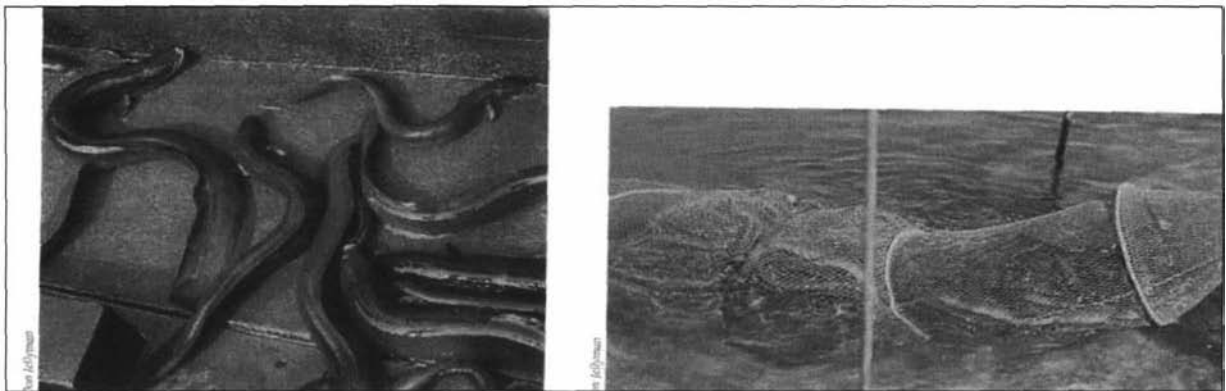


Figure 12. Jones (2005, p. 35). Eels recently caught for commercial purposes.



Extensive studies of New Zealand eels showed that seventy per cent of the oil of feeding eels is in their tails and when adult eels metamorphose prior to migration, there is a shift so that the oil becomes more even and a reason given why migrating eels are preferred for eating (Shortland, 1950, p. 422).

Thomas Brunner, an early South Island explorer emulated the traditional haangi by saying, “That if eels are carefully dried and skinned, the head cut off and opened down the belly, the bone carefully taken out and the flesh exposed to the smoke to dry, they would last some months” (as cited in Paul, 1996, p. 1).

The traditional Maaori way of cooking called a haangi is still used today and it ensures that all essential nutrients are preserved similar to ‘the pressure cooker method, where steam is trapped underground. The haangi and is an oven dug into the earth initially lined with kindling wood then

heavier wood such as Maanuka or white tea tree or Kaanuka red tea tree and Puriri to form a platform for the suitable stones. Stones that do not crumble with the heat, volcanic rocks are better than metamorphic or sedimentary rocks and must be thoroughly dried prior to use.

Meat such as eel is placed into food baskets that traditionally were woven from Harakeke but today containers can range from elaborately welded perforated steel canisters or simple mutton cloths or tin foil. Meat is put into a separate basket to either kumara or potatoes and other vegetables put into a separate container. Then a covering, traditionally Harakeke but today cotton and sacking is used with white cotton used to cover the food and the sides of the baskets before they are put into the hole. Recipes for using eel have evolved in many societies becoming established as delicacy, the following recipes from a variety of nations indicates that eel was and still is an important part of dietary and culinary consumption (Paul, 1996, p. 2).

v. Eel/Tuna gathering at the time of Urbanisation

Numerous valuable interviews from Tainui kaumaatua that has been recorded stating,

King Kooroki gave us an old launch called Poketoatara that was a very old boat, nothing flash, but we loved it that was used for setting our *hinaki*; most times *hinaki* would be set using rowboats along the Waikato River. Setting and collecting *hinaki* was a major operation for every Waahi and Tuurangawaewae Poukai, as well as the King's Koroneihana. We never ate the flesh of the tuna. That was for the manuwhiri, but we were allowed to eat the bones. Kooroki would always be waiting on the riverbank when our men returned. The King always knew when they were due home. Our men loved to see him standing on the bank of the river.

As soon as everything was off the launches the men would tip the tuna into 45-gallon drums. They'd throw a couple of handfuls of salt into the drums, which would clean and take the slime off the tuna. The old people would say to us "dig a hole, put all the guts and parts not eaten into the hole, don't throw it back in the river". The first lot of in the first *hinaki* drawn up went to the King and his household and always, it was a task for men only. They got tuna from all the waters but the Waikato, Waipa and Mangawaro waters were where most of the *hinaki* were set.

The women never went. The women stayed home. The men did it at night. The women would go down after our men had gone to work the next morning, hang the tuna and start cutting them. The women would first gut them, split them open then hang them on lines down by the Waikato River

bank. To preserve them we filled containers of water and again put a lot of salt in. We would test the water by throwing a potato in and if it floated that indicated there was enough salt. Next we would bone the tuna then we would put the eels in the containers for a short period of time and later take them out and hang them out on miles of line (as cited in *Kooroki My King* 1999, pp. 184-188).^{viii}

To sum up, so far, in this thesis, the long finned eel was a nuclear to traditional Maaori society as a food staple and as a disease preventative source both woven into the Maaori culture tapestry that were revered as something very special and immortalised as a mythical gift. Eels provided the preferred fish food supply to traditional Maaori, were (and still are today) considered to be extremely desirable and such food preserves were highly prized and sometimes fought with tenacity particularly for those inland where the possession of streams, lakes, and lagoons yielding a good supply of eels. Traditional Maaori realised the beneficial effect on health through consumption of the eel to keep them healthy and as result studied and noted of all aspects of the eel. This knowledge was then handed down to subsequent generations who gathered more information to also hand on to their progeny and the knowledge ensured good health and well-being for each subsequent generation. Indeed the chemical assay tests clarify that the fresh water long finned and the salt water conger eel did contain omega-3 thus preventing the chronic Type II diabetes mellitus.

vi. Eel/Tuna and the Hydro-electricity Development

Since the establishment of New Zealand's pastoral farming from the 1880s and the development hydro-electricity generating stations from 1945, together with forestry and associated industries, the rivers and their tributaries have been utilised for the disposal of effluent, animal carcasses with toxic and chemical waste. Local Government and Councils have only moderate by-laws to enforcement and in some areas have none, and usually allow farmers and industry to unnecessarily pollute waterways. As a consequence they have become polluted and unless stringent by-laws are first introduced and second enforced immediately then the pollution will be irreversible within twenty years. Today tribal members believe the polluted and over-fished lake can no longer sustain this practice, causing them to suffer a loss of mana. The pollution is contributing to the ill

health if Maaori and the pollution substantially altered the taste of the eel thereby forcing many Maaori to stop eating the traditional long finned eel food source.

Water is a bountiful natural resource used by all New Zealanders and is one of the country's most important energy resources but not in some futuristic sense, but right now as the fuel that drives turbines to create electricity. Hydro-electric generation is a sustainable green resource of energy where water is simply stored so that it can be released through the turbines when it is required for electricity production. Production of hydro electricity helps to reduce the need to burn fossil fuels which produce greenhouse gases that contribute to generate global warming.

Since the late 1930s that followed an electricity supply crisis that had been steadily worsening, the construction of the flow gates at Taupo spearheaded a 10-year plan to develop the Waikato hydro scheme. Construction of the gates began in 1940 and was completed in 1941, subsequently strengthened to withstand the increased traffic on State Highway 1. Lake Taupo is the source for the Waikato River, providing natural flow of water which is tapped to generate electricity from a catchments area of 3300 square kilometers. The largest input comes from the Tongariro River and from the Tongariro Power Development both of which drain the peaks of the Kaimanawa Ranges and Tongariro National Park. The strategic location of the Waikato hydro system in the upper North Island is a key factor in the New Zealand electricity supply system, helping to reduce the need to transport alternative electricity over long distances resulting in energy losses. It is among the worlds most efficient, with a centralised control room in Hamilton. In fact nine hydro stations were constructed on the Waikato River from 1924 at Arapuni, Aratiatia, Lake Karapiro Maraetai (two), Whakamaru, Atiamuri, Lake Ohakuri and Waipara.

Aratiatia about 13 kilometres downstream from Taupo with the smallest hydro reservoir water is stored only for a short time after release from Lake Taupo.

But because of the scenic qualities and the discovery of geothermal activity at nearby Wairakei it was not until 1954 that the government began investigating ways to use the Aratiatia Rapids for electricity generation. Construction work began in September 1959 creating a lake that was filled in March 1964 and is largely a *run of river* ((Mighty River Power (2002 leaflet number 2).

The first of the Maraetai's power houses (the third in Waikato system) began producing electricity in 1952 from

three of its five turbines. The second powerhouse was not completed until 1970. The Whakamaru power station as the fourth constructed plays a pivotal part in the Waikato River hydro system, as well as being a significant contributor of electricity to the national grid. It is also used to connect the Mokai geothermal station to the national transmission system and with other local stations provides power quality services to the central North Island. Atiamuri is eight kilometres downstream from Ohakuri and takes water directly from the larger upstream station; with the relatively small storage of Lake Atiamuri means the timing of its generation production is critical, particularly if Ohakuri is generating at full capacity. The Waipara as the smallest power station supplements other stations during periods of heavy demand which can result in its lake level fluctuating over a relatively wide range. Lake Ohakuri is the largest lake on the Waikato River and plays an important role in the management of daily water flows in the Waikato Hydro system with the project approved in November 1955 and completed in January 1961 (Mighty River Power (2002 leaflet number 6).

The Arapuni power station is the oldest station on the Waikato River as the first government built hydro-electric station construction began in 1924, commissioned in June 1929 but did not start operating until May 1932 and the turbines upgraded in 2001. Karapiro was constructed in 1947 and 1961 and additional strengthening work completed in 2000, is 188 kilometres downstream from Lake Taupo to help manage flows in the lower river.

However, in conclusion hydro-electricity development was not the only option available in the region for electricity generation as geo-thermal generation was a viable alternative. Thus the unavailability today of the eel as the staple Maaori diet is reflected in the poor health and lack of well-being, especially the high incident of diabetes Type II in Maaori and the periphery diseases caused by it. The causes of the decline of the traditional staple fresh water long finned eel for Maaori have been primarily through:

- the introduction of trout in the 1880s
- the introduction of carp in the 1880s
- the development of over 600 hydro-electric generating stations that reduced the number of eel elvers available to develop destroyed by the turbines.

vii. Geothermal an alternative to Hydro-electricity

The sources of renewable energy, such as wind power, solar cells and hydro-electricity rely directly or indirectly on the weather elements, but geothermal energy comes from within the earth itself by the pressures of gravity. It is a vast resource, most of which is deep within the earth that can be economically tapped when it is relatively near the surface, as evidenced in hot springs or geysers. This energy source is essentially inexhaustible and it is possible to extract heat faster than it is generated at any local site.

Lawless (2001) comments that in contrast to oil fields which are eventually depleted, properly managed geothermal fields keep producing indefinitely and is more abundant in some parts of the world. The richest region is the East Pacific Rim and in the East Pacific geothermal resources are found along the coastal regions of Latin America, Central America, and North America all the way to Alaska. On the west side, they are widely distributed in Eastern Russia, Japan, the Korean Peninsula, China and island countries such as the Philippines, Indonesia, New Guinea, Australia and New Zealand. This buried energy source is used directly both to supply heat and to generate electricity that can be generated from hot water pumped from beneath the earth's surface, from steam extracted directly, or from steam produced by circulating water into fissures in hot rock below the surface. First harnessed for electricity generation in Italy in 1904, geothermal energy is now used in scores of countries, although in many cases it is used primarily to supply hot water to bath houses (p. 3).

The most significant use of geothermal energy in New Zealand is perhaps the geothermal power station, built during the 1950s at Wairakei near Taupo, and the development at Ohaaki between Wairakei and Rotorua. These fields take steam pressure from underground and pipe it into turbines generating electricity. New Zealand's achievements in this field have led to the development of further fields overseas, in South America, Indonesia and Philippines. The Wairakei field produces about the size of a conventional hydroelectric power station on the nearby Waikato River. Although some geothermal energy is used at a geothermal plant at the Rotokawa geothermal field and the Mokai

field does have significant future development opportunities, it is under utilised as a valuable source of electricity generation.

Future geothermal energy development

Geothermal heat is potentially a huge source of energy and one that does not disrupt the earth's climate. In Japan, an abundance of geothermal energy is close to the surface, as the thousands of hot spring spas throughout the country attest. It is estimated that the potential electrical generating capacity of geothermal energy in Japan could meet 30 per cent of the country's needs. Some countries are so well endowed that they can run their economies entirely on geothermal energy.

To sum up, electricity today is predominantly generated by hydro-electricity stations situated on a number of the main rivers in both the South and North Islands, the same rivers for the annual eel migration route. Elvers today still follow the long established annual migratory river patterns throughout New Zealand and hydro-electric power station turbines destroy thousands of elvers during their annual migration. A compromise needs to be established to meet the populations' electricity requirements and the annual elver migration to succeed. If eel farms could be established to prevent the elvers from reaching the hydro-electric generating turbines or, alternatively some form of channel diversion strategically established at selected hydro-electric stations, to illustrate, the first three hydro-electric generating stations that the elvers encounter when migrating from overseas. In conclusion the unavailability today of the eel as the staple Maaori diet is reflected in the poor health and lack of well-being, especially the high incident of type II diabetes in Maaori and the periphery diseases caused by it.

Kia tupu, kia hua, kia puaawai.

To grow, prosper and survive.

Part four — Validating of Eel/Tuna Diet

Omega-3 from finfish

i. Medical Clinical Trial Findings

Recent scientific and medical research findings have confirmed suggestions and theories that diet is a contributing factor to the prevention of certain diseases and that diet can control and prevent these diseases. More than twelve years ago Dyerberg and Bang first reported a lower incidence of coronary heart disease in Greenland Eskimos. This finding was attributed to their diet, which was rich in fat from whale, fish and seals. Further analysis revealed that the Eskimo's had lower levels of plasma cholesterol and triglyceride and high plasma concentrations of certain polyunsaturated fatty omega-3 is a particular type of polyunsaturated fat used by the body to make various hormone-like substances that control many body processes, because the body cannot manufacture them they must be consumed in our food to ensure good health. The colour varies from pale, light yellow to orange with a characteristic odour ranging from bland to fish-like.

1. Nestel (2001) says the effects of fish oils, fish and omega-3 (n-3) fatty acids on cardiovascular functions and outcomes in recently published studies are reviewed. The original hypothesis that eating fish is protective has been largely sustained but refined to indicate benefit mainly from those who are increased risk. Biologic plausibility has been extended from the established benefit of lipid lowering to improvements in vascular and arterial functions. A major intervention trial in patients with cardiovascular disease has confirmed the benefits of moderate amounts of long-chain n-3 fatty acids; thus, the triad of evidence comprising epidemiology, biologic plausibility and interventional success through randomised, controlled trials has been established (pp. 68-73).
2. Dewailly, Blanchet, Lemieux, Sauve, Gingras, Ayotte and Holub (2001) concluded the consumption of marine products as the traditional Inuit diet with the main source eicosapentaenoic acid and docosahexaenoic acid,

(part of the omega-3 family) appears to beneficially affect some cardiovascular disease risk factors (pp. 464-473).

3. Hardman (2001) says omega-3 polyunsaturated fatty acids (the type of fat found in fish oil) have been used to kill or slow down the growth of cancer cells in culture and in animal models and to increase the effectiveness of cancer chemotherapeutic drugs. These positive results justify clinical testing of fish oil content in conjunction with cancer chemotherapy (pp. 2041-2049).
4. Das (2001) claims the low rates of coronary heart disease were found in Greenland Eskimo's and Japanese exposed to a diet rich in fish oil containing omega-3. Thus there appears to be a close interaction between the central nervous system, endocrine organs, cytokines, exercise, and dietary omega-3 fatty acids. This may explain why these fatty acids could be of benefit in the management of conditions such as septicemia, and septic shock, Alzheimer's disease, Parkinson's disease, inflammatory bowel diseases, diabetes mellitus, essential hypertension and atherosclerosis (pp. 57-75).
5. O'Keefe (2000) maintains that during the past twenty-five years the cardiovascular effects of marine omega-3 (omega-3) fatty acids has been the subject of increasing investigation. In the late 1970s, epidemiological studies revealed that Greenland Inuits had substantially reduced rates of myocardial infarction compared with Western control subjects. These observations generated more than 4,500 studies to explore this and other effects of omega-3 fatty acids on human metabolism and health. This review summarises the emerging evidence of the use of omega-3 in the prevention of coronary heart disease (pp. 607:614).
6. Rudnicka and Birch (2000) say lipid abnormalities occur more infrequently in Type II diabetes than in the non-diabetic state, and there is now considerable evidence that the rate of diabetes in the Asian and Afro-Caribbean population is approximately three times that in the white Caucasian background population. They also say certain ethnic groups

world wide have a much higher prevalence for example the Pima Indians of Arizona have a prevalence of 50 per cent and people originating from the Indian sub-continent are particularly prone to Type II diabetes (p. 19).

7. Burr (2000) confirms the discovery of omega-3 fatty acids came about as a result of contacts between scientists in different countries and disciplines that followed up on some unexpected observations. There are probably other fields of research in which discoveries of similar importance await the application of lessons from this story (pp. 3975-3985).
8. Ebbesson, Kennish, Ebbesso, Go and Yeh (1999) found that eating fatty fish reduced the risk of primary cardiac arrest and sudden death by fifty per cent. A study of diabetes among Eskimo's has found that glucose intolerance and insulin resistance are associated with a move from traditional fish and marine mammal diet, high in omega-3 fatty acids and low in saturated fat to commercial foods (pp 145-165).
9. Mori, Bao, Burke, Puddey, Watts and Beilin (1999) concluded that incorporating a daily fishmeal into a weight-loss regime was more effective (than either measure alone) at improving glucose-insulin metabolism for obesity in hypertensive insulin resistant patients (p. 817-825).
10. Pirich, Gaszo, Granbegger and Sinzinger (1999) concluded that both *ex vivo* and *in vivo* platelet activation parameters exhibited signs of decreased activation by a six-week diet supplemented with omega-3 fatty acids. They determined omega-3 may be beneficial in reducing atherothrombotic risk in patients with hyperlipoproteinemia (diabetes mellitus) Type IIa and IIb (pp. 80-86).
11. The Nutrition Taskforce (1999) has estimated that about one third of all deaths in New Zealand were believed to be attributable to dietary factors (p. 89).
12. The Denver Post (1999) published an editorial claiming labels now on food do disclose the amount of saturated fats. But they do not disclose the amount of *trans* fats, the form of fat that is created when vegetable oil is

hardened into margarine and shortening. And increasingly, medical researchers link *trans* fats to heart disease, the No. 1 cause of death for American men and women. Still some experts argue that *trans* fats may be more unhealthy than saturated fats. However some manufacturers now promote products that are low in saturated fats without disclosing that the same foods are high in *trans* fatty acids that may be even more likely to clog the arteries (p. 7).

13. Harris (1997) says the effects of marine omega-3 fatty acids are now well established; what remains is to determine the mechanisms behind these effects and, more importantly, their health consequences (p. 16).
14. Nestel (1997) trials on people eating linolenic acid (one of the omega-3 fatty acids) rich foods arterial compliance or elasticity, an index of blood vessel health, improved dramatically in a few weeks.
15. Nestel (1996) comments that the USA Public health recommendations support the equivalent of about 400mg of omega-3 fatty acids from fish daily, or about two or three fish meals of fatty fish such as mackerel, salmon, sardines, tuna and herrings per week, will provide this amount. He claims that at least 1 gram per day of the plant precursor containing linolenic acid is also advised. But this essential omega-3 fatty acid found in many green leafy vegetables in particular in oils from flax, canola and walnut (p. 8).
16. Benton (1997) claims lipids account for about 50% to 60% of the dry weight of the brain, the comment should be taken seriously (p. 227).
17. Singer (1993) says that there is increasing evidence that the blood pressure-lowering effect of omega-3 fatty acids is weak in normotensive (normal blood pressure) subjects, but significant in patients with mild hypertension. His literature review indicates more than ten mechanisms are involved in the blood lowering actions of omega-3 fatty acids. He claims these can be considered with many reports on dietary polyunsaturates (the good fat known as PUFA) with few studies

specifically addressing the question of omega-3 polyunsaturates and human vasomotor function in vivo *in humans* (pp. 494-505).

18. Knapp (1993) concluded in his clinical trial the following conclusion investigating dietary enrichment with omega-3 fatty acids may be having multiple effects on vascular parameters that additively result in a lowering of blood pressure in hypertensive individuals. He says further work is needed to determine the mechanism of this effect, and its actual role in producing long-term protection. Clinically significant benefits in patients with hypertension, in those with other forms of vascular disease, and in the general population of countries having high rates of atherosclerosis (hardening of the arteries causing high blood pressure) and its complications (p. 247).
19. Gurr (1992) comments that human tissues are unable to make all the fatty acids found in the body or required by the body for perfect health (p. 121).
20. The Health and Research Council of Australia (1991) say omega-3 is a particular type of polyunsaturated fat essential for good health, by making hormone like substances that control many body processes. However as the body cannot manufacture them we need to obtain them from the food we eat (p. 5).
21. Lees and Karel (1990) say patients with both Types I and II diabetes mellitus are at increased risk for the premature development of arteriosclerosis. Diabetes is a risk factor for both coronary and peripheral vascular disease and several factors, including hyperglycemia, hyperaggregatory platelets, and lipoprotein abnormalities, are known to occur in the diabetic patient, all of these may be involved in the enhanced predisposition for arteriosclerosis. Diabetes mellitus has been reported to be exceptionally uncommon in Greenland Eskimos, it has been speculated that this may be linked to the dietary habits of this population (p. 35).
22. Horrobin (1982) describes essential fatty acids (EFA's) are dietary factors which were discovered in 1929 and like vitamins cannot be made in the body but must be taken with food (p. 3).

ii. Nutritional aspects of Omega-3

Although most of the chemicals in the human body exist in the form of compounds, biologists and chemists divide them into two principal groups. First inorganic compounds that usually lack compounds are generally small ionically bonded molecules necessary to body functions, for example water, many salts, acids and bases. Second organic compounds which always contain carbon usually joined by covalent bonds, are very large molecules ideal for building blocks for body structures, for example carbohydrates, acids, proteins and nucleic acid. Lipids composed of carbon, hydrogen and oxygen with a large and diverse group of compounds and insoluble in water, for example fats and prostaglandins. A molecule of fat or triglyceride contains two substances called glycerol and fatty acid. It is the fatty acid capable of absorbing additional hydrogen in particular omega-3 because it has a joined three-chain pattern of fatty acid. The three researched fatty acids are collectively known as omega-3 fatty acids are named α -linolenic acid (ALA) eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA).

Table 13. Shreeve (1992). Common food sources for omega-3 fatty acid (p. 87).

fatty acid	source	total fatty acid %
α-Linolenic acid	freshwater fish	1- 6
	marine fish	1
	linseed	45-60
	green leaves	56
	grapeseed	10-11
Eicosapentaenoic acid	freshwater fish	5-13
	codfish	9
	Pacific anchovy	18
	mackerel	8
	herring	3-5
	sardine	3
Docosahexaenoic acid	sardine	9-13
	Pacific anchovy	11
	mackerel	8
	codfish	3
	herring	2-3
	freshwater fish	1-5

Haumann (1997) comments that during the 1970s and 1980s medical research indicated populations that included seafood as a major part of their dietary intake had lower rates of cardiovascular disease than those populations that did not. This initiated numerous studies and claims (some are not scientifically proven) and research with long chain omega-3 and diseases such as:

- coronary heart disease (CHD)
- arthritis (and inflammation)
- immunological conditions
- diabetes mellitus Type II
- kidney diseases
- skin disorders
- cancers, and
- brain development (p. 443).

Shreeve (1992) also claims that the essential fatty acids omega-3 are often referred to as polyunsaturated fatty acids (PUFA)'s because they contain among them those vital compounds the essential fatty acids (EFA)'s. PUFA's with 20 or 22 carbon atoms in their chains are called *long-chain* in order to distinguish them from those with 16 or 18 carbon atoms. The position along the row of carbon atoms at which the double bonds occur in unsaturated fatty acids is crucial to many of their properties (p. 51).

Table 14. Shreeve (1992) has tabulated Linolenic Acid as 18 carbons, 3 double bonds omega-3 polyunsaturated fatty acid (p. 88).

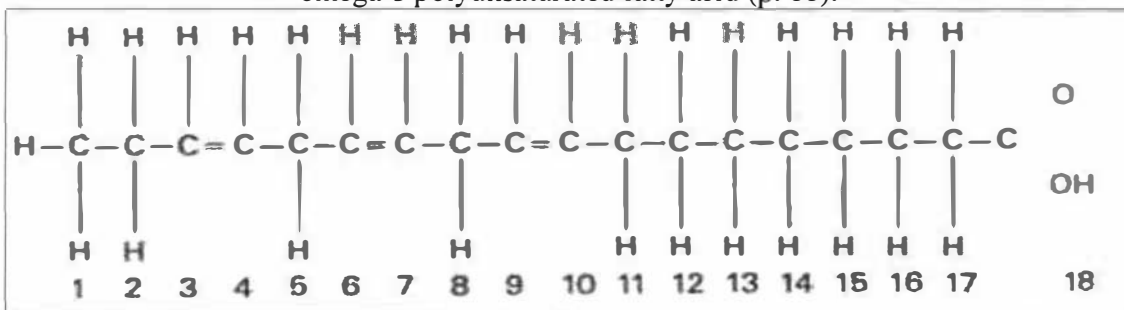


Table 15. Shreeve (1992) (below) has tabulated Linoleic Acid as 18 carbons, 2 double bonds omega-6 polyunsaturated fatty acid (p. 86).

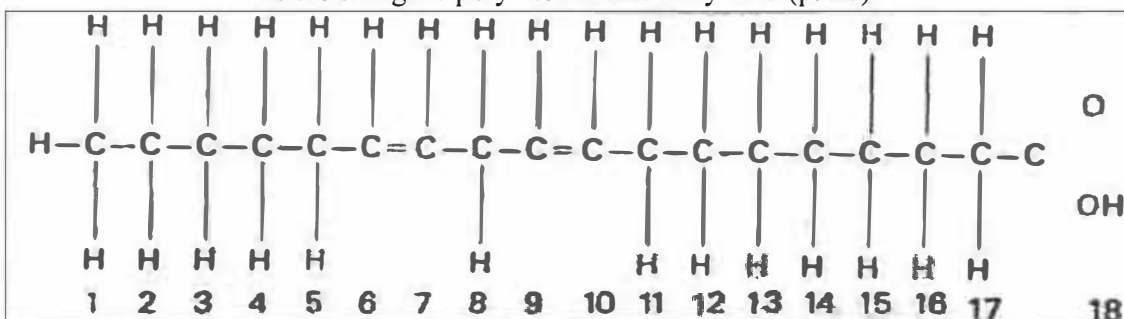
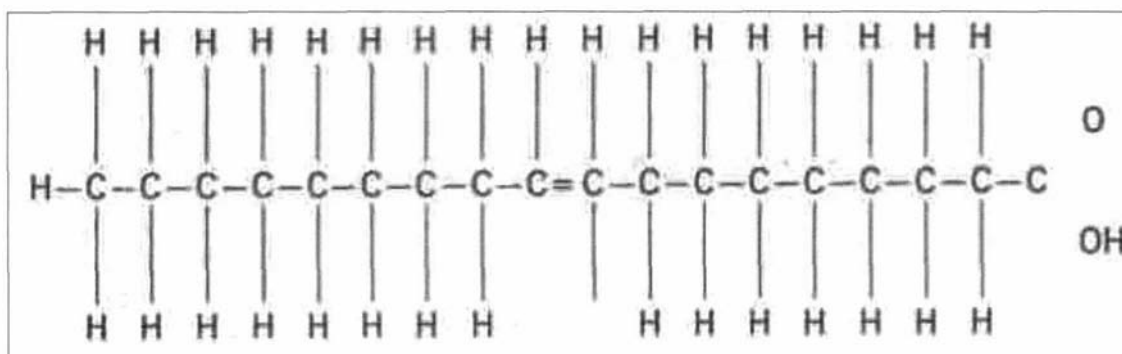


Table 16. Shreeve (1992) has tabulated Oleic Acid with as 18 carbons, 1 double bond an unsaturated fat found in olive oil (p. 87).



Shreeve (1992) claims that omega-3 included in fish oil as unsaturated fat is fat consisting of triglyceride molecules whose constituent fatty acids are not full saturated with hydrogen atoms; instead two neighbouring carbon atoms are linked to one another by double bonds instead of by single ones. This means under certain conditions, more atoms of hydrogen could be added. Fatty acids with two or more double bonds are known as *polyunsaturated*, simply meaning unsaturated in several places along the carbon atom chain (p. 51).

Shreeve (1992) then says that it is usually described by numbering the carbon atoms from one end. Double bonds are not usually found before the third carbon atom on the chain, the fatty acids which have double bonds starting in this position are referred to as omega-3 fatty acids. Double bonds beginning on the fourth and fifth carbons are rare in biological systems. The next common place for double bonds to start is on the sixth carbon atom. Fatty acids of this type are referred to as omega-6 fatty acids. ALA can be converted through desaturation and elongation to EPA and DHA. Docosahexaenoic acid, an intermediate in the conversion of EPA to DHA, is now attracting research interest because it is an important part of the long chain PUFA circulating in the blood (p. 54).

Fish oils are much more subject to deterioration than are other fats or oils because when polyunsaturates in an oil they are exposed to air, there is a time interval called the induction period which it appears no that no oxidation appears that no oxidation is occurring. At the end of the induction period, rapid uptake of oxygen, called autoxidation, takes place with the length of the induction period determined by the

temperature, by the amount of light, and by the presence of heavy-metal salts, peroxides, or other sources of free radicals (Stansby, 1990, p. 121).

Tortora & Anagnostakos (1984) say that a lipid is the correct chemical collective name for the triglyceride molecules and other fatty compounds within the bloodstream. The fats and oils we consume reach the circulation after the process of digestion has taken place. Perhaps the best way of grasping the idea of fatty acids and other essential fat compounds is to visualise exactly what happens to the fats consumed as part of our normal diet. Solid fat, such as margarine and butter, is partly melted within the mouth as it is chewed together with other foods and warm saliva. It is then swallowed and passed down the food pipe or *oesophagus* into the stomach. Here it is completely melted and partly emulsified into droplet form by the contractions of the muscular walls of the stomach. The stomach mixes solid foods with the mucus and digestive juices produced by the cells of its lining, reducing all the solids to a liquid or semi-liquid state. The contents of the stomach then pass, little by little, into the small intestine, where they are mixed with and further broken down by the chemical reaction of the digestive juices formed by the pancreas and by the cells lining the duodenum and jejunum.

Lipase is the name of the organic catalyst or enzyme which helps to digest molecules of fats. It is produced by the pancreas and is responsible for breaking down the triglyceride molecules into their constituent fatty acid and glycerol fractions. This process, once believed to be complete, is now known to be only partial and much of the dietary fat is assimilated, unchanged, in the form of a very fine emulsion. This can only be produced provided there is enough lipase present to break down a proportion of the fat molecules, together with sufficient bile salts from the liver. Once this part of the digestive process has taken place, the molecules of fatty acids, glycerol and unchanged triglyceride pass through the lining cells of the small intestine. Some of them enter the capillaries *the smallest blood vessels* and thereby the portal bloodstream and the liver. Most of them go straight into the lacteals, *the lymphatic vessels of the small intestine*, and are conveyed by them straight into the main bloodstream, without passing through the liver first. Fat can then be stored or utilised at whichever points in the body it is most urgently required (p. 648).

In addition to triglycerides, glycerol and free fatty acids, the lipid fraction of the blood includes cholesterol as highly important fat, phospholipids, such as lecithin, and some hormones and vitamins. Being insoluble in water and therefore in the blood plasma, lipids are able to remain suspended in the blood only after they have been formed into a fat/protein complex named *lipoproteins*. The cells of the blood carry this out by making an outer shell of water-soluble proteins, within which the triglycerides, cholesterol and other lipids are contained. These complexes take the shape of a small ball and they stay suspended in the blood plasma because of their water-soluble coating of protein. The percentage of proteins these lipoprotein balls contain ranges from 1 to 99 and determines their density and their size. The small, heavy, compressed balls are denser and more compact than the larger, lighter ones and are called high density or very high density lipoproteins (HDL or VHDL). They usually contain larger quantities of triglycerides and cholesterol and are heavier than water by between 6 and 28 per cent. The less dense ones are low density (LDL) or very low density lipoproteins (VLDL). They are lighter than water and contain far less lipid material and more protein (Shreeve, 1992, p. 56).

Tortora & Anagnostakos (1984) say fatty acids are catabolised differently and the process occurs in the matrix of mitochondria. The first step in the fatty-acid catabolism involves a series of reactions called *beta oxidation*. Through a series of complex reactions involving dehydrogenation, hydration, and cleavage, enzymes move remove pairs of carbon atoms at a time from the long chain of carbon atoms comprising a fatty acid. The result of *beta oxidation* is a series of two-carbon fragments, acetyl coenzyme A (CoA). Most fatty acids have even numbers of carbon atom and the number of acetyl CoA molecules produced is easily calculated by dividing the number of carbon atoms in the fatty acid by two. As part of the normal fatty acid catabolism, the liver can take acetyl CoA molecules, two at a time, and condense them to form substances collectively known as ketone bodies and their formation is called ketogenesis. They then the liver, enter the bloodstream, and diffuse into other body cells where they are broken down into acetyl CoA, which enters the Krebs cycle for oxidation (p. 640).

Stansby (1990) notes fish oils are much more subject to deterioration than are other fats or oils because when polyunsaturates are in an oil are exposed to air, there is a time interval called the induction period which it appears no that no oxidation appears that no

oxidation is occurring. At the end of the induction period, rapid uptake of oxygen, called autoxidation, takes place with the length of the induction period determined by the temperature, by the amount of light, and by the presence of heavy-metal salts, peroxides, or other sources of free radicals (p. 120).

iii. Lethicin's importance in good health

Lecithin is an essential constituent of all living cells, animal and vegetable, and appears to be intimately concerned with the absorption and transportation of fats and is odourless and tasteless. And cleanses the arteries of fat deposits particularly cholesterol the waxy substance present in all cells essential in maintenance of blood vessels and as a member of a class of phospholipides is formed by a combination of glycerol with two fatty acids. One of which is saturated the other unsaturated and with choline phosphate it disperses fat from the liver or prevents its accumulation in excess.

Szuhaj and List (1990) claim lethicin generally refers to a complex, naturally occurring mixture of phosphatides obtained by water-washing crude vegetable oil and separating and drying the hydrated gums. In addition to the phosphatides, such products contain triglycerides and other substances that are removed in an emulsion with the gums. Then they say phospholipids seem to be of universal occurrence in living organisms. As constituents of cell walls and active participants in metabolic processes they appear to be essential for life (as cited in Stansby, 1990, p. 1).

Lethicin is a part of almost all biological membranes; therefore we need to consume a great deal of this phospholipids as part of our diet. Foods such as eggs, wheat germ, oatmeal, trout, liver, soybeans and peanuts are rich in lethicin. Mammals do not have to eat lethicin molecules in order to survive; however they may have to eat some source of choline molecules. Three enzymatic pathways catalyze lethicin biosynthesis, yet only one generates new choline molecules. The cytidine diphosphocholine (CDP) and base exchange pathways do not cause a net synthesis of choline but only redistribute pre-existing molecules. The methylation pathway, catalyzed by the enzyme(s) phosphatidylethanolamine-N-methyltransferase (PEMT), makes new choline molecules by sequentially methylating phosphatidylethanolamine, using S-adenosylmethionine (SAM) as the methyl donor. This enzyme has the highest

activity in the liver, but it is also found in kidney, testes, heart, adrenal, lung, erythrocyte, brain and spleen. The methylation pathway makes new free choline molecules, as the lecithins produced are hydrolyzed. We do not know whether this source of choline is sufficient to meet the needs of mammals. Early experiments with insulin first demonstrated choline's importance as a nutrient. Depancreated dogs developed fatty liver and died. Choline administration prevented this (Zeisel, as cited in Stansby, 1990).

Zeisel (1990) noted that choline and lecithin has been used as treatments for human illnesses for decades. The major sites of action proposed for these compounds have been the nervous system, the cardiovascular system, the immune system and the organs which store and transport lipids within the body. Expanding on the mechanism of lipid transport where lecithin has been used as a treatment to prevent the development of atherosclerosis. The accumulation of cholesterol and its esters in the arterial wall are thought to result in atherosclerosis. The importance of cholesterol intake and the resulting hypercholesterolemia has been controversial. There has been an agreement that lowering LDL cholesterol is beneficial. As described earlier, one of the important functions of lecithin is to contribute to the formation of transport lipoproteins. Administration of large amounts of lecithin changes the plasma lipoprotein temporarily. Lecithin rich in linoleic acid alters the size and density of chylomicrons and VLDL by altering the coat (phospholipids) to core (triglyceride) ratio. Esterification of cholesterol is mediated by the enzyme lecithin cholesterol acyltransferase. In humans with hypercholesterolemia lecithin treatment lowers blood cholesterol. Six months after lecithin therapy was discontinued the blood cholesterol in these patients had returned to high levels. Results have not been as encouraging in studies on patients with type II hyperlipoproteinemia treated with Lipostable, an impure lecithin product this may be because less lecithin was used (as cited in as cited in Stansby, 1990, p. 333).

Schmidt and Orthoefer (1990) say that crude commercial lecithin is a mixture of oil and phosphatides with minor amounts of other substituents. A change in the relative concentration of any one of these components, or an alteration of its chemical structure, may cause some change in the physical or chemical properties of the lecithin. Lecithin can exist as a liquid, plastic or free-flowing solid. Its colour, solvent solubility,

surfactancy and chemical reactivity all can be modified (as cited in Stansby, 1990, p. 203).

iv. Eel/Tuna Omega-3 scientific assay testing proof

There was no published literature specific to the chemical assay testing for the existence of omega-3 in the long finned eel that were regularly consumed by Tainui Maori. The purpose of the chemical assay sample testing was to prove the theory that the oil from the long finned eel did actually contain omega-3. AgriQuality Laboratory Network, 131 Boundary Road, Lynfield, Auckland completed all the assay testing. First six samples (four fresh uncooked and two smoked) were assay tested on a small long finned eel *Anguilla dieffenbachii* that weighed 1.5 kilogrammes 20 October 2003.

Sample one was a fresh diameter cross section taken from the first third part of the body Laboratory Reference 290174-1:

Alpha Linolenic C18:3n-3 %m/m	0.3
Steridonic C18:4n-3 %m/m	0.2
Eicosatrienoic C20:n3-3 %m/m	0.1
Eicosatetraenoic C20:4n-3 %m/m	0.4
Eicosapentanaeic C20:5n-3 (EPA) %m/m	4.3
Heneicosapentaenoic acid C21:5n-3 %m/m	0.2
Docosapentaenoic C22:5n-3 %m/m	2.4
Docosahexaenoic c22:6n-3 (DHA) 5m/m	4.7

Sample two was a fresh diameter cross section taken from immediately behind the head Laboratory Reference 290174-2:

Alpha Linolenic C18.3n-3 %m/m	0.2
Steridonic C18:4n-3 %m/m	0.2
Eicosatrienoic C20:n3-3 %m/m	0.1
Eicosatetraenoic C20:4n-3 %m/m	0.4
Eicosapentanaeic C20:5n-3 (EPA) %m/m	4.5
Heneicosapentaenoic acid C21:5n-3 %m/m	0.3
Docosapentaenoic C22:5n-3 %m/m	2.2
Docosahexaenoic c22:6n-3 (DHA) 5m/m	4.3

**Sample three was a fresh diameter cross section taken from
the last third part of the body Laboratory Reference 290174-3:**

Alpha Linolenic C18:3n-3 %m/m	1.0
Steridonic C18:4n-3 %m/m	0.1
Eicosatrienoic C20:n3-3 %m/m	0.3
Eicosatetraenoic C20:4n-3 %m/m	0.4
Eicosapentanaeic C20:5n-3 (EPA) %m/m	2.6
Heneicosapentaenoic acid C21:5n-3 %m/m	0.1
Docosapentaenoic C22:5n-3 %m/m	2.0
Docosahexaenoic c22:6n-3 (DHA) 5m/m	1.0

**Sample four was a fresh diameter cross section taken from
the first sixth part of the body Laboratory Reference 290174-4:**

Alpha Linolenic C18.3n-3 %m/m	0.2
Steridonic C18:4n-3 %m/m	0.2
Eicosatrienoic C20:n3-3 %m/m	0.1
Eicosatetraenoic C20:4n-3 %m/m	0.4
Eicosapentanaeic C20:5n-3 (EPA) %m/m	5.7
Heneicosapentaenoic acid C21:5n-3 %m/m	0.3
Docosapentaenoic C22:5n-3 %m/m	2.9
Docosahexaenoic c22:6n-3 (DHA) 5m/m	6.1

**Sample five was a freshly smoked diameter cross section taken from the
middle of the body Laboratory Reference 290174-5:**

Alpha Linolenic C18.3n-3 %m/m	0.6
Steridonic C18:4n-3 %m/m	0.1
Eicosatrienoic C20:n3-3 %m/m	0.1
Eicosatetraenoic C20:4n-3 %m/m	0.1
Eicosapentanaeic C20:5n-3 (EPA) %m/m	1.3
Heneicosapentaenoic acid C21:5n-3 %m/m	0.1
Docosapentaenoic C22:5n-3 %m/m	1.2
Docosahexaenoic c22:6n-3 (DHA) 5m/m	2.7

**Sample six was a freshly smoked diameter cross section of the head taken
from of the body Laboratory Reference 290174-6:**

Alpha Linolenic C18:3n-3 %m/m	0.7
Steridonic C18:4n-3 %m/m	0.1
Eicosatrienoic C20:n3-3 %m/m	0.3
Eicosatetraenoic C20:4n-3 %m/m	0.3
Eicosapentanaeic C20:5n-3 (EPA) %m/m	1.2
Heneicosapentaenoic acid C21:5n-3 %m/m	0.1
Docosapentaenoic C22:5n-3 %m/m	1.5
Docosahexaenoic c22:6n-3 (DHA) 5m/m	1.1

The assay chemical tested results were very positive and reflected that long finned eel did have considerable amounts of omega-3 to be significant enough to support this research. The sampling repeated on 16 December 2003 taking only fresh samples from a larger 8 kilogramme long finned eel *Anguilla dieffenbachii* and testing for any deterioration over first twenty-four hours and then repeated at forty-eight hours. While at the same time assay testing was completed on diameter cross section sample derived from the middle of the body of a sea-salt water 18 kilogramme male conger eel *Anguilliforms congridae*. The short finned eel *Anguilla australis schmidtii* was not assay tested because research with my kuia and kaumaatua confirmed that they had never formed part of the diet because they had too many bones and insufficient meat.

Sample one was a whole fresh Laboratory Reference 310956-1:

Alpha Linolenic C18.3n-3 %m/m	1.2
Steridonic C18:4n-3 %m/m	0.1
Eicosatrienoic C20:n3-3 %m/m	0.3
Eicosatetraenoic C20:4n-3 %m/m	0.4
Eicosapentanaeic C20:5n-3 (EPA) %m/m	2.1
Docosapentaenoic C22:5n-3 %m/m	1.4
Docosahexaenoic c22:6n-3 (DHA) %m/m	1.1
Omega-3 fatty acids %m/m	6.3

Sample two was the same as sample one but the test repeated after twenty-four hours Laboratory Reference 310956-2:

Alpha Linolenic C18:3n-3 %m/m	1.2
Eicosatrienoic C20:n3-3 %m/m	0.3
Eicosatetraenoic C20:4n-3 %m/m	0.3
Eicosapentanaeic C20:5n-3 (EPA) %m/m	2.0
Docosapentaenoic C22:5n-3 %m/m	1.4
Docosahexaenoic c22:6n-3 (DHA) %m/m	1.0
Omega-3 fatty acids %m/m	6.3

Sample three was the same as sample two but test repeated after forty-eight hours Laboratory Reference 310956-3:

Alpha Linolenic C18:3n-3 %m/m	1.2
Eicosatrienoic C20:n3-3 %m/m	0.3
Eicosatetraenoic C20:4n-3 %m/m	0.3
Eicosapentanaeic C20:5n-3 (EPA) %m/m	2.0
Docosapentaenoic C22:5n-3 %m/m	1.4
Docosahexaenoic c22:6n-3 (DHA) %m/m	1.0
Omega-3 fatty acids %m/m	6.3

Sample four is a diameter cross section of a fresh large female conger eel

Laboratory Reference 310956-4:

Alpha Linolenic C18:3n-3 %m/m	0.6
Steridonic C18:4n-3 %m/m	0.3
Eicosatrienoic C20:n3-3 %m/m	0.2
Eicosatetraenoic C20:4n-3 %m/m	1.0
Eicosapentanaeic C20:5n-3 (EPA) %m/m	3.0
Heneicosapentaenoic acid C21:5n-3 %m/m	0.2
Docosapentaenoic C22:5n-3 %m/m	2.8
Docosahexaenoic c22:6n-3 (DHA) %m/m	9.9
Omega-3 fatty acids %m/m	18.0

In conclusion the eel samples were taken from different parts of the eel where the head had the least omega-3 content and the tail section had the most. However the head was not used by traditional tangata whenua Maaori because the head is considered tapu, in fact the most tapu part of the body, but the areas most favoured by our tuupuna had the highest content of omega-3. The results proved to be greater concentrations of omega-3 in the long finned and conger eel (the latter being considerably higher than fresh water species but traditional Maaori did consume conger eel as part of their diet when they were available). Interestingly the omega-3 fatty acid quality did not deteriorate over either a twenty-four hour or a forty-eight hour period with the Final Laboratory Reports attached to the *Appendix* of this Thesis as Appendices B and C.

v. Omega-3 development

The Australian Government Fisheries Research and Development Corporation (2004) advise about the importance of the fatty acid omega-3 in disease prevention but that it should not be considered in isolation. It has a premium place in a healthy diet for most people with the Mediterranean diet recommended as the ultimate diet for good health and disease prevention. The Mediterranean diet consists of: more bread, more vegetables and legumes, more seafood, less meat (beef, lamb pork) replaced by poultry, no day without fruit, no butter or cream and olive oil or other mono-saturated oil sources such as canola,

sunflower, soybean or palm. In fact Nutritionists increasingly advocate the use of a Mediterranean diet (which contains seafood) as a healthy diet for people at risk or suffering from coronary heart disease (p. 13).

The Australian Government Fisheries Research and Development Corporation (2004) then debate that omega-3 seafood fats have a favourable effect on heart disease risk factors such as platelet aggregation responsible for the stickiness of the blood), high blood pressure and metabolism of plasma lipoproteins (blood fats). However, in people with diabetes, caution needs to be exercised in supplementation with omega-3 fish oil capsules (where one gram of fish oil is about 30% omega-3 fatty acids). This is because dosages between four and ten grams per day (equivalent to or more than one to three serves of seafood per day) may result in increased levels of blood sugar (glucose). However, lower doses (2.5 grams per day) have been shown not to affect glycaemic control, although they still provide useful effects on heart disease risk factors. Generally, eating seafood does not create a problem and is actually an advantage. Omega-3 intake can reduce insulin resistance in skeletal muscle. A high dietary proportion of omega-3 fats have been implicated in increased insulin resistance; hence an increase in dietary omega-3 fats from seafood may address this (p. 13).

Humans can manufacture some types of fatty acids in the body, but most obtain those essential for good health (the poly-unsaturated omega-3 and omega-6) from the diet. Omega-3 fats are best found in seafood and plants such as soybean, canola, flaxseed and purslane. Then the Corporation state that in recent times, the emphasis in affluent diets has been on poly-unsaturated fatty acids of the omega-6 type, so that the ratio of the omega-3 to omega-6 has been too low. Regular seafood intake plays an important role in allowing a healthy ratio of omega-3 to omega-6 fatty acids. To prevent essential fatty acid deficiency, nutritionists generally recommend that humans must consume at least 2.4% of total fat intake as omega-6 fats and 0.5-1.0% of total fat as omega-3 fats (The Australian Government Fisheries Research and Development Corporation, 2004, p. 9).

vi. Comparative societies that consumed eel

It is interesting to note that in societies where eel has been consumed and still consumed regularly today diabetes is absent, for example parts of India, China, Japan, Italy and

Spain to name just a few. However since some people in those societies traditionally eating eel have adopted a more Western style diet and abandoning eating eel then diabetes Type II has suddenly appeared.

Wang (2003) says that about 15 years ago, non-insulin-dependent diabetes (or Type II diabetes) was a disease rarely known by people in China. Knowing someone with this disease was almost unheard of by individuals and medical scientists and nutritionists paid no attention at all to diabetes at that time. There were very few population surveys or other research about diabetes conducted in China before 1990. National-level prevalence data for China were available for the first time from a 1980 survey, which found an overall rate of Type II diabetes at 0.67% with considerable regional variation. The prevalence of Type II diabetes in China was estimated as *low* by the World Health Organisation (WHO) Ad Hoc Diabetes Group even in 1994 based on a study in 1986.

Wang also says that since the early 1990s the prevalence of diabetes has quietly increased in urban cities of China. While all of China is undergoing major changes, the urban areas are the centers of rapid economic development, and the people living in them have been experiencing major shifts in their traditional dietary practices over the last two decades. In 1995-97, the Chinese Academy of Preventive Medicine conducted a nationwide survey on Type II diabetes that covered 40,000 people from 11 provinces across the entire country. The findings were very astonishing. The overall prevalence of Type II diabetes in China had reached to 3.6% for the study population, ages 20 to 74 years old, which is 5 times higher compared with the results of the 1980 survey.

This study also showed that the prevalence was higher in urban than in rural areas; it was higher in larger urban cities than in medium or small urban cities; and higher in relatively more economically developed rural areas than in undeveloped rural areas. The highest prevalence occurred in Beijing, the capital city of China, with the prevalence of 6.24%--a 3.7 fold increase over a 16-year period.

Then Wang notes that to face and understand the real risks of developing diabetes, people have to ask what has caused this tremendous increase in diabetes and other chronic diseases. As a nutritionist, I believe that changes in dietary patterns are one of the most important determinants in these changing risk patterns. Rapid economic development has

led to a significant shift in lifestyle which is also reflected by changing dietary habits, from a traditional low saturated fat, low protein diet to a Western dietary pattern, with increasing consumption of animal foods, and thus increasing consumption of saturated fat (pp. 66-78).

Diabetes is not just a disease of the developed countries. It is, however, clearly a disease intensified by development providing credibility to our ancestors' knowledge and their way of thinking. The prevalence of diabetes in urban India is 10 percent, according to the site. That is even higher than the US rate. But we have small studies this year that say that 14 percent of the population of our cities has diabetes and it is increasing. The increased prevalence of diabetes in India has a lot to do with a switch from a traditional to a Western diet and that the traditional Indian diet is good for diabetes (Rao and Paturi, 2001, [Web site: <http://www.mendosa.com/diabetesindia.htm>]).

The Japanese National Survey Report (1997) estimated that around 6.9 million people suffer from diabetes in Japan and 90% have Type II diabetes. However recently there has been a dramatic increase of Type II diabetes, which may be related to both environmental changes and the presence of diabetes-susceptible gene alleles in this population. Indeed, several studies have shown that migration from Japan to the US increases the risk for Type II diabetes, and moreover, people in Japan are increasingly exposed to the Westernised style of living (pp. 1247-1255.).

vii. Aquaculture development for eel consumption

Global demand for fish and fisheries products is rapidly growing as people become better educated on the type of food to avoid obesity and chronic non-communicable diseases such as Type II diabetes. In fact information is readily available through the internet while at the same time people are now independently seeking out information and consuming food that contains nutrients required for optimum good health such as fish and sea/fresh water species. Indeed the traditional tangata whenua diet was rich in seafood species where it has now been well documented that such a diet contained in abundance all the required nutrients for good health by prevention of the many chronic diseases now afflicting Maaori. Indeed the time has now come for New Zealand to develop aquaculture

products for domestic and export markets, and it is anticipated that this industry will develop through recent legislation.

EnviroNZ (2005) comments that New Zealand's aquaculture has now entered a new era with the passing of the Aquaculture Reform Act 2004, and the lifting of the three year moratorium on marine farming last December. The Act paves the way for the creation of Aquaculture Management Areas (AMA) as specific areas of our coastline that will be available for marine farming. Regional councils will decide which areas of coastal marine area are suitable and appropriate for future aquaculture development, and will plan for them using the coastal planning provisions of the Resource Management Act. Aquaculture Management Areas can also be proposed by industry, using a special private plan change process.

The Ministry of Fisheries will determine early in the planning process whether the proposed area has an undue adverse effect on fishing activities. The proposed area will then be publicly notified and open to submissions, before the regional council makes its decision. Māori interests in commercial marine farming space have also been addressed in the Act. Iwi will be provided, where possible, with 20 percent of marine farming space allocated since 1992 and 20 percent of any future new space. The Ministry of Fisheries, the Ministry for the Environment, and the Department of Conservation will help councils with policy and guidance on implementing the reforms, including creating Aquaculture Management Areas (p. 5).

The \$1 billion-a-year potential of New Zealand's aquaculture industry can now be realised. The whole purpose of the reform is to provide clarity and certainty to users which were not there before. Councils will now be able to effectively manage aquaculture and encourage industry to develop in a sustainable way (Fisheries Minister and Associate Environment Minister, David Benson-Pope, 2005, p. 6).

Theiman and Palladino (2004) make a note by saying that in Europe the Romans were actually the first to employ techniques that could be categorised under farming. In the work of the classical historians Livy and Seneca, fish ponds and holding facilities are mentioned as being especially in fashion among the nobility. The farming of salmonids, now comprising a large part of the finfish production in Europe and North America, was

greatly stimulated by the invention of artificial fertilization of trout eggs by Jacobi in 1765, later discovered by Remy and Gehib in 1842. This was the start of the artificial culture of salmonids. Fish culture has only recently been introduced in North and South America and Africa (p. 213).

Ruiter (1995) describes aquaculture as the farming of aquatic animals and implies some form of intervention in the rearing process to enhance production such as regular stocking, feeding and the protection from predators. Aquaculture involves an incredible diversity of species ranging from seaweed, molluscs, crustacea and finfish to exotic species such as frogs and crocodiles. Although aquaculture and especially the rearing of fish are perceived by the public as a 20th century invention its roots go back to ancient times. Some form of pond fish culture probably existed in China in 1000BC (p. 18).

Thieman & Palladino (2004) then say given that water, especially marine water, covers nearly 75 percent of the earth's surface, it should not surprise you to learn that aquatic environments are a rich source of biotechnology applications and potential solutions to a range of problems. Aquatic organisms exist in a range of extreme conditions such as frigid polar seas, extraordinary high pressure at great depths, high salinity, exceedingly high temperatures and low light conditions. As a result, aquatic organisms have evolved a fascinating number of metabolic pathways, reproductive mechanisms, and sensory adaptations (p. 206).^{ix}

There is enormous potential for Maaori economic development through the innovative use of fisheries, fauna and flora but to ensure intellectual property rights remain in control of Maaori legislative protection is needed. Maaoritanga and culture is collectively based rather than individually based laws relating to patent ownership require revising to include the collective hapuu ownership. But current ownership and patent laws in New Zealand do not include the collective ownership principle of Maaori organisations, so current legislation would need to be amended to accommodate.

Indeed some of those people from various societies that traditionally regularly consumed eel and have then switched to a Western style diet have also developed Type II diabetes, just like tangata whenua Maaori. The dietary change in relationship to the manifestation

of Type II diabetes symptoms is now being carefully examined by medical specialists around the world. I have collected eel recipes from around the world and these are included as appendices; thus establishing eel as a well accepted edible source and traditional delicacy for many people around the world where the eel habitats

Ruiter (1995) comments that eels also contain good quantities of the water-soluble vitamins that comprise of the B vitamin group: Thiamine, Riboflavin, Niacin, Pyridoxine, Pantothenic acid, Folates and vitamin B12, all essential for good health and all found in eels. However processing does deplete the vitamin content of: Pyridoxine, Pantothenic acid and vitamin B12. Eels also contained the following trace elements: Calcium (65mg./100g.), Phosphorus (295 mg./100g.), Magnesium (22mg./100g.), Sodium (80mg./100g.) and Potassium (360mg./100g.) and all higher than most other freshwater fish and comparatively very favourable to marine fish (:192). Iron (20mg./kg.), Zinc (18mg./kg.), Manganese (0.3mg./kg.), Copper (1.0mg./kg.), Iodine (0.8mg./kg.). Smoked eel only minimally reduced all the trace element content (pp. 161-206).

viii. Aquaculture Eel Farming for future dietary consumption

Eel is not readily available on the domestic market but South Island river eel can be purchased live and prepared as the customer requests or as smoked eel at SeaMart (now the Auckland Fish market) in Auckland for approximately \$20-00 per kilo when stock is available. In contrast export river eel obtained from all over New Zealand but does not supply the domestic market and this would appear to be a breach of the TOW Fisheries guarantee made to hapuu Maori. It seems logical to use the elvers that annually migrate to New Zealand to provide the valuable omega-3 food source that the eel provide to assist in preventing Type II diabetes that is currently devastating the health of those with Maori heritage.

Eel-farming adjacent to where the annual migratory elvers travel and by Maori developing eel-farming as a business it would provide employment opportunities, education, training and skill acquisition to supply both domestically and globally. It would allow our people to combine the traditional knowledge of the eel with modern

technology for collective tribal-hapuu-whaanau and iwi Maaori organisations entrepreneurial ventures.

Tesch (1977) says it was thought that eels would be unsuitable for farming however they have been farmed commercially since the eighteenth century but some eel-farming does exist today on a commercial basis mainly in Japan. Eel farming has been economically successful in Italy and Japan where Type II diabetes and associated heart disease statistics are low where dietary intake is high in omega-3 through marine products, vegetables and unsaturated oils (p. 328).

McDowal (1978) comments that Maaori concerns were overlooked in the rush to meet export orders for Europe and Japan. The fishers were mostly Paakehaa labourers who caught eels for seasonal employment, though some were farmers whose land bordered fishable waters (p. 3).

Abrami, Natiello, Bronzi, McKenzie, Bolis and Agradi (1992) concluded when comparing the absolute and relative amounts of eicosapentanoic acid (EPA) and docohexaenoic acid (DHA) in muscle from four different fish farms that farmed eels concluded that they have an adequate source of fish products for human nutrition. In fact farmed eels were richer in DHA and EPA than wild animals (p. 79).

Astill and Kerei (1980) say the first eel farm in New Zealand was built at Kerikeri, North Auckland in 1971, the following year Wattie Industries together with Donaghy Industries built a farm at Brookby, and in 1973 a further four farms were built. Two were to use heated water, one at Meremere (Watties) and one at Papakura (Carter Merchants). The other two were outdoor farms, at Te Kaha (Hourota Industries and Taiyo Fishing Company) and at Flag Swamp, Dunedin (Wrightson-NMA). All these ventures failed over the next two years, for a variety of reasons including escalating food costs, depressed export prices, irregular supplies of glass eels (elvers), unfamiliarity with the culture requirements of the New Zealand species and some instances of disease (p. 1).

Astill & Kerei (1980) published the results of two years of monitoring the glass eels run at Makara Stream, Wellington and his data confirm in more detail the trends seen at Te

Kaha. The long finned eel finish running much earlier than the short finned eels and the condition of both species (as expressed by a ratio of length to weight) falls through the season.

Despite these initial failures it was considered that there should be a more detailed study of eel farming, and that a more carefully controlled evaluation of the prospects and problems should be undertaken. This was made possible in 1976 when the eel farm owned by Hourota Industries was offered to the Government as an aquaculture facility and pilot production station. The farm was re-opened in 1977 and serviced by the fisheries Management Division, but in 1978 the responsibility for the station passed to the Fisheries Research Division. Research effort was concentrated on developing techniques for farming the short-finned, *Aguilla australis*. These techniques were applied to a pilot programme in 1978 culminating in the harvest of 1.4 tonnes of eel in 1980 (pp. 5-8).

McDowal (1978) says that during WWII there was extensive exploitation of eels, primarily from Lake Ellesmere in search for supplies of vitamins, which were not easily available from overseas. Eel oil has a very high content of both vitamin A and D say Cairns (1945, as cited in Mc Dowall, 1978, p. 425); Shortland (1950, as cited in Mc Dowall, 1978, p. 425); and Russell (1948, as cited in McDowal, 1978, p. 425). Then they all say no other flesh except for sardines has as much of the fat soluble vitamins (pp. 425-427).

Mc Dowall (1978) concludes that from 1958 to 1978 the Fiordland National Park Board considered approving the capture of indigenous eel to stop them from preying upon stocks of introduced Atlantic salmon in park waters. However the shallow, murky waters of Lake Ellesmere supports one of the largest eel fisheries in the world – in 1980, 320 tonnes of eel were caught from there – predominantly for export with very little available for the domestic market (p. 431).

Ka pu te ruha, ka hao te rangatahi.

The old net is cast aside, the new net goes fishing.

Part five — Maaori Health status

Prior to Urbanisation Type II diabetes was absent

Part five explores and firmly establishes the status of tangata whenua Maaori health providing an important background and platform for this doctoral research thesis.

The Public Health Commission of New Zealand (1991) claim that their statistics indicate Maaori health has declined considerable since colonisation and urbanisation with chronic non-communicable diseases developing that previously apparently non-existent. It has been since the 1960s that diabetes mellitus Type II became proportionally higher in Maaori than the European counterpart, and diabetes mellitus Type II four times more common in Maaori. However other lifestyle risk factors that contribute to Type II diabetes cannot be ignored such as:

- smoking
- lack of exercise
- obesity (and food intake abuse)
- socio-economic factors of inappropriate housing, inadequate education, high unemployment and a high rate of accidents
- alcohol and drug abuse illegally and legally prescribed (p. 23).

Goldie (1903) was a western style medical practitioner who continually searched for the type of diseases that tangata whenua Maaori suffered and diabetes mellitus was not amongst them.

Goldie (1903) stated, “karakia was extensively used with a specific karakia for whatever ailment afflicted them” (p. 46).

i. Diabetic Specialists authenticate statistics:

- Henschen (1996) comments that New Zealand’s national statistics indicate that three per cent of the population is diagnosed as diabetic; however, Type II diabetes mellitus is four times more common in Maaori and Pacific Island populations (p. 16).

- Scragg, Baker, Dryson and Dryson (1996) comment that there is a strong genetic component in obesity and lack of exercise, which are two risk factors also contributing to the cause of Type II diabetes mellitus (p. 89).
- de Lore (1993) says the onset of Type II diabetes for Maaori is approximately ten years earlier than in Paakehaa (p. 60).
- Shillitoe (1988) claims a link between a change in culture and diet contributes to diabetes mellitus Type II (p. 15).
- Brown (1992) says that Maaori display prevalence about four times that of Paakehaa who are genetically relatively protected and that the onset of Type II diabetes for Maaori is approximately ten years earlier than in Paakehaa p. (7).
- The New Zealand Herald (2002) claimed improved nutrition and physical activity are key to halting the diabetes mellitus Type II crisis and New Zealanders' expanding waistlines are contributing to a diabetes epidemic, forecasted to affect more than 145,000 New Zealanders' in 2011 – an increase of 77 per cent (p. A4).

ii. Diabetes absent in traditional knowledge search

Traditional knowledge verification has been obtained through the meticulous examination many of the old traditional hapuu karakia, waiata and pakiwaiatara from: the Tainui, the Arawa and the Mataatua waka hapuu of: Ngaati Tuuwharetoa, Ngaati Kahungunu, Kai Tahu, Ngaati Awa, Ngaa Puhi, Taranaki, and Ngaati Raukawa. Indeed my meticulous search found absolutely no reference to the distinctive diabetes mellitus symptoms particularly the excessive thirst and the sweet smell of the urine. Undoubtedly had these symptoms existed in our people they would have recorded them and woven them into the traditional stories known as pakiwaiatara? While at the same time they would have included the distinct symptoms in the karakia and ngaa mooteatea waiata. I say the absence provides conclusive evidence from a Maaori perspective that the disease did not exist, but then in the 1960s the symptoms suddenly manifested. Thus because traditionally life was structured with particular rules and etiquette enforced from a hierarchical society but equally active, healthy and innovative people who sought answers; they would have recorded and existence symptoms of diabetes for subsequent generations.

Maintenance of physical fitness was recognised as a personal and national obligation. It was also part of the sacred duty of every single member of the community to maintain the body in perfect health. Physical fitness was thus an honourable thing, ill-health was a disgrace, and physical unfitness not accepted. It was a religious duty for a man to keep himself fit and well; obviously therefore if he was unfit and unwell he had sinned and deserved to suffer, and should be made to suffer in such a way to cure himself and improve him. It was a crime against physical morality for a Maaori to fail to acquire knowledge of the human body and its functions, or fail to improve his development or maintain his health. Disease and unfitness were the consequences of such sin. Some diseases were due to sins on the part of the individual, resulting from lack of exercise and from over-eating; others were inherited, and due to wrong-doing by the parent or ancestors. Cripples were not regarded as sinful in themselves, but as the unfortunate bearers of the sins of others. They were not blamed, but they were considered quite unfit to reproduce. On the other hand, those who neglected to exercise their minds and bodies were blamed for their physical defects, deprived of the privilege of reproduction, and degraded in rank (Rout, 1926, p. 1).

Rout (1926) says it was the personal duty of every Maaori to maintain the body in perfect health by means of diet and exercise. The care of the bowels was the secret of good health. Those who were unable or unwilling to be healthy should not be allowed to live, that is permanently unfit should be eliminated. The natural remedies or, rather, the preventives were clearly known to the Ancient Maaori. By diet and by exercise the Maaori kept their body physically fit and healthy. If the so called civilised nations of the present day could be persuaded to adopt the Maaori diet with an abundance of fruit and vegetables, coarse meals, with a little fish, eel or bird. There was no cancer among the New Zealand Maaori, or any other native race, so long as they lived their own natural life. As to the contagious diseases, the Maaori public health laws were obviously sufficient to eliminate these, and until the Maaori came under the control of European public health officers, acting as emissaries of civilisation, the spread of contagious diseases was impossible; the exercise and health parades were alone sufficient to ensure rigid prevention. They used sunlight as a preventative measure and the clothing worn was designed to prevent the spread of disease; that visitors were required to leave their own

bedding outside a visiting Paa because Maaori believed that disease was transferred in bedding (pp. 194-196).

Rout (1926) comments that Sir William Lane Bart, a Consulting Surgeon to Guy's Hospital in London comments that his long surgical experience has proved to him conclusively that there is something radically and fundamentally wrong with the civilise mode of life. And he believed in 1926 that unless the present dietetic and health customs of the White nations ate reorganised social decay and race deterioration are inevitable. The New Zealand Maaori view that when the bowels are clean the whole body is clean is perfectly sound scientifically, and its ethical significance is far wider and greater than most of us imagine.

Sir William also noted that if the habit cultivated by the Europeans by regulating their diet and exercise in such a manner to ensure proper evacuation of the body's waste matter) as was the Maaori habit of emptying the lower bowel would benefit public and personal health almost unbelievably. An obese and inflated abdomen is a truly hideous and unnatural sight, as unhealthy as it is unlovely; but an overloaded colon is much worse; it is the chief cause of our mental depression, pessimistic attitudes, marital unhappiness and social disorder. Finally, Sir Arthur Keith who was appointed the Senior Demonstrator of Anatomy at the London Hospital in 1895 and was Head of the Department in 1899 says that the lifestyle and methods used by the Maaori to prevent diseases were very effective as they did not suffer from any diseases (p. xiv).

Rout (1926) comments that cleanliness of body was inculcated from childhood. Neither soap nor oil was known, but the body was cleansed every evening before the dances started. And in suitable weather there would be swimming, and on emerging from the water, the wet body was dusted all over with a fine powdery earth called one-puehu or sacred earth. A paste of the sacred earth was mixed in a calabash and used for washing the skin and hair. The Maaori diet was so healthy that the teeth needed very little cleaning, but a mixture of sacred earth with wood ashes was sometimes used as a toothpaste. Splinters of wood served as toothpicks and the children were taught to remove particles of food from between the teeth after each meal. From childhood every Maaori was taught the necessity of keeping the privy parts scrupulously clean with sacred earth

in the form of a paste. Flax-waste which was soft and fluffy served as the toilet paper it was collected and stored for this special purpose. Dried moss was sometimes used when the supplies of flax-waste ran short (pp. 35-37).

iii. Traditional Maaori Health and Healing Methods

Durie (1994) comments that the systems for treating illness were sufficiently well-established in traditional times to indicate that there was an awareness of basic anatomy, an understanding of physiological principles, recognition of the healing properties of flora. While traditional healing was largely symptomatic, aiming to provide rapid relief of symptoms, the physical remedies themselves were employed within a wider philosophical and theoretical context. Healers focused on two aspects of a health problem. The underlying aetiological hypothesis was based on the tapu/noa considerations, while the symptoms and signs were regarded as the outward manifestations of the problem (p. 15).

Durie (1994) then comments that traditional Maaori healing encompassed several activities at spiritual, psychic, physical and ecological levels. The approach was an eclectic one, drawing on observations from a variety of sources but based on an understanding of human behaviour within the context of tribal survival, communal living, limited resources, and a temperate climate. A wide range of healing activities were practiced, many quite pragmatic, others derived from more complex understandings of religion, psychology, and philosophy. Five classes of activity were in common use, though more than one set of interventions at a time was the rule. A healing encounter could have included a ritualistic observations as well as poultice, bathing in a particular pool of water, and some action by the family as a whole (p. 17).

Durie (2001) says traditional Maaori healing has not been rigidly defined, but there are a number of recognisable features that distinguish it from the treatment in a medical sense. Nor is it necessarily useful to attempt to understand traditional healing in terms of biomedical concepts and scientific proof. Though certain plants may have anti-bacterial or other therapeutic activity, and can be analysed scientifically, it is misleading to ascribe

health changes only to those properties and so dismiss (or fail to appreciate) other components of the healing process (p. 158).

Durie (1994) comments that though the public health system in early times was impressive, all the more because of the limited access to other technologies, and healing systems were relatively well established, it would be misleading to presume that Maaori life was without serious health problems or that disease was only sporadic. Life was a struggle. Food gathering occupied much time and often required lengthy expeditions away from home. Even then, variety was not assured (p. 22).

Meat and fat were not regular dietary items, and cannibalism way has been part, at least, a consequence of that deficiency. With a climate far from tropical, protection from the elements was limited, clothing not always adequate, and the benefits of an open fire were diminished somewhat by excessively smoky surroundings. It is not known what effects a harsh environment had on longevity and wellness. Early explorers were impressed by the stature of the people they met and Cook concluded that Maaori in 1769 were a healthy race (Durie, 1994, p 22).

However, I do not totally agree with some of the comments made by Professor Durie particular the comment about meat and fat were not regular dietary items. This may have been pertinent for some hapuu or for specific geographic areas that lacked the natural resources that formed part of the regular staple diet for many hapuu, such as the eel/tuna. The eel/tuna formed the staple food for hapuu where because it was plentiful in the adjacent Waikato River and tributaries, and was preserved when the supply was excessive and able to be stored safely for a long time. However some hapuu did not have sustainable access to eel/tuna and may have suffered from a lack of dietary intake of meat and fat because of the lack of natural resources, but not all.

I also challenge the comments about *serious health problems* because no reference has ever been made through the traditional Maaori communication methods about any serious diseases as I have previously discussed. However the arrival and contact made with the European did introduce communicable infectious diseases, such as measles, influenza, gonorrhoea, syphilis, tuberculosis, typhoid, scarlet fever, whooping cough and other and bacteria and viral infectious diseases. Because Maaori were isolated from other populations they had never been exposed to these contagious infectious they had no

resistance to them and as a consequence of the European contact was the introduction of diseases that devastated the Maaori population. Mortality rates were high where in some areas whole settlements of both children and adults were wiped out and as a result the Maaori population was drastically reduced through epidemics. In fact, serious health problems did arise secondary to the infectious diseases that left many Maaori communities with depleted numbers with many of its people with chronic systemic illnesses that also had a drastic economic consequence rendering poverty.

Rongoaa

Macdonald (1973) comments that traditional Maaori Medicine known as Rongoaa was made from native flora and fauna with extensive knowledge acquired over the years, carefully analysing the effects by using various leaves, barks, moss, roots, berries, flowers and used externally, internally or as a vapour. These were made into poultices for sprains and boils, splints for broken bones from the Tootara tree, and charcoal for burns. The root of the Harakeke used to treat constipation, the Poohutukawa tree's inner bark was used to stop bleeding, as pain relief for toothache and made into a liquid to cure diarrhea. The Tootara tree bark was boiled with the Maanuka shrub to make a lotion that reduced fevers and smoke from the burning wood was used to treat paipai (p. 61).

Rongoaa knowledge was held in trust by the Tohu and other specially selected people (usually related and of a high rank) that included the type of foliage or natural resource and the time to gather as well as the method used to prepare as a medicinal preparation. The Tohunga played a dominant leadership role in all aspects and was treated with great respect and aura because of the power they (usually male but could be female) possessed and was demonstrated through challenge, as was the Maaori way.

Whilst Elsdon Best's recording about many aspects of tangata whenua Maaori has been validated by contemporary Maaori there are some aspects of his writings that are challenged by many Maaori as being incorrect such as his comments about the use of Rongoaa. Indeed any knowledge about the medicinal uses derived from available resources such as barks, leaves, and roots and then modified through experimentation, trial and error was knowledge held by only a select few such as a Tohunga. Therefore to give or provide knowledge that had been accumulated over subsequent generations would

have been a breach of the tapu and noa concept that formed the basis any traditional or old-time Maaori health methodology or intervention.

van Urk et al. (1992) comments Elsdon Best claimed that the Maaori of old relied principally upon his priest when attacked by sickness and that the priests did not deal in herbal remedies and there was no science of medicine in Maaoriland. And that he believed most of them to be based on the European method of treatment of the sick but acknowledged that Elsdon Best is the most widely accepted authority (regarding accounts of the day to day life). While at the same time disagrees with his comments about Maaori not having developed the rongoaa prior to the arrival of the European. They substantiate their disagreement with Elsdon Best by claiming that the reports of Cook, Cruise, Rutherford, Dieffenbach and Colenso all evidence that the old-time Maaori used external remedies (p. 16).

van Urk et al. (1992) says that Captain Cook observed the Maaori using a vapour bath and the use of extensive use of New Zealand plants. In 1848 Reverend Richard Taylor of Whanganui published a Maaori vocabulary under the title *A leaf from the natural history of New Zealand* containing valuable notes on the medicinal use of native plants. He revised this information in a second edition published in 1870. Dr O'Carroll, who was attached as a physician and surgeon to many expeditions against the Maaori insurgents during the 1860s, published an article on Maaori Medicine in the Taranaki Almanac for 1884. J Kerry-Nicholls, who explored the King Country in the 1880s, compiled native pharmacopoeias which confirm and supplement the observations of other writers. Dr W. Goldie of Auckland published in 1905 a full account of Maaori Medicinal Lore, in which they listed some 56 plants with medicinal uses (p. 20).

Wai

All populations rely on water for survival and most have incorporated the significance and appreciation of water into their culture and many used water for healing and cleansing purposes. Fresh water was consumed every morning from rising to the first meal of the day to ensure the body was cleansed internally and kept healthy, regular bathing in water was also part of the body cleansing and water was used as a ritual and

formed an integral part of spiritual healing and cleansing by the Tohunga of some ailments that were considered to be caused but usually in conjunction with karakia or chanting. The water was sprinkled by the Tohunga over the person or the person was immersed in a pool of water usually specially reserved for that purpose and because the water has some significance. It may be that the water was a spring from the ground or that it was somewhat different in purity from other water.

Walking or bathing the feet in certain water(s) was a method used with the belief that health benefits would enter through the soles of the feet in a manner that we describe as *osmosis* with the feet considered receptive to good health.

Mirimiri

Mirimiri involves a number of different treatments of body massage for therapeutic use or as part of health and wellness where a particular part of the body is massaged by kneading the muscles with the fingers or *romiromi*. Then with pressure against the spine with the feet or *takahi*, stretching the legs by pulling or *toto* or by a number of people placing their hands directly on a particular place in the body because of pain or injury.

Calvert (2002) comments that most of the Pacific Islands people used massage as part of their traditional health routine very similar to the mirimiri, but in Hawaii it is called lomi-lomi being an integral part of the native healing arts system for centuries, passed down through family traditions. Other nations have also used massage as part of their traditional health methodology, to illustrate in the Philippines the Filipino healing art of therapeutic massage is called hilot, in Indonesia particularly the island of Bali using coconut oil as it has been since ancient times; also common in Thai massage and other Asian systems of manual healing arts (p. 20).

Surgical Intervention

Buck (1949) says that there was also some surgical intervention developed usually in conjunction with injuries received; but tattooing was extensively practiced and could be classified as a surgical intervention. Wounds were cauterized with the live end of a fire stick. A sharp-edged piece of stone, a *rehu* was used to sever the umbilical cord (p. 406).

Tohunga Suppression Act 1907

Oral Tainui History (n.d.) says that in 1907 the Tohunga Suppression Act was intended to eliminate traditional Maaori healing and to discourage Maaori away from traditional methods and to use western medicine exclusively. This was instituted by Dr Maui Pomare from North Taranaki graduated in 1899 from the American Missionary College in Michigan, United States of America and trained at the Battle Creek Sanatorium, was the first Maaori Health Officer. He introduced western medicine methods and was opposed to the traditional collective hapuu tribal system promoting individualism and subdividing tribal lands so that individual families could prosper and was openly opposed to the methods used by Tohunga in the treatment of tuberculosis, and welcomed the Act. Dr Pomare was later the Member of Parliament for the Western Maaori seat but eventually lost support for his opposition to retaining traditional knowledge and methodology. He claimed the Tohungaism or witchcraft was one of the worst evils we had to deal with. The strong arm of the law was the only potent medicine that could cure this cancerous malady. A few doses of the lock up had the desired effect.

Webster (1979) claims the reasons for the introduction of the Tohunga Suppression Act were complex and health was not the sole consideration. The Act made it an offence for anyone to foretell future events to Maaori, and discouraged visionaries or prophets and the following is an extract from the Tohunga Suppression Act 1907.

Every person who gathers Maaori around him by practicing on their superstition or credulity, or who misleads or attempts to mislead any Maaori by professing or pretending to possess supernatural powers in the treatment or cure of disease, or in foretelling of future events, or otherwise is liable on summary conviction before a Magistrate to a fine not exceeding twenty-five pounds or to imprisonment not exceeding six months (Webster, 1979, p. 87).

Durie (1993) then says that Tohunga Suppression Act 1907 almost led to the extinction of Maaori perspectives and knowledge relating to sickness and healing. After 1907 healers-Tohunga relied on underground networks to maintain a tradition and continue the craft. In that process distortion and embellishment were not uncommon though nor was innovation and the incorporation of new techniques to supplement those lost through official sanctions against Tohunga (p. 1).

Durie (1993) continues by commenting that whatever the rights or wrongs of the Tohunga Suppression Act, or its justification, it had the effect of weakening Maaori confidence in indigenous approaches to health care, and led to the erosion of Maaori methodologies relating to health, science and the wider environment. Maaori leadership was weakened, and although Pomare encouraged elders from the Maaori Councils to take positive roles in health and sanitation, by 1910 effective Maaori community participation in health services was declining. The Councils were by then under funded to the point of inactivity and Tohunga were practicing in secret, if at all (p. 2).

Durie (2001) then says the foundations for health are complex, often ill defined, and not necessarily linked in a direct way to either physical or mental disorders. But it is impossible to address Maaori health without understanding the wider environments within which health takes shape. And are the foundations of health the same for Maaori as for other New Zealanders or are there specific factors that must be taken into account? (p. 35).

iv. Maaori healthy until Urbanisation dietary changes

Indeed it appears that tangata whenua Maaori at the time of Captain James Cook's arrival in 1769 enjoyed good health with few chronic or infectious diseases as this fact has been well documented by Captain James Cook's logged observations. Therefore the following extracts confirm and verify that at the time of his arrival tangata whenua Maaori were healthy and this evidence complements the traditional knowledge methodology previously that there was no apparent evidence of any chronic non-communicable lifestyle diseases. Indeed tangata whenua Maaori were healthy and no mention is made of any chronic diseases being observed or recorded, supporting my theory of good health through the regular consumption of eel and a holistic lifestyle. However they apparently did have some skin problems and problems with their eyes caused by the smoke used for cooking and heating.

Captain James Cook spent six months on the New Zealand coast in 1769 circumnavigating the islands and going ashore at numerous places and logged into his Voyage Journal in March 1770.

The natives of this country are strong raw boned people rather above than under the common size especially the men. They are all of a very dark brown colour with black hair, thin black beards and white teeth and as such do not disfigure their faces by tattooing and have in general very good features. They seem to enjoy a good state of health and many of them live to a good old age (as cited in Wright St Clair, 1971, p. 20).

Captain James Cook stated “That health is determined by the past as well as the present” (as cited in Wright St Clair, 1971, p. 20).

Wright St Clair (1986) also claims that in 1770 Banks objectively observed the diet and the status of health recording it in some detail and the following detailed extracts are provided directly from Bank’s diary. Joseph Banks was an accomplished and gifted scientist and naturalist providing a very detailed account of the diet and health of Maori in 1770 when he accompanied James Cook on his first voyage (p. 21).

Thus these eye witness recordings provide additional credibility by validating that tangata whenua Maori were very healthy with no chronic diseases such as Type II diabetes and other non-communicable diseases were obvious or apparent at the first European inception.

The men are of a size of the larger Europeans, stout, clean limbed and active, fleshy but never fat, as the lazy inhabitants of the South Seas Islands are; vigorous nimble and at the same time clever in all their exercises. The disposition of both sexes seemed mild, gentle and very affectionate to each other, but implacable towards their enemies. Their food in the use of which they seem to be moderate consists of: dogs, birds, especially sea fowls such as Penguins, Albatrosses, fish and eel, sweet potatoes, yamms, cocos, some few wild plants as Sowthistle, Palm Cabbage, but above all and which seems to be to them what bread is to us the roots of a species of fern very common upon the hills and which very nearly resembles that which grows on our hilly commons in England and is called indifferently Fern, Bracken or Brakes.

Simple as their food is their cookery as far as I saw is as simple, a few stones heated hot and laid in a hole, their meat laid upon them and covered with hay, seems to be the most difficult part of it. Fish and birds they generally broil or rather toast, spitting them upon a long skewer. So simple a diet accompanied with moderation must be productive of good health, which indeed these people are blessed within a very high degree: tho we were in several of their Towns, were young and old crowded to see us actuated by the same curiosity as made us desirous of seeing

them I do not remember a single instance of a person distempered in any degree that came under my inspection and among the numbers of them that I have seen naked. I have never seen any eruption on the skin or any signs of one by soars or otherwise. Such health drawn from such sound principles must make phisicians almost useless, indeed I am inclined to think that their knowledge of physic is but small from the state of their surgery which more than once came under my inspection, of this art they seemed totally ignorant (Captain James Cook, as cited in Wright St Clair, 1986, p. 20).

A farther proof and not a weak one: of the sound of health that these people enjoy may be taken from the number of old people we saw, hardly a canoe came off to us, that did not bring one or more and every town had several whom if we may judge by grey hairs and worn out teeth were of a very advanced age; of these, few or none were decrepid, indeed the greatest number of them seem'd in vivacity and cheerfulness to equal the young, indeed to be inferior to them in nothing but the want of equal strength and agility (Captain James Cook, as cited in Wright St Clair, 1986, p. 21).

Typical Maaori daily diet up until the changes from Urbanisation

The typical daily diet of the traditional Maaori was derived from the abundant resources readily available in the environment where they lived that was either adjacent to or within easy access of a waterway either sea water or fresh water. Indeed water as a resource was used abundantly to cleanse the body physically and spiritually with the regional waterway sacred to the local people because it produced a regular food source and was sacred through its own identity. The daily diet did not change dramatically with the arrival of the European but domestic animals farmed for food as an economic commodity were introduced but the meat not preferred over the traditional staple foods. Such as eels (fresh and sea water species), fish, shark, seafood, bird and available/seasonal vegetables and fruits such as water cress, puuhaa and berries.

- an abundance fresh water consumed in the morning and drunk separate to food (with the intake similar to what is recommended today of six to eight glasses of water for good health)
- two protein rich meals that included a daily intake of unsaturated fatty acids rich in omega-3 from eel, fish, shark, seafood, bird at midday and late in the afternoon depending on the day's activities,

- and served with native vegetables and fruits were consumed daily from the natural green vegetables notably puuhaa and water cress that grew abundantly to purify and cleanse the body.

In other words the traditional Maaori diet at the time of the first European's arrival was similar to what global health experts recommend for good health today and that is daily water, protein (that contains omega-3) with vegetables and fruit. I have been unable to locate reference to any alcoholic beverage being consumed either from traditional historical records of waiata, karakia, tukutuku, moko or from Captain Cook's observations, that presumably would have been offered as part of a hospitality gesture.

Now examining the dietary intake nearly 100 years after the first European contact in 1769 with some published statistics of the food consumed at the Runanga Hui held at Ngaaruawaahia from 23 May until 28 May 1860. This important Kiingitanga Hui shortly before Pootatau's sudden passing in June 1860 provides further verification of the type of diet for tangata whenua Maaori that had not changed dramatically with the European influence. The Hui was attended by approximately 3,000 comprising of 1,600 women and children with 1400 males attending and Hohana, the Assistant Secretary in State Affairs at Ngaaruawaahia provided specific details of the type food eaten consumed.

Reverent Thomas Buddle (1860) stated that the following food was provided:

- eels (smoked and/or dried) 36,000
- fresh eels caught for the occasion 580
- sharks 20
- baskets of dried fish 16
- potatoes 2,000 baskets
- pigs 84 (were brought in the inaugural Tainui waka voyage)
- bullocks 3
- flour 31 tons and 8 bags
- bags of sugar 9
- pumpkins (or gourds were brought in the inaugural Tainui waka voyage)
- vegetable marrows
- 1 chest of tea (p. 65).

An analysis verifies that the eel was still consumed as a staple food in abundance with at least one eel for each person every day thus regularly consuming the unsaturated fatty acid omega-3 and lethicin in abundance.

Professor Kevin Gould (2005) from Otago University's Botany department (and in conjunction with Auckland University Researcher's) found that traditional Maaori food plants rival some European *wonder foods* for goodness. The commonly eaten puuhaa was found to have more than three times the antioxidant level of blueberries, but some less frequently eaten items, such as the fruit of the swamp maire (maire tawake), had up to 18 times more. Blueberries are one of the most antioxidant-rich foods in the Western diet. Higher intakes of certain antioxidants lower the incidence of certain cancers, which may help to explain why pre-European Maaori appear to have low levels of non-infectious diseases such as cancer.

The New Zealand Herald published an article on March 1 about the above research findings "Traditional Maori kai help in fight against cancer," 2006.

v. The longevity question

Although I can whakapapa back to this time when the Tainui waka arrived, the life expectancy of my tuupuna was greater in comparison to the European in Europe, but today our current dominant European culture is skeptical of oral historical recordings, thus making my claims controversial. Pootatau Te Wherowhero passed in 1858 at 101 years and according to my whaanau whakapapa longevity was common.

Maemae (2007) stated, "That Pootatau Te Wherowhero lived until aged 101 years" (Maemae is a Kiingitanga Kuia who presented a Power Point Presentation at the Tainui Endowed College, Hopuhopu, Ngaaruawaahia).

Pootatau's father the great chief Te Rauangaanga from Ngaati Mahuta and his mother Parengope II also lived to a great age. Most of the whaanau that were not killed prematurely during warfare all lived well in excess of the 47 years of their European counterpart of the time. But without scientific proof then the evidence lacks depth in the modern evidence-based society that we are today, perhaps some time in the future may be able to substantiate.

However in comparison to European civilisation health and longevity from recorded British and European history presents substantial controversy as to whether or not tangata whenua did live longer than they did at a comparable time. In fact during the European Middle Ages around 900 AD including ancient Rome and Medieval Europe was poor,

underdeveloped, thinly populated with war, disease, famine, low birth rates and people lived on average to 30 years (but estimated to have been between 20-30 years).

Best (1924) comments that teeth the Maaori possessed his most remarkable feature – they were large, white, regular, and remained sound into old age. In old skulls one notes teeth worn down to a surprising extent, but still perfectly sound. An expert has stated that the Maaori has the finest teeth of any existing race. The simple life, the hard fare, and industry of the old-time Maaori kept him usually in good health, and in many cases he was long-lived. No doubt the law of the survival of the fittest caused weaklings to perish, and helped to produce an energetic, healthy, virile population. Few diseases afflicted them, and, apart from the dangers of war and black magic, men reckoned to die of old age. Epidemics introduced by European, such as measles, have at various times taken heavy toll of lives (p. 6).

Arnold (1992) says in the period 1560-89 AD life expectancy was 41.68 years, a higher expectancy of life than only known before the late 19th Century. The average life expectancy at birth was low, falling into the low thirties for much of the period 1656-1701 AD and dropping to 28-47 for those born in the quinquennium centred on 1681 AD (p. 39).

Guy (1994) claims that the Tudors and Stuarts life had very distinctive ages of man: from baby, youth, adult, old age and death where child mortality was high. But over half those born dying in their first year and only one person in ten were expected to reach 40, but disease was a problem. In fact disease was not a problem for traditional Maaori because it did not exist until the European arrived with infectious diseases and then life-style diseases like Type II diabetes (p. 40).

vi. Consequences of Urbanisation dietary/lifestyle changes

Maaori Urbanisation created a total change in all aspects of traditional Maaori lifestyle included diet, cultural alienation and lifestyle, with the Paakehaa New Zealand diet that typically contained animal fat and meat. Indeed Maaori now have nearly 50% higher

saturated animal fat intake than non-Maori, simultaneously with less vegetable and fruit intake.

Burkitt and Trowell (1983) concluded that there is usually a sequence in the emergence of chronic disease as the diet of the developing country becomes more *westernised* and this has manifested in high incidences of Type II diabetes in Maori (p. 949).

The National Plan of Action for Nutrition Dietary (1999) set dietary intake targets to increase the daily consumption of vegetables and fruit that all New Zealanders eat at least five servings each day. Fruits and vegetables are excellent daily nutrient and antioxidant sources. Research has identified antioxidants as a disease development protector against many chronic diseases including coronary heart disease, Type II diabetes and cancers.

The Hillary Commission (1995) comments New Zealand was the highest consumer of saturated fat from the entire Organisation for Economic Co-operation and Development (OECD) countries:

- 50% of Maori (42% of non-Maori) were not eating the recommended number of five plus vegetable and fruit servings
- 79% of Maori (66% of non-Maori) were deficit in any fruit
- the Paakehaa diet is higher than saturated animal fat from domesticated animal consumption and lower in monounsaturated (MUFA) and polyunsaturated (PUFA), derived vegetables and fruits servings.

Positive nutritional analysis of current Maori diet:

- higher monounsaturated fats (good fat)
- higher energy median intake
- higher intake of iron
- implementation of dietary change
- dietary changes from a *high fat* to fruits, vegetables, bread, cereal
- greater intended future dietary changes

- more frequent hot milk beverage users
- more frequent consumers of bread
- less likely savoury biscuits or crackers
- more likely to consume porridge
- more likely to eat high protein foods such as lamb, hogget, mutton, fish, pork (roast, chops, steak), corned beef, mixed lamb dishes, shell fish

Negative nutritional analysis of current Maaori diet:

- higher energy from saturated fat
- higher saturated fat intake
- higher dietary cholesterol intake
- less likely to meet adequate carbohydrate intake
- higher mean alcohol intake
- inadequate vitamin E intake for females
- inadequate riboflavin for females
- higher inadequate foliate intake
- higher inadequate calcium
- insufficient manganese
- less likely to trim fat off meat
- less likely to remove skin off chicken
- less likely to use olive or canola oil
- use lard for cooking
- higher proportion had financial hardship
- less likely to vitamin supplement
- less frequent users of cheeses
- less likely to eat fruit
- more likely to eat pork bones.

vii. Maaori Health Development Strategies

The traditional Maaori diet prior to Maaori Urbanisation was rich in the omega-3 fatty acid (and lethicin) obtained predominantly from eel, but also fish, seafood and native bird, as a consequence diabetes mellitus was apparently absent. While at the same time other chronic non-communicable diseases were also apparently absent and their appearance was abruptly in 1960s as a consequence of the change from a predominantly rural holistic lifestyle to a more fragmented urban lifestyle. I ask is the current native eel available a good source of omega-3? The answer is unquestionably *yes*. Therefore a concordance of historical and contemporary knowledge most certainly strengthens the rationale of this research question through a sound methodology that is more than a plausible theory.

As part of the hypothesis research a number of research questions were presented to my kaumaatua, discussed and then meticulously examined as part of this thesis compilation.

Such questions were:

- Could the past knowledge be used to solve the current Type II diabetes epidemic?
- Can omega-3 from a traditional diet Maaori diet be used today?
- Can omega-3 from a traditional Maaori diet prevent Type II diabetes mellitus in today's world?
- Can historical data be synthesised with contemporary knowledge to indicate a possible solution to Type II diabetes rates in Maaori?
- Was omega-3 a significant feature of a pre/post European diet?
- Could an omega-3 eel/tuna diet explain the absence of Type II diabetes symptoms from the historical records?
- Can the traditions of the past correct the health problems of today?
- Should we look to the past for the answer to the current Type II diabetes epidemic?

Throughout all the discussions it was agreed that the holistic lifestyle and the traditional values of the tuupuna undoubtedly prevented the lifestyle diseases such as Type II diabetes. And that the diet prior to the urbanisation must have protective mechanisms

because the onset of the disease rapidly manifested subsequent to the urbanisation where drastic dietary and lifestyle changes were made. Thus prior to urbanisation our tuupuna knew that (eating certain foods, drinking plenty of water, ensuring the body was regularly internally cleansed, regular daily exercise) was healthy and science of today backs them up. Such as the chemical assay of the eels to prove that omega-3 existed and that the unsaturated fatty acid is essential to good health. In other words the tuupuna had accumulated extensive knowledge that included knowledge to keep them healthy, thereby providing a problem pathway resolution where Maaori are able to be involved in potential interventions to solve today's problem. But finding solutions through western medicine practice has not succeeded in preventing Type II diabetes mellitus (and other chronic non-communicable diseases) that are currently afflicting our people.

The traditions of the past are now being accepted globally as a viable alternative for health maintenance and chronic non-communicable disease prevention. The more holistic approach and disease prevention strategies that in the past has been alien to a Western medical philosophy but some provision has been made over the last ten years for a more traditional Maaori healing to be available as a health service. It is anticipated in the future that some of the traditional Maaori healing methodology and disease prevention will become a mainstream health service strategy available to all New Zealanders.

Summing up now, contemporary tangata whenua Maaori are vulnerable to Type II diabetes mellitus and it would appear that lifestyle choices particularly the dietary intake is pivotal in maintaining the disease. The adage *you are what you eat* is now regarded as definitive and scientific-based knowledge where the last decade has seen an abundance of data, information and scientific research in the areas of nutrition and nutritional supplementation. The results continue to demonstrate that the foods we eat determine health, wellness and longevity, and that some foods offer medicinal qualities; something our tuupuna knew through careful observation. They had an innate understanding that the food and the nutrition they contained were directly related to health, wellness, longevity, and healing with the following nine key health promotion strategies identified as pivotal and I have developed them from the Tuupuna Knowledge Base Methodology research that is presented as a Health Intervention in Chapter four of this thesis:

Traditional knowledge verified in Maanuka Honey Clinical Trial

There are other examples of traditional resources and methods that have now been scientifically proven and medically accepted as legitimate. Maanuka fauna and flora had always been used for its healing ability and traditional indigenous knowledge and therapy appears to have enormous potential in solving new problems. Maanuka honey is now being recognised to have bacterial properties and can promote effective wound healing and traditional Maaori Medicine or *Rongoaa* has now been accepted by the global medical profession as having credibility.

Allen and Molan (1991) found that Maanuka honey had a high level of antibacterial activity following the results of a Clinical Trial completed at Waikato Hospital in association with the Waikato University's Honey Research Unit. They also found that Maanuka honey could be used against antibiotic-resistant pathogens in particular *Staphylococcus aureus* in leg ulcers by reducing the bacterial bioburden. World War II and the infections from wounds necessitated the development of penicillin as the forerunner to modern antibiotics to treat many global diseases but a major problem has arisen as bacteria are continually mutating to become Antibiotic Resistant.

Durie (1993) claims the current wide Maaori interest in traditional healing can be attributed to several factors as identified and discussed as:

1. The repeal of the Tohunga Suppression Act in 1964 removed any legal barrier through it is unlikely that it was still a strong deterrent. By the late 1950s several Tohunga had established large followings practicing quite openly on marae and in other settings. Though not well regarded by medical people, they had built up reputations within Maaori communities and centres flourished at Rotorua (Adams), Taumarunui (Phillips) and Ruatoria (Gage), well before the repeal of the Act.
2. Since the early 1980s, the resurgence of interest in all aspects of Maaori culture has been associated with a call by Maaori for greater autonomy and a measure of self-determination. To some extent this has coincided with greater recognition by the government and the courts of the Treaty of Waitangi, but it has also been part of a global movement in which indigenous people have claimed a right to cultural property and their own intellectual knowledge.

3. There has also been some loss of confidence in western methods of treatment as Maaori have been confronted with cardiovascular disease, mental illness, hypertension, diabetes, cancers, asthma and more recently sudden infant death syndrome. Smoking, obesity, excessive alcohol use, motor vehicles, substandard housing, unemployment and stresses associated with urbanisation (and whaanau destabilisation) are the new causative factors. Perhaps because of the multi factorial nature of the so-called life style illnesses, medical treatment was bound to have limited effect, but many Maaori came to see the medical limitations as evidence of failure. True, late intervention for cancer and other diseases mitigated against favourable outcomes but Maaori began to feel (and complain at numerous health hui held in the 1970s and 80s) that there was something unsatisfying about clinical approaches. These relied mainly on medication without the promise of a total cure and often with a host of debilitating side effects that did little to improve patient compliance.
4. Uneven access to primary medical services was a further factor. Costs for visits to the doctor and then prescriptions, as well as cultural barriers and difficulty in arranging schedules, resulted in an under utilisation of primary care services by Maaori.
5. The missing link in health services has been identified by many Maaori as *taha wairua* or a spiritual dimension, having been argued on marae and at regional and national hui that an over-emphasis on physical aspects of illness has been associated with corresponding inattention to emotional, cultural and spiritual factors. A four-sided approach to health: *taha wairua, taha hinengaro, taha tinana, taha whaanau* and translated means the spiritual, the psychological, the physical and the family that has been recognised by Maaori as the Maaori health Hauora model. More often than not conventional health services have failed to address the first two aspects whereas those are the dimensions that have been given major emphasis by traditional healers (p. 65).

Teenei te tuku aku ki mua o too aroaro.

I now place it before you.

Chapter two

Methodological Review

This chapter is significant because it explores the methodology that is used to address the discussed Type II diabetes health issue for contemporary Maaori. This chapter first examines Western academic theoretical methodologies, then Kaupapa Maaori methodologies, after that introduces and develops the concept of inherited knowledge. This new research methodology is a combination at the interface of Positivist Methodology from science and history in conjunction with Kaupapa Maaori research methodology established from values, lore, tikanga and credibility by looking to the past. This research methodology is a synthesis of two approaches where the framework used is reproducible through an accepted or approved example of something against which others are judged or measured. In addition there is the establishment of new knowledge through the investigatory analysis from which the findings are presented thus introducing Tuupuna Knowledge Base as a research methodology that extends the existing Kaupapa Maaori research methodology (established by Professor Linda Smith with her 1999 publication *Decolonizing Methodologies*), holism versus sectolism with reproducible access. This chapter examines if inherited whakakapa knowledge be classified as a Knowledge Based Science in an academic context. Then it firmly establishes the combination of knowledge-bases through the Science of Knowledge from the scientific view and the Maaori view by demonstrating accessibility and credibility.

i. Research Paradigms and Methodologies Review

Guba and Lincoln (1984) claim inquiry paradigms as principles or patterns which define for the researcher what the purpose and limits of legitimate inquiry and argue that research paradigms provide the framework for research to be carried out and explored, reflecting the fundamental beliefs or metaphysics that are concerned with the essential and underlying principles which shape and define perceptions of the world, its nature, and the position of people within it. The following comparative summary introduces the two basic research methodologies where Qualitative examines written data as Standards and Quantitative looks at statistical data as Standards (pp. 108-111).

Table 17. Guba and Lincoln (1984) compare the two styles for analysis (p. 110).

Quantitative style	Qualitative style
<ul style="list-style-type: none"> ● measure objective facts ● focus on variables ● reliability is key ● value free ● independent of context ● many cases, subjects ● statistical analysis ● researcher is detached 	<ul style="list-style-type: none"> ● construct social reality, cultural meaning ● focus on interactive processes, events ● authenticity is key ● values are present and explicit ● situational constrained ● few cases, subjects ● thematic analysis ● the researcher is involved

Denzin and Lincoln (1994) argue that applied and action research have a natural affinity with clinical methods. Each tradition reflects a commitment to change, although clinical research displays a greater concern with diagnosis and treatment than with large-scale social change *per se*. historically, the Positivist and Post-positivist paradigms have dominated clinical, medical research.

William Miller and Benjamin Crabtree 1978 (as cited in Denzin & Lincoln 1994) present a qualitative alternative approach that locates clinical research in the tradition of Post-positivist applied anthropology. Their perspective stress the following: research design; experimental, survey, documentary and field methods; and the uses of grounded theory, personal experience methods, clinical interviews, and participant observation. They rely heavily on the data management methods and techniques developed by Tesch 1979 (as cited in Denzin & Lincoln 1994) and Miles and Huberman 1981 (as cited in Denzin & Lincoln, 1994) offering an innovative model of rigorous analysis for qualitative materials (p. 143).

Denzin & Lincoln (1994) identify the relative range of Positivist paradigms used:

- Positivism as a dualist and objective has dominated western social and physical science dissertation since the 1600s where assumption or supposition rather than assertion exists

- Post-positivism reflects more recent efforts to respond to the criticism of positivism known as *critical realism*
- Critical Theory is used to describe a set of alternative paradigms linked by the assumption that inquiry is *value determined*
- Constructivism is an argument that both knowledge and reality lack an objective or absolute value through interpretation (p. 106).

Table 18. Standards for Positivism critiqued by Miles & Huberman (1981, p. 143).

Item	Positivism	Post-Positivism	Critical Theory	Constructivism
Ontology	naïve realism <i>real</i> reality but apprehendable	critical realism <i>real</i> reality but only imperfectly	Historical realism or virtual reality shaped by social political ethnic	relativism, local and specific with constructed realities
Epistemology	dualist and objective	modified dualist and objectivist critical traditional community findings probably true	transactional subjectivist value mediated findings	transactional subjectivist created findings
Methodology	experimental manipulative verification of hypothesis quantitative methods (quantity or numbers)	modified experimental manipulative falsification of hypothesis may include qualitative methods	dialogic dialectical	hermeneutical dialectical

Phillips (1987) argues the basic premise is that a scientist will usually work within a theoretical framework or paradigm that determines the problems that are regarded as crucial. The ways these problems are positioned and conceptualized, the appropriate method of inquiry, and the relevant standards of judgement should be able to determine which methods to consider and which methodologies are acceptable (p. 205).

Phillips (1987) writes that beliefs provide the foundation through which impressions of reality are formed or called the Alternative Inquiry Paradigm, Basic Beliefs or metaphysics (being beyond and after physics). Then over the last three decades the epistemological status of science has come into question and for some scholars the landmark was the translation of Popper's *Logic of Scientific Discovery*. The message was

clear, scientific knowledge-claims can never be proven or fully justified, they can only be refuted. For others, the turning point was less sharply demarcated, but it was bound up with the gradual erosion of the credibility of logical positivism with the position that for several decades had appeared to be the foundation of the traditional epistemology of science. Others were finally shaken by Kuhn's *The Structure of Scientific Revolutions* (1962) or by the work of Kakatos or Feyerabend (as cited in Phillips, 1987, p. 3).

By the mid 1970s, *the rationality of science* has become a major issue with Newton-Smith (1981) saying that the scientific community sees itself as the very paradigm of institutionalised rationality. It is taken to be in possession of something, the scientific method, which generates 'logic of justification'. But while truth is the aim, ignorance is the game (pp. 44-46).

Popper (1957) stated, "There is no criterion of truth. In other words *criterion of truth* refers to a decision method: that leads to a finite sequence of steps which test – whether or not the statement in question is true" (p. 45).

Thus in the absence of a general criterion of truth it might be argued that tangata whenua Maaori possess true theories, yet are unable to present them in a way that qualifies and satisfies the requirements of a scientific model.

Popper (1957) reached the conclusion that the essence of science is testability, or more precisely the openness to refutation. A statement that is compatible with any possible evidence is not scientific, no matter how interesting it might appear; scientific statements are important and testable because they rule out certain possibilities. Scientific knowledge progresses by a process of formulating bold conjectures and then subjecting them to equally bold criticism and test. Therefore it may be surmised that according to a scientific model knowledge grows not by a process of proving items to be true, but by the *weeding* process of error elimination. That is why openness to criticism is the mark of rationality for a Popperian. However the dogmatic attitude is clearly related to the tendency to verify laws and schemata by seeking to apply and confirm them, even to the point of neglecting refutations. In comparison the Critical Theory stance is open to challenge, change, testing and refutation (p. 7).

ii. Kaupapa Maaori Research Methodology

Professor Linda Smith (1999) describes Kaupapa Maaori research as providing a focus through which Maaori people (as communities of the researched, and as new communities of the researchers) have been able to engage in a dialogue about setting new directions for the priorities, policies and practices of research for by and with Maaori. But she also states that Kaupapa Maaori is also located in Critical Theory, due to the notions of critique, resistance, struggle and emancipation that it embraces.

The Standards to measure are:

- guidance from upbringing
- clearly articulated view from elders
- triangulation with other sources such as readings
- a common view
- stands investigation analytically
- Peer Review by whaanaunga culturally safe (pp. 183-185).

Professor Linda Smith (1999) then argues that Kaupapa Maaori research is culturally safe because it involves the elder mentorship thus creating a rigorous and culturally relevant and research paradigm that is appropriate for both Maaori researcher and Maaori being researched. Then Smith (1999) also debates that the Western cultural archive contains within it several traditions of knowledge and rules of practice which are useful for framing and engaging in debates concerning knowledge. For example, within the context of observing and making sense of human realities Smith (1999) challenges the notion that scientific research is a process that is as objective and value free when as most social scientists assume. She argues that Western paradigms create systems of classification and representation enabling certain discourses to be played out in systems of power and domination with real material consequences for colonised people (p. 104).

Other Maaori scholars have established a research framework in their doctoral thesis and Te Kani Kingi included a summary framework in his unpublished Doctoral Thesis (2002) *Best Health Outcomes for Māori* from Massey University.

Table 19. Kingi (2002). A Kaupapa Maaori Summary Framework (p. 65).

Position	Components	Implications for Research
Ontology	<p>Maaori values, beliefs, traditions and cultural practices are central:</p> <ul style="list-style-type: none"> the notion of Maaoritanga and, the inter-relatedness between people, nature and the development of social system and social organisation the concept of holism is fundamental 	<p>emphasis placed gaining knowledge through inter-relationships research:</p> <ul style="list-style-type: none"> connections between health and broader social, economic, cultural and historical factors is emphasised Maaori health research should be carried out in a way that appreciates Maaori heritage, beliefs, values, and practices, and thereby affirms identity
Epistemology	<p>assumes that the researcher's values influences the research:</p> <ul style="list-style-type: none"> the relationship between the researcher and participants is interactive is linked to the accumulation/acquisition of knowledge and its transmission 	<p>culturally competent research team is absolutely essential:</p> <ul style="list-style-type: none"> methodologies and methods will be selected that are cognisant of the interactive relationship between researchers and participants data interpretation is influenced by the researchers values need to be explicit as to the researcher's value-base
Methodology	<p>methodologies consistent with Maaori beliefs and values:</p> <ul style="list-style-type: none"> appropriate frameworks need to be developed a wide range of components or considerations are relevant such as Maaori language with Maaori participation and input, Maaori aspirations, quality control and accountability 	<p>the need to further develop distinctly emerging Maaori methodologies:</p> <ul style="list-style-type: none"> Western and other non-Maaori methodologies that are consistent with a kaupapa Maaori paradigm will be utilised

Graham Smith (1990) summarises saying that Kaupapa Maaori research as related to *being Maaori*, is connected to Maaori philosophy. He argues that Kaupapa Maaori validates and legitimates Maaori culture and language, and primarily concerned with the struggle for autonomy and cultural well-being.

iii. Matauranga/Western Scientific Research Methodologies

Cunningham (1998) argues that the traditional Maaori worldview acknowledges and centres on a concept of holism. The concept centres on notions of connectedness and

interdependence, on the personal and collective, and on the physical and spiritual relationship between man and the environment (p. 396).

Cunningham (2000) then comments that arguably, traditional Maaori operated in ways not dissimilar to Western researchers, scientists and technologists, albeit with indigenous methodologies, philosophies and world views. Maaori knowledge has not always been easily catered for within the paradigms which have operated to date in the Research, Science and Technology sector in New Zealand (p. 45).

Cunningham (2000) continues, by considering Maaori knowledge, in context of the *past* knowledge and *future* knowledge. Past knowledge encompasses historical, such as, the recent past (post-Treaty, Colonisation, Urbanisation) and the distant past (pre-Treaty). A conservative Maaori worldview is central to this: wholism, an Iwi-based Maaori social system, and an oral tradition are significant dimensions of this historical view. For Maaori, future knowledge stems from the environment in which it was developed. Future knowledge must take cognisance of the contemporary Maaori worldview, Maaori social and cultural diversity, partnership, protection and redress in terms of the Treaty of Waitangi and responsiveness in terms of public sector interactions. However Maaori-specific methodologies for academic research are in the formative stage but this thesis has attempted to provide credibility for historical knowledge and a pathway to develop a scientific framework both for indigenous academic research utilisation (p. 47).

Parson (1995) assesses science as the study of the world around us using a hypothetico-deductive process as the *scientific method*. But then comments that this concept is not exclusive to western or European-derived cultural traditions but also found in indigenous peoples cultures. All indigenous people have science according to their needs and cultural understanding of their surroundings, the environment. He states, that the same thought processes which allowed Polynesians to voyage between the islands of the Pacific and settle them, has also sent people into space. The term Maaori Science has been used to emphasise Maaori people who used the scientific methods and that it is not the prerogative of western countries only (p. 4).

Dickinson (1996) implicates the scientific method within a Kaupapa Maori paradigm by placing a cultural practice such as preparing karaka berries within a scientific model. He

discusses how trying to find out whether the berries are poisonous, and removing the poison, is science. Presenting two alternative viewpoints is only appropriate if the viewpoints are genuine alternatives; that is if they are seeking to do the same thing in different ways (p. 6).

To sum up, so far, in this thesis, Western Epistemologies and Kaupapa Maaori have been discussed and how Maaori methodologies such as Kaupapa Maaori are recognised as valid academic research methodologies. In fact Kaupapa Maaori methodologies can qualify as scientific research models yet have cultural distinctions that keep them separate to Western research paradigms, such as Maturanga Maaori. Maturanga studies a topic in the real world where it is located within and from its interactions and seeks to build a conceptual framework in which to codify knowledge.

Professor Mason Durie (2001) identifies Maturanga Maaori issues s being:

- The knowledge belongs to Iwi and should remain under Maaori control.
- There are signs that the Crown policies for science, research and technology could lead to the assimilation of Maturanga Maaori into main stream knowledge systems.
- Maturanga Maaori is different to science and should not be confused with it.
- Maaori participation in science and technology should be encouraged but it is not a goal which directly linked to Maturanga Maaori.
- The Government bears some responsibility for the protection of Maturanga Maaori and should make funding available for its transmission and development without confusing the issue with Maaori participation in science (p. 84).

Ministry of Research, Science and Technology (1995) discuss that science and maturanga do not seek to do the same thing but such a statement is untrue as both science and maturanga seek to codify knowledge in a useful manner. Both result in useful and unuseful concepts. Both rely on empirical observation and codifying that knowledge in a theoretical framework. The perspectives however are different. Science seeks to isolate the study matter from the real world under a set of very specific

conditions, thus placing the topic in isolation, and then drawing observations about its place in the real world (p. 5).

Williams (2000) comments that cultural prudence extends to concerns about proprietary rights, the appropriation of Maturanga Maaori for commercial purposes and the subjection of Maturanga Maaori to scrutiny within frameworks more suited to the evaluation of scientific knowledge or the logic of mathematics. This does not mean that one is necessarily more valid than the other. Thus this thesis argues that rationality is a culture specific notion; one culture's rational thought is not necessarily the same as another's. Therefore the rational thought that underlies scientific inquiry is but one form of thought as is Kaupapa Maaori and Maturanga Maaori (p. 21).

iv. Traditional Indigenous Knowledge Methodology

The traditional or historical methods used by many indigenous people could be comparatively described today as *sustainable methodology* or *technology* where traditionally conservation measures were observed to guarantee the resources were not extinguished. The review of existing publications illustrates that traditional knowledge acquired by indigenous people over time, and bestowed to subsequent generations does have acceptance in a modern scientific world of today. Therefore the constant demand for the global limited resources and environmental issues relative to these natural resources has motivated many people and governments to become aware that conservation and selective use of the limited resources are necessary for any future generation's well-being. Examination and analysis of indigenous populations presents evidence where they were required to preserve natural resources to ensure subsequent generations inherited sufficient for their survival. Then with a surplus to secure a continued supply of all resources such as food sources, fauna and flora for medicinal and scientific purposes (such as making dyes for clothing) presents both credibility and worthiness in a modern world.

Wilman and Burch (1998) argue that traditional societies managed their natural environment in a more sustainable way than do modern societies. Thus in traditional

societies, institutional arrangements to overcome or avoid depletion of commonly owned resource stocks are often intricately woven into the society's cultural fabric.

Wilman & Burch (1998) state, "If we move forward in time, it is possible to investigate the understanding and beliefs of traditional societies, as well as their actions" (p. 94).

Then they say that common to traditional societies are an intimate knowledge of, and a reverence for, the natural environments in which they lived. Intimate knowledge of the natural environment was essential for survival. The Plains' Indian understanding of nature (like that of most traditional societies) came from studying until he was part of it (p. 77).

While the Indian did believe that the Almighty gave each of His creations some particular grace or power, and that these favours, at least in part, might be obtained from them, by him, he knew he could only acquire them if he studied their possessors' habits and then copied them to the limit of his own ability. Accordingly, he acquired abilities for scouting, hunting and wise living far beyond those on any other peoples (Thomas Mails, as cited in Wilman & Burch, 1998, p. 78).

Wilman & Burch (1998) claim decisions are based on a very detailed knowledge of what happens in Nature, but little knowledge of why it happens. Through trial and error, heuristic systems of rules that suit a particular situation have evolved. With the introduction of a new technology, or an institutional change imposed from the outside the community, the process of trial and error must begin again. More generally, the institutions developed by traditional communities develop a more scientific understanding of the natural system. This has to be done in a way that melds traditional and scientific knowledge to make the result understandable at the community level (p. 86).

Smith (2000) stated, "Nature as material and it is spiritual, it is given and made, pure and undefiled; nature is order and it is disorder, sublime and secular, dominated and victorious (as cited in Phillips & Mighall, 2000, p. 2).

Phillips and Mighall (2000) comment that terms like nature and society, although frequently used, are highly complex.

Denzin and Lincoln (1994) include the method of collecting and analysing empirical data that they call *Applied Ethnography* but ethnography is principally defined by its subject matter, which is ethos, or culture, and not by its methodology, which is often but not invariably qualitative. The term culture is itself ambiguous and has been subject to a variety of interpretations, each implying somewhat different methodological approaches. In my view, culture is composed of those understandings and ways of understanding that are judged to be characteristic of a discernible group.

Much of the value of ethnography lies in its narrative or in *the telling of a story* that is based on cultural representations. Whereas traditional ethnography has focused almost exclusively on telling stories about *the other* or generally distant peoples, many contemporary ethnographic approaches tend to focus on the ways in which people fashion culturally meaningful expressions from fields of experience in which meaning is routinely contested, and where culture is perennially under construction. This has been particularly true of applied ethnography, which is by its very nature interventionist and culturally intrusive (pp. 852-858).

Phillips & Mighall (2000) comment that according to Soussan (as cited in Phillips & Mighall, 2000), the ideas that underpin the concept of sustainable development have evolved as people have re-appraised their concerns over the relationship between economic and social development, patterns of *resource* availability and use, and the resultant environmental impact. This is encapsulated in the concept of sustainable development defined in the 1987 Brundtland Report titled *Our Common Future* where development that meets the needs of the present without compromising the ability of future generations to meet their own needs. Since that conference the idea of sustainable development has become synonymous with the long-term management and/or development of society and the world's resources despite people formulating different views on the concept where two broad approaches have emerged *developmental and radical* (p. 247).

Developmental

The Brundtland Report emphasised that the role of sustainable development is to meet human needs. It identified two key concepts: first the basic needs of all people must be

provided – food, water, security, employment, etc.; and second that there are no limits to development but that development is a function of existing technology, the socio-economic organisation of society and its impact on the environment. From an economic viewpoint sustainable development looks to improve material wealth, especially for the poor, and provide lasting and secure livelihoods. Material wealth is defined by Redclift (as cited in Phillips & Mighall, 2000) using indices suggested by Barbier (as cited in Phillips & Mighall, 2000): food, real income, educational services, health care, sanitation, water supply and emergency aid. Thus the emphasis of this approach is to meet social and economic needs. Following this route sustainable development is used to maintain future levels of production and consumption and a departure from the Brundtland view leads to the possibility that sustainable development may be defined by people themselves to realise an ongoing process of self-realisation and empowerment.

Radical

The focus of sustainable development is to conserve the earth's natural resource base. Sustainable development in this sense takes a green approach, where ecological stability is the key issue. This approach addresses environmental degradation, loss of soil and water quality and air pollution, and determines sustainable yields of renewable resources. Ecocentric ideas of stewardship of the earth by humans, rather than for humans, feature strongly in this view of sustainable development. Embodied in this approach is the idea of ecojustice: 'treating life-support systems of the Earth with a degree of care and respect that can only emerge if society also treats itself and its offspring similarly' (O'Riordan as cited by Phillips & Mighall, 2000, p. 54).

Saunier and Meganck (1995) comment that the key concern for planners is the traditional links between cultures and the natural world; it deals with the responsibility over resources. Tenure systems upon which responsibility is built are based on legitimacy drawn from the community in which they operate rather than the nation-state in which they are located. Indigenous systems of resource tenure are extremely variable, complex mixtures of individual and community rights, enforced by the local culture. These systems are flexible and constantly evolving, often in response to changing environmental conditions (p. 28).

Coward (1998) asks what can be learnt from examples of how traditional societies succeeded or failed in developing institutions to manage common property resources. The task of these institutions is to encourage the individual to restrain his pursuit of self-interest for the good of the community. In most cases a system of norms and conventions was used, enforced by the desire of the individual to gain and hold the approbation of his fellows in the community. Such an approach works well in the community and the commonly owned resource are easily identified. This requires that individuals outside the community can be excluded. Individuals within the community must clearly understand the behaviour that is required of them. It is also desirable that members of the community are able to monitor the behaviour of their fellows, and the state of the resource (p. 82).

Sillitoe (2002) comments that it is by no means clear, particularly at this time, with the search for whatever it is growing rapidly in development circles based on work published by: Antweiler 1998; Purcell 1998; Semali and Kincheloe 1999 (as cited in Sillitoe, 2002). This is demonstrated by a range of alternative terms used for indigenous knowledge by different writers vying for prominence and claiming to be more representative as they argue over the content of, and approaches to, this field. They include local knowledge, rural people's knowledge, insider knowledge, indigenous technical knowledge, traditional environmental knowledge, peoples' science and folk knowledge. Some writers contrast this knowledge with scientific knowledge, even implying that it applies only to non-western knowledge, prompting others to query the status of 'non-scientific' Western beliefs and the implications of contemporary accelerating globalising trends (p. 8).

Sillitoe (2002) then says when we have decided what indigenous knowledge is, we have to face the question of how best to undertake research into it. We need to devise a methodology that mediates effectively between the contradictions that characterise the promotion of development research from an indigenous knowledge perspective, epitomised in the contrast between local indigenous knowledge and global scientific understanding Greiner (as cited in Sillitoe, 2002). The one is more narrowly culturally contextualised, whereas the other is cosmopolitan and has universal theoretical aspirations. The methods of the former are more inductive with a 'relative' model of the world underlying the knowledge tradition, which to outsiders involved in development is

largely unknown (even unknowable according to post-modern thinkers). However the methods of the latter are more deductive, with a 'general' model of the world and established methods for investigating it. Consequently, we cannot assume that one will be congruent with the other; rather we have to seek the contrasts and parallels. We have to reconcile indigenous knowledge wide holistic knowledge and systemic understanding of every person, with scientific knowledge, the narrow and in-depth understanding of highly trained specialists and in doing so promote cross-culturally informed research (p. 13).

Semali and Kincheloe (1999) suggest that in recent years the world has witnessed a growing interest in traditional or indigenous knowledge but that some of this interest is purely academic. But some of it is spurred by the promise of possible applications of this knowledge. The knowledge of traditional and indigenous communities concerning characteristics of plants and herbs, particularly medicinal plants, is considered useful in promoting the sustainable use or exploitation of biological resources. As the use or exploitation of biological resources has become much more as a result of evolutions in biotechnology, the exploration of biodiversity for commercially valuable genetic and biochemical resources is seen by some as a possible key to biodiversity conservation (p. 332).

Three schools of thought can be distinguished Agrawal (as cited in Semali & Kincheloe, 1999). The first one stresses the differences in the subject matters for research. The school of thought argues that that the main differences are based on contextual grounds, as indigenous knowledge is more deeply rooted in communities' environments and the third school of thought focuses on the differences in methodologies used to conduct research. Indeed there can be no doubt that traditional communities possess another type of knowledge than urban communities in Western or Westernised societies. The point is, however that we should not focus on bits of specific knowledge, but rather on the *generation* of knowledge. What matters in the longer-term is the continuation of a system that has shown to be able to generate knowledge that differs from the knowledge generated by the *scientific* knowledge system, as it is a system that has developed alternative solutions for several local problems. Perhaps these solutions are not as

sophisticated as the solutions developed by the scientific system, but often they are equally effective and environmentally more sustainable (p. 54).

Semali & Kincheloe (2000) say that in recent years there has been a growing interest in *indigenous knowledge* and its relevance to the formulation of resource management regimes, or the conservation of fauna and flora. The interest is part of an intellectual reaction against what Freidman (as cited in Semali & Kincheloe, 2000) calls the anti-culture and anti-nature of modernism. It reflects the increasing scepticism many people in the industrialised world have of the heuristic power of the western, scientific paradigm and of economic development as such, which so far has been the fundament of most management regimes designed and imposed by national and international bodies Bruun and Kalland (as cited in Semali & Kincheloe, 2000). Moreover, it reflects the growing ability of some indigenous peoples and their organisations to make their voices heard both in national and international fora.

Although both science and local environmental knowledge are based on detailed empirical observations, their selection and use of observations might be different. Whereas the scientist's selection of data is based on her or his desire to test the validity of theoretical models, the local man or woman often selects data according to a survival strategy. There is no model to falsify; knowledge is not true or false, only more or less effective. Accumulation of information is therefore not directed by preconceived theoretical models as in science, but by a desire to have a pool of information which is essential for the flexibility that real life situations require. In other words, local knowledge at this level is practical (pp. 319-325).

Denzin & Lincoln (1994) say given that so many non-Western cultures within and outside industrial nation-states are oral communication based, it would make more sense to suggest generalisable qualitative methods epistemology structured around verbal communication. As so many non-Westerners view the social, the emotional, and the spiritual as integral parts of a whole person linked to a physical environment, it would also be crucial for such a qualitative methods epistemology to be grounded in holistic rather than fragmented and dichotomized notions of human beings. Other cultural

constructs, such as time and space, as paradigmatic principles, also have profound implications for developing qualitative research methods (p. 185).

Turnbull (1984) comments that at first glance, the connections between the sociology of science and oral histories are not obvious, but a closer inspection shows them to be fundamentally connected through the constellation of issues. These form the heart of contemporary human inquiry, such as the interaction of language, action and belief in social practices. However, philosophical work on the epistemological problems of positivism forced the recognition that science has a history in the full cultural sense, not just a chronology (pp. 47-80).

Furedi (1992) comments that perceptions of history tend to fluctuate with changes in society. The demand for a particular type of history is symptomatic of the mood and intellectual influences that prevail at any time. Historical thinking is the outcome of history, the very recognition that changes take place in society over time is itself the result of social development. Historical thinking, a sense of change and of development, is a prerequisite for the emergence of history as a distinct sphere of inquiry (p. 59).

Howarth (1998) says that the transmission of information by word of mouth is obviously very old. There appears to be little certainty about how language originally developed, but there is a general consensus of opinion that the earliest known language systems go back at least six thousand years. It is likely that spoken language has its origins in 'grunts, barks and hoots copied by pre-human figures', so-called onomatopoeic sounds. Language development both spoken and pictorial is primary in mankind. Perhaps language was an effective aid for survival, but as humans advanced and speech-based language became more and more sophisticated this seems to have led generally to a desire to pass on useful information from one generation to the other (p. 1).

Most traditional Maaori songs were prior-composed, and their texts were fixed, in that a song might be memorised and sung in the same form over a period of many years. Although on other occasions would be adapted to fit new circumstances, and the process of oral transmission might also bring some changes (Orbell, 1995, p. 24).

v. Introducing the Tuupuna Knowledge Base Methodology

In addition to the established traditional oral history that is the standard used by Polynesian and other traditional people and the established Kaupapa Maaori research methodology, there is the knowledge entrusted to selected people. In fact this ancestral knowledge includes the values derived from lore and tikanga providing credibility to our ancestors' knowledge and way of thinking by looking to the past for answers. I describe it as Tuupuna Knowledge and the methodology as Tuupuna Knowledge Base Methodology. The rationale for *Tuupuna Knowledge Base* research methodology framework gives greater depth and credibility to a wider audience and catering for a more world-view aspect. Tuupuna Knowledge research methodology does not need to be restricted to health but could be an investigation process used by tangata whenua to resolve issues, or if relevant, by others.

Thus for accessing the Tuupuna Knowledge Base data collection and quality assurance has been through my own personal history and the knowledge inherited from my grandmother, extensive oral history discussions and formal whaikoorero presentations such as Poukai, Koroneihana, Kiingitanga Hui and Tangihanga. Then Key Informant Interviews with kaumaatua and kuia, semi-structured questions with answers (for ten year Eel/Type II diabetes Interview Data Gathering Study 1996 to 2006) and recorded transcripts and notes that have been verified by checking back to the original informant and informed consent sought and granted. In addition the publications from Ettie Rout (1926), Elsdon Best (1929) and the Oral Diaries from Taawhiao the second Maaori King, all provide additional authenticity and quality assurance.

The following demonstrates the development of the Standards for the Tuupuna Knowledge Base Methodology and are an extension of the Kaupapa Maaori Methodology that has been previously discussed.

- There has been continued *guidance in upbringing* through the intimate association I had with my maternal grandmother until her death in 1987. She had continual tikanga guidance from her kuia and upbringing at a Kiingitanga Marae situation that was from the *tuupuna knowledge* influence.

- There has been a clearly *articulated view from elders* as this thesis research has involved regular discussions with my whaanau and hapuu by returning home to visit Taupiri Mountain, the Waikato River, Tuurangawaewae Marae, and the land of the Waikato to connect with my tuupuna/tiipuna for guidance and direction. The informal and formal interview style koorero with kaumaatua and kuia where traditional oral history and valuable unpublished knowledge enabling linkage to their oral history knowledge. This is regarded as tikanga supervision especially in respect of Kiingitanga kawa.
- There has been *triangulation with other sources* such as readings and audible recordings previously published.
- The methodology *is a common view* of all tangata whenua Maaori and the tuupuna/tiipuna knowledge concept underpins Maaoritanga, in fact it is the whakapapa of the tuupuna/tiipuna that unites all waka, hapuu and whaanau beliefs and customs.
- That the research methods can actually *stand analytically investigation*.
- That the methodology can be accepted through a *peer review* from whaanaunga and hapuu.

vi. Tuupuna Knowledge Base Methodology Standards

- The whakapapa qualifies the source and validation of *old knowledge*.
- Where possible the hapuu or iwi kuia or kaumaatua will authenticate that the old knowledge or inherited knowledge derived from the tuupuna.
- The knowledge is visionary based *old knowledge* for the future benefit and tribal strength through an unselfish commitment to knowledge.
- That the knowledge has been directed and acquired in partnership with a wairua experience such as physical visit to sacred mountain, river/sea/lake, urupa, historical significant place in connection to the hapuu knowledge being sought.
- That the knowledge is validated by several repeated experiences.
- That the research method can actually stand analytically investigation.

- That the method can be accepted through a peer review by hapuu and academic institutions.

Tuupuna Knowledge Base methodology supporting credibility

Mahuta (1990) comments in *Taawhiao's Vision* lectures that the twenty-odd years Taawhiao (the second Maaori King from 1860 to 1894) and his followers spent in isolation provided them with ample time to mediate and speculate on their fate. It was during these quiescent times that many of his sayings as ohaoha or tongi (sayings) emerged and Waikato regrouped around the powerful symbols of the Kiingitanga. For them, it became the repository of tradition and therefore of knowledge. The people were the students, the kaumaatua the teachers, and the marae and meeting house the lecture theatres. Generation after generation would attend tribal Hui and hear the vision constantly being re-encountered (p. 5).

My qualifications derive from the fact that I am the mokopuna of Taawhiao, the second Maaori King and member of the Kaahu Ariki and advisor to the Maaori Queen. Moreover, having been raised by King Koroki, I have an intimate knowledge of the workings of the Kiingitanga, its aims and aspirations and the frustrations it has endured up to the present time (Mahuta, 1989 in evidence to the Court of Appeal, 1989, as cited in Tainui Maaori Trust Board, *Postal Referendum Information Package*, 1995, p. 6).

Tainuitanga link to the Kiingitanga

Tainuitanga is linked inseparably to the Kiingitanga whose primary role in a contemporary setting is to ensure the survival and continued development in all aspects of Maaoritanga. The Kiingitanga was established in 1858 and the following is a time-line of the Kiingitanga Leaders from its inception:

1858 Taawhiao King Pootatau Te Wherowhero I 1860

- big man and powerful Warrior
- successful and revered war strategist
- great Tohunga with vast knowledge
- leader with great mana throughout Aotearoa
- he loved his whaanau

1860 Tukaroto King Matutaera Taawhiao 1894 Pootatau Te Wherowhero II

- quiet and moderate

- passionately devoted to peace
- great visionary and prophet developed Pai Maarire as the spiritual base

1894 King Mahuta 1912 Pootatau Te Wherowhero Taawhiao III

- appointed to Parliament's Legislative Council
- sought compensation for Raupatu confiscation

1912 King Te Rata 1933 Pootatau Te Wherowhero Taawhiao Mahuta IV

- eldest of five sons, a quiet and studious man
- strove to rectify the injustices of the Raupatu
- ensured land development schemes successfully implemented throughout Waikato
- assisted by his cousin Te Puea Herangi (known as Princess)

1933 King Kooriki 1966 Pootatau Te Wherowhero Taawhiao Mahuta Te Rata V

- very small man in stature and very humble
- Taipu second son groomed died at Wellesley College
- passionately assisted by Te Puea Herangi
- 1946 Raupatu Tainui Maaori Trust Board
- established the Kaumaarua or Council of Twelve Elders

1966 Dame Te Arikinui Kuini Te Atairangikaahu VI

- assisted by her cousin the late Sir Robert Mahuta (Ormsby)
- negotiated 1995 Raupatu \$170 million payment with support Act
- a formal Apology for the 1863 Raupatu from Britain's Queen Elizabeth II
- introduced democratic policy and contemporary internal change
- established elected governing Te Kauhanganui and Te Kaumaarua
- supported Te Koohanga Reo and the Maaori Women's' Welfare League
- economic development for Tainui such as the Raupatu Settlement and Japanese fishing contracts directly with the Japanese Emperor through personal visit
- Maaoridom globally recognised through Maaori Arts and Culture

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- inherited on the death of his mother after much discussion and speculation
- currently being guided into the role with an emphasis on education and identity
- developing a Pacific presence with other Pacific Royalty for education and health
- the eldest son Whakumoana Paki now aged 16 years is being groomed to inherit the role

Dame Te Atairangikaahu, 1998, as the Kiingitanga Te Arikinui, stated, “We should at all times conduct our affairs in unity, love, lawfulness and faith – these precepts have carried us thus far, through good times and bad, and served as well” (Trustee *inter alia* of the Waikato Raupatu Lands Trust, 1995, p. 7).

Thus it was the mandate of the late Te Arikinui Dame Te Atairangikaahu and the late Sir Robert Mahuta supported by most Tainui hapuu to negotiate the Raupatu Settlement Part A that was completed in March 1995. Then in a transitional role both the Tainui Maaori Trust Board and the Waikato Raupatu Lands Trust managed the Raupatu Settlement assets until the most amicable democratic solution for the beneficiaries was created through an elected self-governing structure. After lengthy *Hui* a tribal consultation processes followed by a postal referendum administered by the Maaori Land Court in Hamilton for the Te Kahanganui elections with a representative body of sixty-one Marae was established and incorporated known as *Te Kauhanganui O Waikato*.

- (a) To protect, advance, develop and unify the interests of Waikato.
- (b) To uphold and support the Kiingitanga (which incorporates the principles of unity, the retention of the tribal base in collective ownership and co-operation amongst peoples).
- (c) To foster amongst the members of Waikato the principles of Whakaiti, Rangimaarie and Kia Tuupato.
- (d) To achieve a settlement of Waikato’s outstanding *Part B* Treaty of Waitangi Claims for the Waikato River, West Coast Harbours, the Wairoa and Maoro Land Block Claims.
- (e) To do or cause to be done all such other things as the members of Te Kauhanganui shall consider necessary or desirable for the attainment of all or any of the objects of Te Kauhanganui shall own the shares of the Waikato Raupatu Trustee Company Limited.

Tainuitanga Worldview through the Kiingitanga

Although the Raupatu of 1865 robbed Tainui the ability to continue with its successful economic development through land ownership and associated entrepreneurial activities. But with the retreat from the invasion came staunch support for the continuation of the Kiingitanga and return of the confiscated lands or compensation. The Tainui Raupatu Act 1995 provided compensation and the establishment of a contemporary Tainui as the

guardian of the Kiingitanga providing its standards and worldview. But in a contemporary world of today the Kiingitanga is very strongly supported both within Tainui through the Poukai and the Koroneihana, then within other Maaori organisations more commonly known as *The Motu* was clearly demonstrated at Te Atairangikaahu's Tangihanga were many thousands attended throughout the week of mourning.

The Poukai commences around 9-30 AM when our Kiingitanga/Tainui leader arrives (it was the late Te Arikini Te Atairangikaahu but now her eldest son Kiingi Tuheitia) accompanied by a large brass band. Then after extensive whaikoorero from a traditional perspective and in accordance with tikanga Maaori and Kiingitanga kawa a formal kai is eaten in the form of an elaborate banquet where all the traditional kai is served. This includes eel, fish and seafood's and is immediately followed by more whaikoorero but of a more current agenda where the people often interject but all done in a Maaori way following tikanga Maaori.

LeBaron (2003) says that *Worldviews* shape, or help determine values. Values change across cultures, since they have to do with what we consider most important, and the ways we see our relationships, the world and ourselves. Worldviews are those systems and structures within which our values, beliefs, and assumptions lie. Indeed they influence how we see ourselves and others (identities) and how we make meaning of our lives and relationships. Since resolving conflict necessarily involves some kind of change, it is essential to understand the operation of worldviews. When people are asked to change their identity or things they find meaningful, they will resist, sometimes even when the alternative is death, Worldviews keep our lives coherent, giving them a sense of meaning, purpose, and connection. Conflict resolution processes need to help people look into each other's worldviews without trying to change them. Identity and meaning are part of every human life in all world cultures. Meaning is generated from our sense of identity and from the information we receive. Our cultures give us messages about desirable identities (who we are, who we seek to be, and how we relate to others) sources of meaning (what matters/why). Some of those values that vary across cultures include:

- Power social status, prestige, control over others, resources
- Achievement success with competence according to standards

- Hedonism pleasure of sensuous gratification for self
- Stimulation excitement, novelty, change in life
- Self-direction independent thought/action, choice, creativity, goals
- Universalism understanding, appreciation, tolerance, protection
- Benevolence preservation of the welfare in-group members
- Tradition respect, commitment, cultural or religious acceptance
- Conformity restraint of actions or impulses likely to upset
- Security safety, harmony, stability of society, relationships, and self (pp. 66-89).

Ra (1997) says that when the elders of the day decide upon a course of action to mount an effort to unify the Maaori people it was said that in *Kiingitanga* was the seed well planted and that those who acknowledged and respected the position of authority which the *Kiingitanga* Movement represented in our Queen Te Atairangikaahu Ariki would find a place of true accord in the relations with all Maaori.

One wise in the ancient teachings said that the underlying purpose of *Kiingitanga* is to lay the foundation for all the spiritual return home – *kiingi* means to lead, *tanga* to follow, therefore that which follows the action of leading. *Kiingitanga* is the one thing which will enrich the heart and mind to endure the patience needed to travel the inner spiritual pathways in the discovery of who we are. When the values of *Kiingitanga* are well learned than and only then may the spiritual return home again (p. 31).

Much that is experienced in the Maori world is a manifestation of the *wairua of the ancestral line*. It is a natural spiritual experience that draws upon the full expression and guidance of the *Kiingitanga Spiritual Lore* that has been known to us since ancient time. It is *Kiingitanga* that has been taught in our sacred *waananga*, the knowledge and understanding of which has been carried forward generation by generation.

For many, *whakapaka* is merely a table of genealogical connections with our past, a buried past by outdated protocols and traditions that prevent our accessing all that is good about Maaori. The word *whakapapa* means creative knowing. Knowing means, grasping that held within the self. By allowing the *wairua* to express naturally in all our actions and thoughts, the doors to knowledge and understanding open before us and we are no longer alone. We quickly discover out *tuupuna* at our side assisting and guiding us in all that we do (Pootatau Te

Wherowhero Taawhiao, the second Maaori King, as cited in Ra, 2001, pp. 12-21).

The Kiingitanga values of today are much the same as they were when first created for the preservation and survival of Maaoritanga especially the protocol known as tikanga and kawa. In other words that all traditional knowledge handed down from generation to generation to remain without embellishment or changes. And this was made possible because only a selected few were supplied with any knowledge that was very specialised and usually kept within a family.

However from a personal and contemporary standpoint the Kiingitanga values are to succeed in many areas through excellence that is achieved through hard work, persistence and an attention to detail - while at the same time contributing to the improvement or betterment of the collective group that one is associated with and it is usually through whakapapa. Therefore people are encouraged to be creative or *think outside the square* to succeed to ensure they are accepted through a unique contribution. But skills are often taught within a whaanau family with specific roles are handed from generation to generation; and this still happens today and is totally accepted by all.

In short doing a good job, working hard and going the extra mile to ensure success still is the cornerstone of the Kiingitanga as it has been since the 1850s when created by my tuupuna Pootatau Te Wherowhero.

vii. Personal Tuupuna Knowledge Base Method Narrative

Throughout my childhood I spent considerable time with my Maa my maternal grandmother fishing predominantly on the Manukau Harbour frequenting in the same places that our tuupuna also frequented. Gibby, my mother's first cousin also provided me with a written whakapapa given to him by Joe Joe Mason, Ngaati Pukeko kaumaatua, Poroporo Marae where Hinepau lived and met Pootatau Te Wherowhero.

I was also given Russell Bishop's Master of Art Thesis that verified that Pootatau's first child was Irihapeti Te Peeti from Ngaati Pukeko at Poroporo. Then Gibby took me to Kiingitanga Poukai and introduced me to all my whaanau and hapuu and I listened extensively to all the koorero and immersed myself in the culture. It is essential from a Maaori viewpoint to go in person or *to show your face* so that people can have a good

look at you. It is not appropriate for Waikato hapuu to visit a Marae at night. I also visited the place where each of my tuupuna/tiipuna were buried and told them that I was seeking knowledge and asked for the knowledge to be provided when the time was right for me to receive the knowledge.

I also visited many Marae where in many places I was not made very welcome and took that as an indication that, that direction was not for me. I did find that whenever I attempted to follow the Ngaati Pou Charles Marshall=Te Raro II whakapapa that all the doors were closed but when I followed the Ngaati Mahuta whakapapa my experience was very positive and I was made welcome. I was informed by the late Binga Haggie, a prominent Tainui kaumaatua in May 1994, “That Irihapeti was Pootatau’s favourite child and that it was now time for her mokopuna to return to Tainui and to be welcomed back by the Kiingitanga”.

I seemed to be guided and directed by an energy that surrounded me. I noticed particular birds appeared that had not appeared previously especially the Tui, the Kingfisher or *Kootare* in the Auckland city area and south of Auckland the Harrier or *Kaahu*, a type of Hawk.

In fact when ever I travel home to the Waikato the Kaahu always make an appearance just south of the Bombay Hills and one Kaahu will always fly nearby and continue to soar nearby. I always see six Kaahu but since Te Atairangikaahu’s passing and burial in August 2006 I now see seven Kaahu when traveling home to Waikato.

Orbell (1996) Kaahu or Hawk (p. 114).



Orbell (1996) Ruru or Morepork (p. 115).



I asked Gibbby and other kaumaatua and kuia about the significance of the birds and was told that the presence of the birds was part of the wairua from those ancestors that had past, it was an acknowledgement that I was seeking knowledge. I was told that the Kootare was keeping an eye on me to make sure that nothing happened to me and that the Tui were very pleased that I was seeking Maaoritanga knowledge. And that the appearance of the Kaahu was an acknowledgement of the wairua from a Rangatira and that each birds represented a Rangatira from the past. In fact since a child and usually in the night the Morepork or Ruru bird has come close to where I am and woken me. I distinctly remember the sound of the bird and my mother telling me not to worry. But now as an adult I know that if I hear the Ruru at night then someone has passed – this has happened now on thirty occasions. ^x

I discussed this with my Kuia Aunty Daphne Morgan and she said “that the birds visit many of us who are spiritually connected to the wairua – that if it is Te Puea visiting it was the scratching of the Kaarewarewa the Falcon and for Kooriki it was the Piiwaiwaka the Fantail.

Te Puea and her husband Tumokai Kapita told Pei Jones, “It is known in the Waikato, messages of the wairua with declarations of affection were often delivered by pet bird” (as cited in *Taawhiao King or Prophet*, 2000, p. 12).

I also noticed that Rainbows would appear even on a sunny and cloudless day; and the Monarch Butterfly appeared and would fly around me very close. In fact the butterfly would appear whenever I was outside but in abundance when the sun was out. I was also drawn to the Auckland Domain in particular the Oak Trees that grew in the Domain but more particularly to a small hill where Pootatau Te Wherowhero had actually lived. I would visit daily when I was in Auckland and felt the need to walk in my bare feet but always felt very refreshed after spending time amongst the Oak Trees and on the hill where Pootatau had lived.

I also read all the books available to me at the Waitakere Public Library, the Auckland Museum Library (where Charles Marshall’s hand-written diaries are available to read), and the Auckland University Library. I did find that the historical account of the colonisation and settlement of New Zealand were very different and began to examine the contents of books very carefully. Then I became aware that when I was searching for

answers I would walk along a library book-shelf and for some reason I felt a very strong desire to pick the book up. Then when I opened the book the answer would be in the exact page that the book had opened up at.

However before accepting knowledge as being genuine and actually factual I would seek to validate the knowledge from various sources that always included a kuia or a kaumaatua who understood the *old knowledge*. I did find that some of the people associated with a number of Marae that I visited in my search for knowledge did not know the answers. I visited many Marae and many places in search of my knowledge, in other words I was very proactive and felt an urgency to acquire knowledge for whakapapa, health and science. I have also continued to regularly visit my whaanau in particular Te Motu Kapita a Tuurangawaewae Marae kaumaatua.

The approach I took initially was examining the time when chronic non-communicable diseases did not exist in tangata whenua Maaori and this reflected strong traditional Maaoritanga holistic lifestyle choices as the central point. I also believed that the long finned eel contained nutrients that must have prevented all the chronic non-communicable diseases from occurring, and I said that the eel had the unsaturated fatty acid omega-3 usually found in finfish and seafood from the sea. In fact a number of medical and academic professionals actually laughed at me and said that I was wrong but was later proved right when the long finned as the staple and the conger eel eaten when seasonally were chemically assayed specifically for the fatty acid omega-3. But the omega-3 was very stable and the long chain fatty acids did not deteriorate with handling, time or sunlight as had been anticipated because many long chain fatty acids do deteriorate with handling, time and sunlight.

“Type II diabetes did not exist when we ate the tuna regularly before the time when people moved away to find work” (discussions with the old people from Ngaati Pou and Ngaati Mahuta, 1994 to 2007).

viii. Publications supporting the TKB Methodology concept

Miss Ettie A. Rout (1877-1936) was a New Zealand Law Court Reporter who wrote the 1926 publication *Maori Symbolism* from a very accurate Maaori historical perspective. She was a New Zealand Government Authorised Reporter licensed under the hand of His Excellency the Governor of New Zealand by warrant issued by the Minister of Justice in

Wellington (in accordance with The Shorthand Reporters' Act 1900). The knowledge is based on Hohepa Te Rake, a Te Arawa waka Rangatira and he confirms that his knowledge of the Sacred Legends was conveyed to him by the following Maaori Rangatira and Tohunga: Rangiteaorere, Tutaneki, Harehare, Tamarangi, Tikitere, Retireti, Te Heuheu, and others.

In fact Ettie Rout has recorded corroboration with the object of publishing is to preserve permanently some of the World's Sacred Legends. The medical health science, dietary knowledge and disease prevention methodology used by both the Ancient and Traditional tangata whenua Maaori is supported by two eminent British Medical Practitioners and Surgeons Sir Arthur Keith and Dr Haddon. Sir Arthur Keith (1866-1955) trained as a Medical Doctor at the University of Aberdeen (1888). He was made president of the Royal Anthropological Institute and was knighted by King George for his work in 1921.

Rout (1926) had a strong desire to permanently preserve some of the World's Sacred Legends that are similar to those which have perished in the Sagas and other lost and forgotten Oral Traditions. But the major portion of evidence has been provided to Ettie Rout by Hohepa Te Rake, a Te Arawa Waka Rangatira as she wanted to write from a Maaori perspective not a European writing about the Maaori. Indeed she claims that many misconceptions have been recorded about the Maaori from the European and says that it will not always be easy to secure unbiased consideration for some of the contents of her publications. Never in the history of European civilisation have the Sacred Legends of any Native Race received the careful and respectful recording that should be given, and for the lack of this many priceless Legends have gone for ever. With love of truth and desire for knowledge many Europeans combine a curiously intense hostility to new facts and an implacable hatred of ethical and economic principles different from those on which they suppose civilisation to be established and maintained. In addition they are hampered by the most amazing credulity in regard to the alleged beliefs and customs of those peoples they term as *natives*, and by a false sense of superiority over all other peoples of all times (p. xvii).

In no circumstances are Maaori science and history ever considered by Europeans in the same manner as the learning of their own civilisation. That in Miss Ettie Rout the Maaori have at last found a reporter and legend-carrier who will accurately and

honourably record the facts and feelings embodied in Maaori Legends, and I hereby declare that all the evidence not ascribed to others or known previously to the reporter, have been furnished to her by myself as some of the Sacred Legends actually handed down generation after generation by selected members of the Maaori nobility (Hope Te Rake, a Te Arawa Waka Rangitira, as cited in Rout, 1926, p. xvi).

Rout (1926) confirms the Ancient Maaori life was based on these Standards:

- Race Improvement
- Education
- Health
- Community Wealth
- Cultivation
- Brotherhood of Man
- Religion
- Science
- Joy
- Original Innocence.

The Maaori doctrines, on the other hand, are, that all people are born in Original Innocence, that it is their positive religious duty to improve them selves, and that they all die. While these doctrines were rejected generally by Europeans, nevertheless certain English writers picked up on Maaori ideas and principles, gave them literary form, and thereby earned a reputation for themselves as philosophers, scientist, thinkers, and so forth. Hohepa Te Rake wishes to record this as a considered view of the Maaori nobility in regard to the works of Samuel Butler, Bulwer Lytton, John Ruskin, Charles Darwin and Alfred Russel Wallace (p. 65).

Rout (1926) confirms that Maaori scientists who have studied the natural sciences of the Europeans have no hesitation in saying that scientist's Charles Darwin and Alfred Russel Wallace were indebted to Maaori lore and their doctrines of Evolution by natural selection, sexual selection and the survival of the fittest. Both these observers travelled extensively in many parts of the world, including South America, Hawaii, the South Sea Islands, Tahiti, New Guinea, the East and West Indies, Malaya, Australasia and New

Zealand. Darwin says that he had sketched out his Evolution of Theory in 1843, and Wallace, who went abroad later, wrote his first paper giving a statement of Evolution in 1858, and sent it to Charles Darwin (p. 97).

I never saw a more striking coincidence; if Wallace had my manuscript sketch written in 1842 he could not have made a better short abstract. Even his terms now stand as heads of my chapters. The explanation of this striking coincidence can only be that both these English scientists obtained their fundamental conceptions and even their terms in regard to evolution from the same source that is from the Maaori whose philosophy and science had spread along the route of his migration from America to New Zealand (Charles Darwin, as cited in Rout, 1926, p. 99).

Rout (1926) recorded that the very phraseology with which Darwin and Wallace have worked out their theory has its counterpart in Maaori language and science. Sexual Selection, for example, in the Sacred Legends is *Tohu tangata a Puhi*, meaning the choice of the Man by the Woman. Natural Selection or the Survival of the Fittest is *Ma toa ma tu e ta te tu*, the fittest and the bravest are the survivors in the battle of life; the Struggle for Existence is *Tu Pungoro Tuhoro kia maia Ra*, by their courage, industry and construction do the heroes (the Children of the Sun) ensure their own survival.

These principles and sayings were everyday commonplaces to the Maaori Scientists; it was only to the Europeans that they seemed new and startling. In his General Summary and Conclusion to *The Descent of Man* Darwin said that the main conclusions arrived at in this work and now held by many naturalists who are well competent to form a sound judgement is that man is descended from some less high organised form. This has been the Maaori belief from time immemorial (p. 98).

Ra (2001) says that for Maaori it is the knowledge and understanding of whakapapa that will open the doors to our self-identity and allow us to claim all that we are. Today the archives of whakapapa continue to gather dust and in opening the doors of our sacred whakapapa, the wairua of the land and all that we are will open before us, bringing in its wake direction of purpose and control of our own destiny. To share the whakapapa of identity is to restore the dignity and pride of being Maaori. For those who lead, maturity of judgement in sharing the knowledge of 'who we are' relies on the ability to understand

the nature of the sharing process of all things Maaori. First openly acknowledging one has a duty and responsibility to share, making no distinction of person, class, colour or race in the sharing process. Second that one need not self-seek the rewards of mana of ones' position as leader (pp. 49-52).

Durie (1993) says that traditional Maaori communities recognised two classes of leaders, Rangatira and Tohunga. Within both classes hereditary and ascribed roles were important and together they covered political, spiritual and professional dimensions. Rangatira were political leaders. Tohunga were the professional experts in a variety of pursuits including agriculture, warfare, weaving, decorative arts, fishing, and environmental conservation – and healing. Their knowledge and skill was critical for the well being and survival of their people though their effectiveness depended as much on the affirmation of the people as on their own intrinsic qualities. In this sense Tohunga were closely integrated with their communities and ere party to the threats, the aspirations, the resources and the limitations (p. 13).

Finally I have used Elsdon Best because his research and focus is primarily with Ngaati Awa, and the whakapapa I follow links into Ngaati Pukeko Ngaati Awa at the Poroporo Marae at Whakataane. I have visited Poroporo several times spending time with kaumaatua and in particular Kuia Irihapeti who lived adjacent to Poroporo as her father had and many generations prior to her had. I sought authenticity and validation of all aspects of eel/tuna fishing and gathering from what Elsdon Best had written when at Poroporo and permission to include validation in this thesis. However they did not authenticate Elsdon Best's publications about the Rongoaa Maaori Medicine because he had not experienced first hand and his writings were the opinions of others not verified.

ix. Applying a Tuupuna Knowledge Base and Standards

I have sought validation of the standards for judging knowledge through tikanga Maaori primarily through my Ngaati Mahuta whakapapa kuia and kaumaatua when I have met with. They confirm the standards for judging knowledge are:

- Whakapapa dictates the authenticity of any Maaoritanga knowledge especially the whakapapa of the person delivering the knowledge and whose whakapapa provided the knowledge and where the knowledge originated.
- Specialisation and authority of the knowledge provided can be verified by other people who also have the authority to speak about the subject usually a kaumaatua or kuia but not always.
- Knowledge is always accompanied by tikanga Maaori and with the kawa of the rohe that the knowledge specifically relates to. The knowledge may have its own tikanga, kawa and standards that have been established over time and still used such as the kawa at Kiingitanga (for the Kiingitanga) the Poukai has established standards. Traditional knowledge is shared with all the people that are attending for that specific occasion that held by the host Marae thus the occasion validates because the opportunity to contest is available and if not contested then is accepted.
- Knowledge is always provided with tikanga supervision *when the time is right* to provide knowledge (the time being when the knowledge provider believes that the person is suitable and ready to respect the knowledge).

The research approach I have used is to provide credibility to specific knowledge handed down to each subsequent generation, and that a methodological framework will recognise and accept the standards that can be reproduced as legitimate. The methods used have been through the extensive literature review, through the cultural narratives and through my own personal narrative used to acquire additional tuupuna knowledge. The research design for this thesis emphasises the Tuupuna Knowledge Base focus and verification of the Tuupuna Knowledge Base. Thus it is apparent through the selection of the chronic disease Type II diabetes as a case in point where omega-3 through eel/tuna is a demonstration of a holistic practice.

The strength of Kaupapa Maaori is that the knowledge is localised and has been selectively inherited to ensure its authenticity from around 1350AD with many people sharing a common view and it withstands investigation analytically as being genuine and can be reproduced. The weaknesses of Kaupapa Maaori is that the substance of oral histories may be altered and that knowledge was inherited only by selected people that

did not or will not share the knowledge. However this would require an awareness of tuupuna knowledge and people having access to the knowledge, then comparing, contrasting and synthesising through a Specified Intervention. The historical is usually an eye witness account of past events and developments often recorded in chronological order; thus has a high degree of fact and credibility.

In comparison the strength of a Western Science Methodology is that the systematic study based on observation, experiment and measure can be reproduced. This method has dominated Western social and physical science dissertation since the 1600s where assumption or supposition rather than assertion has existed. The weakness of Western Science Methodology is that scientific experimental data and outcomes can be manipulated and fraudulent or historical recordings can be biased, romanticised.

Table 20. Tuupuna Knowledge Base and Western Science Summary.

	Tuupuna Knowledge Base	Science
Type II diabetes Prevalence	oral tradition (past) no evidence of Type II	epidemiology (future) global epidemic
The approach To wellbeing	hauora/holistic	pharmacological sectoral physical wellbeing
the approach to intervention	tuna practice as intervention totally holistic	medical/personal health public health/more holistic
Intervention Design		COMBINATION

Therefore the two questions I am now asking:

- Is it possible to combine knowledge traditions?
- Is it possible to access knowledge?

The answer to both questions is yes to both questions – and their extrapolation incorporated into the design of a health intervention for Type II diabetes based on the traditional knowledge of Eel/Tuna Practice. Thus the practice is an example of a Maaori intervention applied from a tuupuna knowledge base and probably did deliver hauora, first through awareness then through access by participation.

Now turning to ask the follow questions:

Is there a logical explanation which associates eel/tuna practice and well-being?

The answer is an absolute yes and involved a protocol or routine of physical exercise, social interaction for a positive outcome, a spiritual dimension because of the supporting tikanga and then health benefits derived from the dietary consumption of the omega-3 and lethicin the long finned eel contains. The *AgriQuality* long finned eel scientific chemical assay analysis sampling report is attached in the appendix of this thesis.

Indeed there has been continued Tikanga Supervision and guidance of Kiingitanga kawa and Tainui tikanga throughout the research and thesis compilation. I have regularly visited Tainui waka kaumaatua at Tuurangawaewae Marae and other Poukai Marae (there are 33 Poukai Marae) and other whaanau living in the rohe who still gather eel/tuna in the traditional way and regularly include it in their diet. They all say that they have whaanau members with Type II diabetes and it developed quickly and believed it was related to their diet; but those people that had still continued to go and gather the eel and regularly include it in their diet did not have diabetes. Also when they gathered eel/tuna they went to the traditional gathering places and gathered in the way that they had been taught – in the traditional way and following a traditional pattern.

Linking the use of Tuupuna Knowledge Base Methodology

The following summary provides a starting point, a process and the outcomes framework:

starting point	process	outcomes
ancestral accumulated knowledge (Tuupuna)	protected traditionally by selective inheritance	limited access of knowledge to people through control
recognition that inherited knowledge was scientific	academic research from those who have the access	credibility and universal acceptance of knowledge
Traditional Maaori society used Scientific methods	accumulated and inherited knowledge of Tohunga	Tohunga was a specialist in a particular science (health)
detailed observation and recording the findings	detailed knowledge access protected (whakapapa)	Knowledge was kept in tact as only facts were provided

As part of the hypothesis research I asked a my kaumaatua and kuia a number of questions, then listened at length to what they had to say, then discussed with them the consequences of each question.

- Could the past knowledge be used to solve the current Type II diabetes epidemic?

- Can omega-3 from a traditional diet Maaori diet be used today?
- Can omega-3 from a traditional Maaori diet prevent Type II diabetes mellitus in today's world?
- Can historical data be synthesised with contemporary knowledge to indicate a possible solution to Type II diabetes rates in Maaori?
- Was omega-3 a significant feature of a pre/post European diet?
- Could an omega-3 eel/tuna diet explain the absence of Type II diabetes symptoms from the historical records?
- Can the traditions of the past correct the health problems of today?
- Should we look to the past for the answer to the current Type II diabetes epidemic?

Throughout all the discussions it was agreed that the holistic lifestyle and the traditional values of the tuupuna undoubtedly prevented the lifestyle diseases such as Type II diabetes. And that the diet prior to the urbanisation must have protective mechanisms because the onset of the disease rapidly manifested subsequent to the urbanisation where drastic dietary and lifestyle changes were made at a specific time that were predominantly in the 1950s.

Concurrently since 1994 I have carefully studied the gathering and consumption of eel/tuna within my own Waikato whaanau (McKay/Marshall) and hapuu (Ngaati Mahuta/Ngaati Pou). They have been have regularly questioned with extensive discussions on exactly how they gather and how often they consume eel. I also regularly discussed their health status together with their whaanau and hapuu with particular reference to Type II diabetes mellitus. The following are a summary of these interviews. Some of them have been very informal while some have been more formally structured.

x. Eel/Tuna Interview Study links Tuupuna Knowledge Base

x.(a) *Kuia and Kaumaatua Discussion Syntheses*

Subsequent to Aunty Emily's funeral in 1994 I have vigorously perused my Maaoritanga that very quickly guided me toward the health issue of Type II diabetes prevalence. In

fact it was during my many visits to numerous Tainui Marae (and the Ngaati Pukeko Poroporo Marae at Whakataane) where lengthy discussions evolved from whakapapa deliberations. Indeed my scientific training and career in the pharmaceutical industry alerted me toward the consequences and complications emanating from Type II diabetes where premature death and a loss in the quality of life became very evident. It appeared to me that if I was able to accurately pinpoint the cause(s) then a solution may be possible to both address what had become an epidemic, but not only in Maaori but Type II diabetes had become a global health issue.

Thus as I researched and searched my whakapapa and Maaoritanga I also researched and searched for any evidence of the existence of Type II diabetes at first through publications available in the Auckland University Library, the Waitakere Library and the Auckland War Memorial Library (Charles Marshall's Diaries). While at the same time searching through the records held by the Anglican Church, attending the Kiingitanga Poukai and spending considerable time with Tainui kaumaatua listening to what they had to say about lifestyle choices, diet and the causes of Type II diabetes.

The following are a notation of the informal Tainui and Kiingitanga kuia and kaumaatua Interview discussions I have had:

Aunty Daphne Morgan te Kiingitanga Kuia

I have had many discussions with Aunty Daphne Morgan either at Poukai or other Kiingitanga occasions and she has always nurtured my acquisition of knowledge and always taken time to share with me and encourage my continued learning. I always spend some time with her whenever I go to Poukai or any other Kiingitanga or Tuurangawaewae Marae occasion. The whaanau connection with her is through Pootatau (not Taawhiao) as she is a direct descendant of Pootatau through his third child and has always been very devoted to the Kiingitanga and close to King Kooriki, Te Puea, Charles Tane Mahuta and Te Arikinui Te Atairangikaahu. Aunty Daphne has often said to me "that up until the people moved to the towns plenty of the tuna was available and they ate it very regularly and there was no diabetes. But that the tuna is not now as available as it was because of the Hydro-electricity development on the Waikato River and recently a lot is taken by the Commercial Fisheries".

Te Motu Kapita Tuurangawaewae Kaumaatua and whaanau

Te Motu Kapita has always been very generous with his time and his knowledge whenever I have sought knowledge about the tuna and I have shared many discussions with him and his family about my doctoral research. He has always listened to my theory that eating the tuna regularly prevented the Type II diabetes and he has always contributed and assisted my search for knowledge. Motu was born in 1927 originally from Tuakau and has lived adjacent to Tuurangawaewae Marae since he was eighteen. Motu said “that they eat the tuna when they catch them in a *hinaki* in the Waikato River near Tuurangawaewae Marae but over the years the big ones have gone and now there are only small ones and are all bones”. He also said “that those people that do eat the tuna a lot do not have Type II diabetes but because they are not as available as they were his whaanau does not eat them very often now”. Motu gets plenty of exercise working on his property, or at the farm nearby and walks to the Marae, he drinks plenty of water, eats vegetables and nuts but also eats Western type food, does not have Type II diabetes. Motu also confirmed to me that there was a Kiingitanga Marae at Churchill where Maa (my maternal grandmother was born and raised).

Hine Kapita, Motu’s wife (who passed in 2006) shares the same whakapapa as I do through Irihapeti Te Peeti and the McKay/Marshall whaanau. Hine has told me many times “those who have eaten eel regularly have no diabetes and that they catch eel in the Waikato River by Tuurangawaewae Marae or in the tributaries – there are lots of places where the eel were around here but not now. When we can get it we boil it, fry it or smoke it and freeze it”. Hine agreed to be part of my Interview Data Gathering Study research because she had a number of health problems but had been a heavy smoker, lived a sedentary lifestyle because of arthritis and ate meat especially pork. Hine said that “one of her sons not eating the tuna had developed Type II diabetes and the Waikato Hospital has encouraged him to eat foods rich in omega-3”. Ben Kapita, another son of Hine’s said to me when I visiting them at their home adjacent to Tuurangawaewae Marae “we have researching omega-3 and the benefits from eating foods with it”.

Hine’s elder sister now aged 75 years told me when I sat with her at Poukai in 1996 that she “had developed Type II diabetes but did not eat tuna regularly and ate lots of sweets and a high saturated fat foods did not getting very much exercise”. She also said the

doctor had put her on a diet to eat plenty of vegetables and not to eat all the sweet stuff and to loose weight”. Then about six months later at Poukai she said “that she had lost a lot of weight but still had the Type II diabetes and was taking tablets from the doctor”. Then when I met her at Tauranganui Poukai in 2006 I told her about my doctoral research with the tuna and the Type II diabetes and she said that she “did not know that the tuna was good for her and could prevent the Type II diabetes”.

Motu’s younger brother George Kapita (who still lives at Tuakau) and I had a lengthy discussion about my research with the tuna/eel at Koroneihana on 23 May 2006. He said that he “wanted to look at the economic benefits and how he can contribute his knowledge to develop something similar to aquaculture or eel-farming”. I have had further discussions with George at the Tauranganui Poukai and he said “that has discussed my doctoral research theory with many people they all agree with my theory and that those people that have continued to eat the tuna do not have Type II diabetes”. He also said that many people are very interested in my research and are looking forward to me completing it and making the research available. Then at the Te Awamarahi Marae Poukai in 2006 he told me that “they have not been able to catch the tuna around Tuakau for thirty years, because the commercial fishermen take them all”.

Te Aoepi Kara CNZM Kiingitanga Kaumaatua

As a Tane Mahuta Scholarship recipient through the Tainui Raupatu Education Programme we were privileged to spend time with Te Aoepi Kara through Seminars held at the Endowed College at Hopuhopu. The Waikato University College was built from funds available through the Tainui Raupatu Settlement and the concept was part of Sir Robert Mahuta’s vision of economic prosperity to be achieved through education. The historical knowledge that Te Aoepi had accumulated was immense and he generously shared the student’s enthusiasm in particular in my theory about the tuna and the omega-3 benefits. It was his suggestion that I pursue my theory about the tuna and the Type II diabetes after presenting two possible hypotheses for doctoral research and direction to include a research profile in the Ta Taare aa Tawhaki Journal of the Waikato University College. In fact my doctoral emerged from the article presented in the 2001 Koroneihana volume 1 publication titled – What are the potential benefits of eel consumption for

Maaori health? The conclusion in the publication said “But I strongly believe that the impact of the loss of the eel and other traditional foods from the Maaori diet should be further investigated”. Te Aoepi Kara advised me that the people who had gathered and eaten the tuna regularly did not have the Type II diabetes but that those that did not eat the tuna often did have diabetes. Unfortunately he passed in April 2006 aged 75 years.

Sir Robert Mahuta (Ormsby) KNZM Kiingitanga Rangatira

Sir Robert was instrumental in the inaugural Tainui Raupatu Settlement (Part A) in 1995 (with Part B the Waikato River and Western Harbour Claim to be settled), thus setting a precedent for all other historical tangata whenua Maaori grievance claims and their settlement process. Although at times controversial from both within Tainui and externally he did establish an opportunity for the development and future prosperity of Tainui Hapuu. However Sir Robert passed prematurely at aged 64 years from the complications of Type II diabetes mellitus and had stopped eating the tuna because the taste of the eel had changed. The Television One documentary called *Waikato is the name of the River* and was televised on Saturday December 22, 2002 at 5-00 PM, featuring the late Sir Robert Mahuta. He commenting that the eel taste had changed over time and people did not like the taste that it had become. The programme provided an overview of the current pollution of the Waikato River with comments from many Maaori who have used the river in the past and desire that river be cleaned up of the pollution.

Although Sir Robert was not accepted and loved as Te Ata was, he was the driving force behind the current economic development and current prosperity of Tainui and if Tainui as the guardians of the Kiingitanga are prospering then it is the marker for all Maaoridom to follow. I personally found Sir Robert Mahuta to listen to what you had to say but very quickly decided if he would spend additional time listening or discussing. I personally found him to be very perceptive listening carefully to what one had to say but soon sorted time wasted out. He was very supportive of education and encouraged many of the students to pursue knowledge providing financial assistance through Scholarship or Education Grant Funding and where the Tumate Mahuta Scholarship recipients delivered research findings through a regular forum that were held the Endowed College (that had

been just built and funded from the Tainui Raupatu Settlement of 1995). Sir Robert had developed Type II diabetes and passed what I consider prematurely aged 64 years; but this research thesis is a result of his encouragement and support.

Charles Kirkwood Tuurangawaewae Kaumaatua

On Saturday 12 July 2003 when informally visiting Tuurangawaewae Marae I spoke at length with Charles Kirkwood (then aged 76 years but passed in August 2006). He told me “that some of the people still eat eel, catching it in the traditional way with karakia, at night when the moon is right, but with a net. Those that eat the eel regularly do not have any diabetes”. Then he said “but getting people to go back to eel may be difficult because many people are not used to the taste and have acquired other tastes from other foods”. He said that he “had lived at Tuurangawaewae for 51 years and had seen many changes regarding food and diet. That when Kooriki was alive they had large gardens where they grew all there own vegetables and caught eel, no diabetes existed”. Finally he reflectively said that there was still eel available to catch and eat.

Mere Kiingitanga Kuia

Our Kiingitanga Kuia have always been very supportive of any academic research in particular my Kuia Mere from Horahora Marae has always been interested and very supportive of my theory on the tuna and Type II diabetes when I have met her at Poukai or on other Kiingitanga occasions. I have Ngaati Pou whakapapa from the Marshall/Te Raro II that links Horahora Marae and on February 1 2006 at the launch of the Sir Robert Mahuta Scholarships at the Endowed College Hopuhopu I shared my kai with her. We discussed at length (as we have done previously) my doctoral research and theory about eating the tuna/eel and Type II diabetes. First she said “that she was very proud of me” and then confirmed “that those people who gather and eat eel regularly do not have any Type II diabetes but also that they were careful with what they ate and also got regular exercise”. I also asked her about the supply of the tuna the eels and she said “that there is less and the supply is diminishing (especially the long finned) they are still found in the eel weir tributaries, streams and lagoons of the Waikato River”. Then she said “that those

that were not careful with what they ate and did not eat the tuna did have Type II diabetes”.

Aunty Emma Tonga Marshall

I have a long association with Aunty Emma and have since 1994 sat with her at many Poukai and attended Tangihanga with her. She is a very close relation of my Mother and Aunty Emma (now in 2006 aged eighty three) says that she “is careful about eating lots of vegetables and also eats the tuna regularly”. She said that she “also exercises regularly and has no Type II diabetes and is very active and does not need a stick but said that her that her sister does have Type II diabetes but does not eat the tuna, vegetables, get much exercise and smokes a lot”.

Neville Gibb (Gibby)

Gibby, a Tainui Spiritual Healer provided me with Kiingitanga knowledge that Rua Cooper had shared with him and I have used the knowledge in this doctoral thesis. In fact Gibby purposely lived a holistic lifestyle (as much as possible in contemporary times) following the traditional way of drinking plenty of water, participating in his Tainuitanga/Maoritanga and being very connected to the wairua through the whakapapa, the land and the rivers. But immediately prior to submitting this doctoral thesis for examination he suddenly passed away. The place at Taupiri Mountain was selected by the Urupa Gatekeeper at a spot where the rainbow appeared to land. It was a beautiful burial.

The McKay and Marshall Whaanau

In June 2003 Hine Kapita invited me to her 60th Birthday Party so that I could meet with other whaanau to discuss my tuna and Type II diabetes research. I met and discussed my research and the need for a Interview Data Gathering Study primarily to find out more about who was still gathering and eating the tuna and who had (or did not have) Type II diabetes in their whaanau. In fact four whaanau agreed to be part of my Interview Data Gathering Study because they still gathered and ate the eel regularly and did not have Type II diabetes. These were two males aged 73 and 72 years from the Marshall Whaanau and two female aged 62 and 59 years related to the Marshall Whaanau.

But they also had whaanau members that did have Type II diabetes but ate a Western style diet, a sedentary lifestyle, smoked (or had smoked) and drank alcohol (or had been heavy drinkers) and did not participate in their Maaoritanga. These whaanau members were a male aged 55 years who had been diagnosed a Type II diabetic for eight years and female aged 54 who had just been diagnosed with pre-diabetes condition. Also a male aged 52 who had health complications from Type II diabetes and a male aged 61 years who had been diagnosed with Type II diabetes for three years.

Kuia Matapaepae Apiata

Kuia Mata has been one of our Tuurangawaewae Marae Kuia in the time that I have been going home to Tuurangawaewae to meet with Motu and Hine Kapita to gather evidence for my doctoral thesis. She has always encouraged me and told me that many people who still gather and eat the tuna in the traditional way do not have the Type II diabetes but those that do not eat it have the diabetes.

Kuia Irihapeti o Ngaati Pukeko

My whakapapa links into the Mataatua waka through Ngaati Pukeko hapuu at Poroporo Marae on the Whakataane River, the Ngaati Awa people. However when searching my whakapapa links I visited Poroporo and met my Ngaati Pukeko whaanau including Kuia Irihapeti. While discussing my whakapapa in the wharenui Irihapeti told me that she remained well because she bathed in the Whakataane River every day to maintain her mauri and she had very good health and well-being.

She also told me “that the people that ate the eel did not have diabetes or other Paakehaa diseases and remained healthy through their connections with their river”. She also said “that she ate the tuna regularly and she had no Type II diabetes”.

Kuia from Kaai Tahu

I have included a Kuia from Kaai Tahu because there is still a regular supply of eel in the rohe and she has regularly gathered and consumed eel as a staple food, exercised regularly and participate in her Maaoritanga. She had no chronic health problems and attributed her agility and excellent health to “eating the tuna as good Maaori food”. Sadly she passed in late October 2006 aged 90 years.

Bruce and Rex Helleur

Bruce and Rex are my Mother's first cousins as their Mother is my grandmother's youngest sister Aunty Emily. Bruce has never participated in any Maaoritanga throughout his life and did not attend his Mother's Tangihanga/Funeral because of the Maaori component it contained. Rex acknowledged the Kiingitanga and had participated in his Maaoritanga with his Ngaa Puhī wife with all their adopted tangata whenua children and arranged his Mother's Tangihanga/Funeral to include mostly Maaoritanga.

Bruce has always been overweight and has lived a more sedentary lifestyle but went fishing regularly and consumed fish until the last ten years of his life when he developed Type II diabetes. Bruce passed in May 2006 aged 74 years then Rex passed a few weeks later aged 69 years. Rex was always very active and loved fishing, ate a healthy well balanced diet but owned Hotels and ate a high component of saturated fat and did develop Type II diabetes in latter part of his life.

Discussion Syntheses links to Interview Data Gathering Study with Eel

As I have noted I had a theory the staple traditional Maaori diet must have contained nutrients that protected against or prevented chronic diseases such as Type II diabetes from developing. I combined the knowledge gained as a pharmacologist in the global pharmaceutical industry particularly the findings from a number of Finfish/Omega-3 Clinical Trials and carefully analysed the results with a focus on Type II diabetes. But they were concentrated on saltwater finfish species because the original research findings platform for omega-3 had come from the Inuit's Findings whose diet was rich in omega-3 but from sea salt water species not freshwater. As I have noted since the 1980s medical and scientific research has been more conclusive about the long chain omega-3 polyunsaturated fatty acids benefits with more of a focus on preventing heart disease.

Some scientific analysis of the two native New Zealand eel species (the short finned and the long finned) had been carried out by the scientist Tesch in the 1950s where he verified that the eel did comprise of both saturated and unsaturated fat. He verified that eel were low in saturated fat and comparatively high in unsaturated fat. It was this data that alerted the possibility that the unsaturated fat could be the essential fatty acid omega-3.

Tesch's (1977) scientific analysis of the nutrients in the freshwater long finned eel are:

- 86.5% total fatty acid content
- 66.2% unsaturated fat
- 20.3% saturated fatty acids
- 11.4% glycerine
- 2.8% lecithin fat binding agent to cleanse fat (p. 367).

Indeed my scientific and medical knowledge enabled me to calculate that the long finned eel probably did contain omega-3 and that it was probably a very high quality despite the fact that it was a freshwater species. But no research had been undertaken, so my supervisor suggested and I agreed that we have some chemical assay testing completed to verify through modern scientific methods that the long finned eel did in fact contain omega-3. The testing was repeated to validate the results.

Te Motu Kapita, the kaumaatua from Tuurangawaewae Marae informed me that prior to 1960s the Tainui people preferred the long finned eel because "the short finned eel had too many bones". He also said that that the oil from the eel/tuna was sweet tasting and the Tainui people would drink the oil. But that since the 1960s the long finned eel although still available was not as plentiful and since the 1980s commercial fishermen were taking large quantities from the tributaries of the Waikato River where they had traditionally caught eel in the *hinaki* eel-pot. Te Motu and his wife Hine introduced me other hapuu and whaanau members where some still ate the eel regularly (and did not have any Type II diabetes) and others that did not eat the eel but either they or their whaanau had Type II diabetes. Then when attending the Kiingitanga Poukai Te Motu introduced me to other Tainui people that shared the same whakapapa and he mentioned that I had a medical background and was interested in the eel/tuna. It was when discussing my whakapapa and then the prevalence of Type II diabetes that some siblings had Type II diabetes and some did not. Then it became apparent to discover first the actual cause of Type II diabetes and second if the long finned eel/tuna had any significance I would need to ask specific structure questions. In fact everyone I spoke to were very motivated to find a cause of the sudden manifestation of Type II diabetes and a solution. There were initially about fifty people that had indicated that they would support any research where I could come up

with cause and solution. Sir Robert Mahuta was also very interested in my pharmaceutical background and suggested returning to university to study, recommending I peruse doctorate.

Development of the two data gathering groups

I was able to discuss the question of Type II diabetes in relation to eel consumption to many people, in fact over fifty people and a definite and defined pattern emerged. The initial evidence overwhelmingly convinced me that those who ate eel regularly did not develop Type II diabetes but those that did not eat eel regularly (some not at all and some only occasionally) did develop Type II diabetes. To be able specific research to be undertaken and with a doctoral thesis in mind I selected two groups of nine that were willing to participate in questionnaires and answer questions about their diet and lifestyle choices. I decided on two groups of nine because nine is a number that is spiritually significant to Tainui. The first group of nine that I called *Group One* and the participants in this group regularly gathered and ate the long finned eel/tuna and participated in their Tainuitanga. The second group of nine was called *Group B* and was siblings or relations to those in *Group A* but they never ate the long finned eel/tuna and did not participate in their Tainuitanga. The method used to gather information was through informal and more formal interviews that often involved the entire whaaanau where the following questions were asked and the all Key Informant Participants in both *Group A* and *Group B* were each asked the same questions because a pattern was sought for verification. I prepared specific written questions to ask to ensure consistency and uniformity of answers and the purpose of the structured questions through interviews were to sample to saturation as follows.

Data Gathering Questionnaire One:

- Do you still gather and eat eel/tuna?
- If the answer is yes then I ask –
- How often? and
- How do they prepare it?
- Then I ask – do any of the whaanau have Type II diabetes?
- If yes I ask – do those whaanau with the diabetes eat tuna?

- If the answer is “no” I ask – do you think eating the tuna prevents it?
- If the answer is “yes” I ask – how often do they eat the tuna?
- If the answer is “yes” I ask – do those with the diabetes gather the tuna?
- Then I ask – do you and the whaanau drink any water?
- Then I ask – do you and the whaanau eat vegetables and fruits?

I have never had an answer back where those whaanau that regular eat the eel/tuna do actually have Type II diabetes.

Data Gathering Questionnaire Two:

- If the answer is to gathering and eating eel/tuna is – “no”?
- Then I ask - do any of the whaanau have Type II diabetes?
- If the answer is “yes” I then asked what type of diet they have.
- Then I ask – does the whaanau eat a lot of meat?
- Then I ask – how many in the whaanau have got the diabetes?
- Then I ask – about what age are the whaanau with the diabetes?
- Then I ask – does the whaanau eat vegetables and fruit?
- Then I ask – do they drink any water?
- Then I ask – what type of exercise do they get?
- Then I ask – do they smoke?
- Then I ask – do you think that the eel/tuna our tuupuna eat prevented the Type II diabetes?

Usually when the subject of Type II diabetes arises most people will then contribute more, as they are all concerned about the whaanau health and wellness and I always listen very carefully to what they have to say.

Data Gathering Questionnaire Three:

- How long have you had the Type II diabetes?
- Have you changed your diet/lifestyle since knowing about the diabetes?
- If the answer is “yes” I ask – what changes have been made?

- Then I ask – do you ever eat eel/tuna?
- If “yes” I ask “how often”? If “no” I ask “why they do not eat eel”?
- Then I ask – “if they eat vegetables and fruit and how often”?
- Then I ask – “do they drink water and how often and when they drink”?
- Then I ask – “what type of exercise do they get”?
- Then I ask – if they smoke?

Then I ascertain if their current health programme is controlling the Type II diabetes, that they are feeling well and able to implement the current programme that they are on and then listen to what they have to say about their own health and managing the Type II diabetes.

x (b). *The Interview Data Gathering Syntheses*

Group A data collection:

- none had Type II diabetes or any symptoms of Type II diabetes
- they have all continued to gather and regular consume the eel/tuna as their forebears have done
- they have exercised regularly
- they have drank plenty of water
- had not drank alcohol regularly or only very moderately or occasionally
- most have not smoked but have around people that have smoked
- they had all followed a more holistic lifestyle in a rural environment
- they all had a spiritual dimension to their lives predominantly through participation in their Maaoritanga through Kiingitanga Pai Maarire
- they all understood and respected tikanga Maaori and kawa
- most speak te reo Maaori regularly or have opportunities where spoken

Group A Results:

Those consuming eel and living a more holistic lifestyle in 2006 (from 1996):

Interview Study 1: Aged 80 years female still no Type II diabetes.

Interview Study 2: Aged 79 years male still no Type II diabetes.

Interview Study 3: Aged 76 years male still no Type II diabetes.
Interview Study 4: Aged 75 years female still no Type II diabetes.
Interview Study 5: Aged 75 years male still no Type II diabetes.
Interview Study 6: Aged 65 years female still no Type II diabetes.
Interview Study 7: Aged 62 years female still no Type II diabetes.
Interview Study 8: Aged 57 years female still no Type II diabetes.
Interview Study 9: Aged 55 years male still no Type II diabetes.

Group B data collection:

- all had Type II diabetes pre-Type II diabetes symptoms
- none had eaten eel/tune (and did not gather)
- but two went fishing occasionally and ate the fish they caught and one followed some traditional tikanga Maaori and kawa
- they did not exercise regularly in most instances seldom
- they did not drink water but drank commercial products readily available
- they drank alcohol very regularly (mainly beer, some spirits, no wine)
- most have smoked and lived around people that smoked regularly
- they all lived in an urban environment following a Western lifestyle
- none had a spiritual dimension to their lives but were aware of their Maaoritanga/Kiingitanga Pai Maarire connection with limited whakapapa
- they all had some understanding and respected tikanga Maaori and kawa
- they did not most speak te reo Maaori and very seldom participated

Group B further questions data analysis:

- prior to the confirmation of Type II diabetes consumed a predominantly Western style diet such as high in saturated fat with domestic meats such as lamb, beef
- high sugar and carbohydrate type foods
- high intake of processed and convenience foods
- none had drunk water but regularly consumed commercial drinks such as Coca-Cola, fruit juices, beer and spirits
- they had lived a sedentary lifestyle and are all overweight

- in some incidences they have not participated in Maaoritanga activities or Tainuitanga or Kiingitanga occasions and have been culturally and spiritually alienated

Group B Results:

Interview Study 1: Aged 50 female Type II diagnosed/diet/exercise/medication.
 Interview Study 2: Aged 42 male Type II diabetes diagnosed/medical treatment.
 Interview Study 3: Aged 55 male passed 2004 Type II diabetes complications.
 Interview Study 4: Aged 55 male passed 2005 Type II diabetes complications.
 Interview Study 5: Aged 63 years female passed October 2006 health issues.
 Interview Study 6: Aged 64 years male passed June 2006 from Type II diabetes.
 Interview Study 7: Aged 69 years male passed May 2006 from Type II diabetes.
 Interview Study 8: Aged 75 years male passed May 2006 from Type II diabetes.
 Interview Study 9: Aged 58 male passed December 2006 from Type II complications (diagnosed/medication/limb amputation).

x.(c). Conclusions and Analysis of the 1996 to 2006 data

The comparative in-depth Interview Data Gathering Study with eighteen people where nine people lived a traditional holistic lifestyle defined as *Group A* and nine people living a typical European lifestyle reflecting the urban migration defined as *Group B*.

Group A regularly consumed the long finned eel, exercised, drank water and participated in cultural activities and did not develop Type II diabetes. were still living and were still healthy and all agreed that their diet rich in eel/tuna and lifestyle choices contributed to current longevity and good health relative to their age with some aged over eighty years *Group B* consumed a high saturated fat diet, lived a sedentary lifestyle and drank large quantities of beer and popular high sugar products. None participated regularly in any cultural activities from choice but had access to all aspects of their Maaoritanga and all developed Type II diabetes with only two still living.

In direct contrast all the participants in *Group B* either developed Type II diabetes or had complications directly related to Type II diabetes that lessened their quality of life with seven now passing in 2007. All *Group B* participants agreed they would have preferred

preventing the disease through healthier lifestyle choices had they known that their diet and lifestyle choices were responsible for the development of Type II diabetes and the other health problems associated with the chronic disease.

Why and how the ten year Interview Data Gathering Study evolved?

As I said in the introduction it was when I was pursuing my Maaoritanga through my Kiingitanga whakapapa and meeting with the whaanau and hapuu that the discussion of health and in particular the prevalence of Type II diabetes arose. After several discussions with kaumaatua and kuia about the apparent Type II diabetes epidemic I was alarmed at the apparent very rapid onset and very aggressive development of the disease that had suddenly manifested from the 1960s. Further research disclosed that Maaori were disproportionately represented in statistical comparison with European and the preliminary medical findings indicated that Type II diabetes had probably developed as a direct consequence of urbanisation particularly of the 1950s. While at the same time I commenced extensive historical and scientific research from a Maaori perspective and actually looked for the causative factors and reasons of Type II diabetes.

Docherty and Smith (1999) suggest the discussion about any scientific evidence should have defined structure that include:

- statement of principal findings
- strengths and weaknesses of the study
- strengths and weaknesses in relation to other studies
- meaning of the study: possible mechanisms and implications for clinicians or policymakers
- unanswered questions and future research (p. 533).

The Statement of Principal Findings in this thesis

The principal findings have been the actual reason why was Type II diabetes and the distinct symptoms were absent in Maaori prior to 1960 together with the actual cause(s) of Type II diabetes mellitus.

Strengths and weaknesses of the ten year Interview Data Gathering Study

First the strength of the Interview Data Gathering Study data was the actual access to people at grass roots level and a genuine preparedness and trust to discuss what could be causing the high prevalence of Type II diabetes. While at the same time listening to the comments made from kaumaatua and kuia about the diet and lifestyle prior ten years prior to the onset of Type II diabetes in the 1960s because the disease takes approximately ten years for symptoms to manifest and present. The next Interview Data Gathering Study strength is demonstrated in the positive outcome of the Clinical Trials completed with finfish containing omega-3 and the possibility of preventing Type II diabetes. Although currently somewhat speculative the data does support this Doctoral Thesis as I have documented in Chapter one Part four. The third strength is the very clear evidence that those participants in *Group A* that regularly consumed eel none developed Type II diabetes or any of the distinct symptoms, are still alive today and older than statically predicted. But that siblings and/or closely related participants that composed *Group B* and did not eat eel but did develop Type II diabetes with pre-diabetic symptoms and most passed prematurely according to life expectancy statistics.

In contrast the weakness is the limited number of thirty participants that were selected from fifty people originally interviewed may be perceived as being too selective and insufficiently robust. Another weakness is the actual acceptance of the data that it may cause problems at a political level where it could be interpreted as a potential Treaty of Waitangi Claim by Maaori for the dwindling supply of the long-finned eel that was the staple food prior to the 1950s Urbanisation. Another weakness is that historically much of Maaori health preventative strategies and science methodology were not accepted with validity and may cause embarrassment for historical recordings that have been factually embellished or distorted to suit or harmonise with the attitude of the time in which they were written.

Strength and Weakness in relation to other studies

The strength of other studies is that they are controlled Clinical Studies usually through a well established globally medical institution recognised as a global authority. But also presents a major weakness because the people are culturally very different. Whilst the Clinical Studies have focused on Type II diabetes prevention through the consumption of finfish such as oily sardines and herrings that habitat the cold water oceans. In fact, the

long finned eel has to date not been used in Clinical Trials but since this doctoral research a Type II diabetes Clinical Trial at Auckland Hospital has incorporated the long finned eel as a source of omega-3.

Meaning of the study with possible mechanisms and implications

It is anticipated that all the research included in the doctoral will be first be accepted for the use of Type II diabetes prevention (and other non-communicable diseases where appropriate) in conjunction with any other medical or clinical treatments also being used or available. In addition clinicians and other health professionals utilise the Tuupuna Knowledge Base Health Intervention especially with Maori and other indigenous clients.

Unanswered questions and future research

The first question is how to use the Interview Data Gathering Study data? I designed a nine point Health Intervention suitable for implementation that is presented in the next chapter based on the Interview Data Gathering Study. It includes regular consumption of eel/tuna (and/or other omega-3 rich oily finfish such as sardines) and incorporating the holistic lifestyle choices but for use in a contemporary setting to prevent the manifestation of Type II diabetes (or its symptoms).

It is anticipated that I will continue with post-doctoral research where I can actually implement the nine point Tuupuna Knowledge Base health intervention as a Type II diabetes prevention programmed at a grass roots marae level. I have had discussions with the academic personnel at the Tainui Endowed College Hopuhopu (previously called the Waikato University Endowed College) and it is anticipated that I will continue with my current supervisor Professor Chris Cunningham.

Finally, this chapter breaks new ground because it examines research methodology from a tangata whenua Maaori perspective by presenting a new way of thinking. This was achieved by examining the ancestral scientific knowledge and disease prevention strategy perspective that was through diet and holistic lifestyle choices. I called the new research tool Tuupuna Knowledge Base Methodology because it based on ancestral inherited knowledge.

Rapua mai te ngaro.
Seek that which has been lost.

Chapter three

The Research Findings

What are the findings of this doctoral thesis research?

This doctoral thesis research clearly indicates that prior to Maaori Urbanisation good health and wellness was a personal responsibility but monitored by the hapuu hierarchy. In fact each person complied to a routine that ensured good health including: daily exercise, drinking water, eating fresh seasonal vegetables and fruits, consuming a diet rich in the unsaturated omega-3 and ensuring the body was regularly cleansed internally. Thus the process of daily living provided lifestyle choices reflecting a hauora health intervention that prevented chronic non-communicable diseases from developing. Type II diabetes mellitus has been used as a case in point because it has had a profound negative impact for contemporary Maaori. And taking 1950 as a point in time when the long finned eel/tuna practice was optimal.

The Tuupuna Knowledge Base research methodology provides tangata whenua Maaori with an additional resource in an academic research setting. This enables accessibility and provides credibility to inherited knowledge, particularly indigenous customary knowledge, allowing the establishment of new knowledge through investigatory analysis. Consequently inherited whakakapa knowledge is classified as a Customary Knowledge with the benefits and practice of combining knowledge bases through awareness, access, validation and utility.

Developing a Tainuitanga Health Promotion Framework

The research findings have been collated as time-line data to assist in developing a Tainuitanga health promotion framework in conjunction with the Tuupuna Knowledge Base research methodology. The predominant research outcome has been the Tuupuna Knowledge Base Health Intervention presented in Chapter four *Part two*.

Table 21. Type II diabetes/eel dietary consumption time-line around 1350 to 2010 AD.

Around 1350AD	1950AD	1960AD	1980AD	2010AD
no Type II diabetes evidence	still no Type II diabetes evidence	evidence of Type II diabetes symptoms	Type II reaches epidemic	global Type II diabetes serious epidemic
Health Status: Holistic health lifestyle practice potential benefit involving the eel with exercise to gather and prepare the eel with collective social interaction. Through the tikanga there was a spiritual/wairua connection with whaanau/hapuu. Health benefits from regular dietary of eels.	Health Status: Traditional health holistic practice outlawed by 1907 Tohunga Suppression Act. Communicable diseases from Whalers, Sealers, Settler's reducing the population as diseases did not exist previously and no immunity developed.	Health Status: Maaori urban migration with sudden dietary and lifestyle change to a European with high saturated fat and high sugar diet. Western lifestyle change to a more sedentary with medical intervention and traditional Maaori cultural alienation.	Health Status: Tohunga Suppression Act repealed in 1964 but the Western influences well established. Maaori realise importance of language and culture with renaissance to educate (reflected globally by indigenous people revival of language).	Health Status: Maaori desire to introduce Maaori health initiatives as Western style medicine not as successful as anticipated. The results are now an epidemic in Type II diabetes and other non-communicable diseases. But Western diet. A more sedentary lifestyle well established
Eel/Tuna Eel gathered as dietary staple from three species with an abundant supply. Eel were dried in the sun, smoked, stored live in special pits for future use. High regular omega-3 and lethicin diet.	Eel/Tuna Eel still gathered in a collective traditional way but other European foods being introduced. Trout and Carp finfish species introduced to compete with eel. Hydro-electricity stations built on rivers interfering in eel migratory process with the potential to cause species extinction	Eel/Tuna Continued hydro-electricity development exacerbating the reduction in eel numbers especially the staple long finned eel. The rivers polluted from farming and industrial wastes. Supply diminished from commercial eel gathering for export.	Eel/Tuna Eel farming experiments fail because of diseases. Eel supply seriously diminished long finned predicted to become extinct. The taste of eel has changed because of the pollution into rivers. The 'Sealord's' Deal includes Maaori Quota for eel.	Eel/Tuna Freshwater long finned eel species are all now predicted to be extinct unless sustainability introduced with NIWA hopeful they can farm the elvers. Traditional Maaori eel gathering locations demised. Aquaculture an option to farm eel and develop.

Table 22. Type II diabetes time-line contributory risk factors around 1350 to 2006 AD.

Around 1350AD	1960AD	2006AD
<p>DIET comprised of staple eel (long finned), seasonal fish, conger eel seafood, bird, variety of local fruits and vegetation as vegetables, unsaturated fat, none or little saturated fat, protein, low carbohydrate, low sodium, low sugar and drank lots of water. Drank a lot of clean fresh water usually in the morning and not with food.</p>	<p>DIET changed rapidly with Urbanisation to Western style with domestic meat and dairy products, high saturated fat, cholesterol, little unsaturated fat, trans-fat from Take-away/Fast-food outlets, few vegetables and fruit, high salt, high sugar, high carbohydrate and did not drink much water but commercial drinks/beer</p>	<p>DIET recommendations from the National Food Guidelines (WHO) are: fruit and vegs 5+ per day, protein from meats beef/lamb moderately but also from fish/seafood. Low sugar, low or no trans fat, low saturated fat, low cholesterol, drink plenty of water with six glasses daily, limit commercial drink/alcohol.</p>
<p>NO SMOKING but European introduced tobacco with contact and trade from 1810 (tobacco global trade) and it became an addiction</p>	<p>SMOKING had become an addiction with chronic diseases such as lung cancer to develop</p>	<p>NO SMOKING for optimum health and to prevent chronic diseases – Plan of Actions to eliminate smoking such as SMOKE FREE MARAE and other programmes (funded)</p>
<p>EXERCISE was daily with a personal responsibility to be healthy and fit.</p>	<p>EXERCISE on a regular daily basis ceased with urbanisation as the motor vehicle replaced.</p>	<p>EXERCISE is recommended daily at least half an hour or one hour three times weekly.</p>
<p>HOLISTIC lifestyle provided a HAUORA health intervention that prevented chronic diseases developing with a meticulous attention to body cleansing with daily bowel movements to rid the body of waste matter.</p>	<p>WESTERN lifestyle from the URBANISATION process from a holism to sectoralism and no protocol for bowel movements and the cleansing of the body of wastes but with a reliance on pharmaceutical drugs and chemicals.</p>	<p>HOLISTIC lifestyle is now being recommended with a realisation that a sectoral approach causes and does not treat or prevent chronic diseases from manifesting – globally people are searching for a more holistic lifestyle.</p>
<p>HEALTH and disease prevention was through a Hauora style of intervention that underpinned life and daily activities. TOHUNGA specialised in health matters and healing but individual people took responsibility for their own health and fitness and thus wellness.</p>	<p>WESTERN medical treatment as part of the urbanisation process and the traditional Tohunga outlawed in 1907 but repealed in 1964 but the practice went underground and was still used rurally.</p>	<p>EPIDEMIC of chronic non-communicable in Maaori with government recognition that Western style medicine and physiological treatment is not a successful for Maaori. There has been a development back to traditional prevention type of lifestyle and Hauora health intervention.</p>
<p>LAW and ORDER was strictly enforced from rules/laws of tapu/noa derived from lore with strong cultural bonds</p>	<p>European laws allowed people more freedom until they were broken then European Justice applied and cultural alienation</p>	<p>Abusive substances causing a lack of adherence to laws through alcohol, illegal drugs and criminal activities causing incarceration/violence issues.</p>

Table 23. Practice as a Traditional Framework Expression around 1350 to 1950AD.

gathering	preparing	storage
<p>Designated people highly skilled with explicit inherited knowledge were dictated and guided by the moon phases through Maaori cosmic science directed from the Tohunga, performing special karakia that preceded the gather and then other special karakia during the gather.</p>	<p>The eel were cut open, cleaned with the head and backbone removed, and then laid on an elevated grating of green rods, either over a fire for several hours or the sun for several days to dry.</p>	<p>They were dried and partially cooked by the heat, after which they would be stored by hanging or packed in baskets. Then when required the dried eel or <i>tuna marake</i> were cooked in a steam-oven to soften them.</p>
<p>A specific gathering season, the warmest time of the year and it was much regulated, the traditional way was to feel under banks with ones hands and grope under stones in the river-bed with ones feet. Rain is considered suitable called <i>marangai</i> which means eel-rain.</p>	<p>Eels are carefully dried and skinned, the head cut off, the bone carefully taken out, flesh exposed to the smoke using Maanuka wood.</p>	<p>Traditionally when eel catches were heavy the excess were dried and preserved as food-supplies, by a fire process known as <i>ahi rara tuna</i></p>
<p><i>Paa-tuna</i> river eel weir method: Large river a very strong labour intensive construction built from a hardwood of Kaauka or Maru timber. Then for a small stream or tributary a different weir was constructed.^{xi} The commonest method of catching eels was with the eel-pot and the bob, spearing, netting, striking or by hand but not using a hook or gorge or in specially designed and made eel-pots and nets called hinaki.</p>	<p>The traditional Maaori way of cooking called a haangi is still used today; it ensures that all essential nutrients are preserved similar to ‘the pressure cooker method’, where steam is trapped underground. Meat such as eel and fish is placed into food baskets that traditionally were woven from Harakeke.</p>	<p>If eels are carefully dried and skinned, the head cut off and opened down the belly, the bone carefully taken out and the flesh exposed to the smoke to dry, they would last some months.</p> <p><i>Corfs</i> method where the eels were stores in moist pits for long periods of time in specially woven baskets as pits in the water where the eel were feed (very similar to the modern eel-farming aquaculture of today) prior to being consumed, dried or smoked.</p>

Table 24. The Eel Practice framework as a modern expression of Tainuitanga.

gathering	preparing	storage
<p>At traditional gathering sites involving the whaanau males where details of the exact location have been handed down through participation.</p>	<p>The eels are carefully dried and skinned; the head cut off and opened down the belly, the bone carefully taken out and the flesh exposed to the smoke using Maanuka wood (smoked whole).</p>	<p>Refrigerator or deep freeze for future use both in a domestic and Marae Complex (such as Tuurangawaewae Marae where \$2million was spent upgrading the kitchen) or Tainui organisation such as at the Endowed College at Hopuhopu have extensive storage capacity if required.</p>
<p>Dictated and guided by the weather (warmer as eel do not like the cold but when raining is best to catch) and especially relating to the phase of the moon.</p>	<p>Haangi method is used at some Marae gathering where a large number of people need to be feed. The eels are prepared in the traditional way with the flesh wrapped in tin foil or and cooked in the haangi.</p>	<p>Smoked eel could store without a refrigerator for several weeks depending on the weather.</p>
<p>Karakia that the Tohunga used is not used today but the Pai Maarire Karakia (Te Kura o Te Ata, Te Kura o Te Ahiahi, Te Kura o Te Awatea).</p>	<p>Domestic situation and eaten either hot or served cold as a meat, frying or micro waved, grilled or baked as a fillet.</p>	<p>Commercial outlets to purchase either live or prepared (with the Commercial Season May to September).</p>
<p>Use traditional hinaki net or gather by hand using a hook at certain places where the water is very deep and caught by the tail not the head because they have sharp teeth and bite at a hook. Fyke nets are used (are similar hinaki) cylindrical tapered nets with wings which guide the eel/tuna towards the opening in the net. Placed in flowing water (not Waikato River) secured by ropes on the riverbanks or by stakes in the riverbed tributaries.</p>	<p>Commercially prepared for the export market only (Germany, Italy, Japan, Britain, China) as smoked eel fillets, whole smoked eel, skinned eel segments, gutted eel for smoking, canned eel, smoked eel pate and frozen eel</p>	<p>Future Aquaculture development and eel-farming are currently being considered. The Aquaculture Act 2004 and the Maori Fisheries Act 2004 (Treaty of Waitangi Fisheries Claim Settlement Act 1992) where 20% of the New Zealand Quota Management (total allowable catch TAC) is Maori Allotment.</p>

Table 25. Developing a Tainuitanga Health Promoting Framework.

Health Promoting Framework	the means or method	example of expression
World view	Guardianship of Kiingitanga Kiingitanga leadership role Raupatu 1865 land confiscation Tainui Trust Board 1946 Raupatu Settlement Act 1995 Crown TOW obligations Economic wealth prosperity Health research programmes	Tainui has the responsibility Kiingitanga leader from 1858 compensation from 1865 compensation to rebuild democratic Te Kauhanganui Article II <i>toanga</i> specific asset/wealth accumulation Hopuhopu Endowed College
Tikanga values	Tainui waka descendants The River (Waikato) The Mountain (Taupiri) Whakapapa knowledge Kiingitanga values philosophy Pai Maarire as a framework Tainui Constitutional structure	Whakapapa to Tainui waka spiritual cleansing source respect the tuupuna/tiipuna Whakapapa in Mihi delivery Te Arikinui with Pai Maarire principles used.
Kawa ethics	Kiingitanga responsibility Kiingitanga ritual/symbols Waikato River to cleanse Taupiri Mountain as a sacred landmark and burial lace Whakapapa knowledge Tuupuna knowledge respect Pootatau Te Wherowhero Pai Maarire spiritual base Taniwha from Waikato River	leader goes to people Poukai insignia flag, Band and the Pai Maarire Karakia “ <i>Haere ki te wai</i> ” concept visit and always stop to show respect and gather tuupuna Whakapapa in Mihi delivery Tuupuna knowledge known Kiingitanga reference point Tariao Karakia of good health Taniwha Whakataukii
Internal factors	Hapuu factions of Tainui waka The Kiingitanga Movement The Waikato River relationship Democratically governed Kiingitanga Marae activities Raupatu 1865 land confiscation Tuupuna Knowledge respect Tohunga Suppression Act 1907 Colonisation effects on wealth Dynamics of Hapuu factions Treaty of Waitangi 1840 Self-governance.	The people from Waikato Service to and for Kiingitanga River pollution restricts uses democratic Te Kauhanganui Coronation, Poukai, Sports Economic devastation Knowledge trusted as benefit Traditional methods outlawed Health and well-being Some hapuu dissatisfied Were not TOW signatories Electoral college of 183.
External factors	Guardianship of Kiingitanga Kiingitanga leadership role Raupatu 1865 land confiscation Raupatu Settlement Act 1995 TOW Tribunal Settlements	Federated Waikato hapuu From Kiingi Tuheitia Over one million acres taken Waitangi Claim set precedent to other Maaori organisations.

Table 26. Incorporating Tainuitanga Worldview from around 1350 AD to the future.

Health Frame work	Around 1350AD Tainui arrival	1865 Raupatu	1995 Raupatu	The Future
World view including Hauora	Established health/wellness through a holistic lifestyle, exercise, diet, water with personal health responsibility. Monitored by the hapuu and led by the Tohunga methods used: wai, rongooa, spiritual wairua, Tohunga karakia mirimiri, surgical intervention. 1858 Kiingitanga established with Pootatau Te Wherowhero. The New Zealand Settlements Act 1863 and the Suppression of Rebellion Act 1863 Waikato invasion 1863 and Raupatu in 1865 over one million acres of land confiscated economic loss	Continued wellness and holistic lifestyle but invasion with land loss in 1865 and economic devastation. Tohunga health Hauora structure outlawed in 1907 with the Tohunga Suppression Act but still operated some knowledge was retained some was lost. Act repealed in 1964 changed and more aligned to complement Western Medicine. Part Settlement formed the Tainui Trust Board 1946 higher education for future leadership. 1950/60 Maaori Urbanisation to Western and chronic disease manifestation Type II diabetes	continued economic prosperity from Part A Settlement higher academic education promoted and the establishment of the Hopuhopu Waikato University College Health research programmes Then Part B of the Raupatu the Waikato River Claim with the pollution restricting uses and the health of Tainui people	Continued economic prosperity people get highly educated. Traditional ways explored made credible and used for chronic disease prevention and health promotion through a more holistic approach. Autonomy back to hapuu with Waikato River title Ownership returned to Tainui.
Tikanga values (overall)	Developed and evolved from an original culture to a significantly unique culture that includes: language, diet, health status, disease prevention, survival and close association to the natural resources and environment.	Tainui waka descendants The River (Waikato) The Mountain (Taupiri) Whakapapa knowledge Tohunga structure Kiingitanga values philosophy	Whakapapa knowledge Kiingitanga values with Pai Maarire as a framework Tainui Constitutional structure	People become better educated academic and in the traditional knowledge. Traditional knowledge understood, respected, and adopted
Kawa ethics (local)	Regionally distinct using the natural resources and what was available for survival.	Kiingitanga responsibility, Waikato River to cleanse, Taupiri Mountain, whakapapa knowledge and tuupuna knowledge respected with Pootatau Te Wherowhero first King, Pai Maarire.	Kiingitanga responsibility, Waikato River to cleanse, Taupiri Mountain, whakapapa knowledge and tuupuna knowledge respected with Pootatau Te Wherowhero first King, Pai Maarire.	same as previous as the Kiingitanga is well established but it will evolve as situations dictate

Tainuitanga Supporting Data

The evidence used in this doctoral thesis to describe the long finned eel/tuna practice has been obtained from the descriptive account of the fishing and eel gathering methods of Maaori provided by the author Elsdon Best. He recorded an historical account and described what he experienced when fishing and gathering eel/tuna with hapuu from Ngaati Awa, Tuhoe, Waikato and Whanganui. His account has been verified by my kuia and kaumaatua from both Ngaati Pukeko o Ngaati Awa of Poroporo Marae and Ngaati Mahuta o Waikato of Tuurangawaewae Marae being the two hapuu that are my tuurangawaewae through whakapapa. In fact considerable knowledge about the practice of eel/tuna gathering, preparation and storage from my kaumaatua at Turangawaewae Marae has contributed to the development of the Tuupuna Knowledge Base research methodology framework.

Tainui oral history (n.d.) claims that it was following the passing of Pootatau Te Wherowhero as the first Maaori King and leader of the Kiingitanga on the 25 June 1860 that provided the British Crown the opportunity to introduce the New Zealand Settlements Act 1863. And then the Suppression of Rebellion Act 1863 immediately followed by the Waikato Raupatu of 1865. As part of the Waikato War from the invasion of British troops and the land confiscation over one million acres of land, most from the Kiingitanga took refuge by retreating into the land owned by Ngaati Maniapoto and known as *The King Country*.

But the tikanga and kawa was not confiscated and until 1880 the traditional knowledge was assembled, versed and presented from Taawhiao as the second Maaori King and Kiingitanga leader, inherited from his father Pootatau. From 1880 until his passing 24 August 1894 Taawhiao resided at Mercer, Rangiriri, Maungatawhiri and Waahi Paa creating his own version of Pai Maarire which he called Tariao, after the morning star, a star in the Milky Way. Pai Maarire consists of prayers chanted and is a mixture of the Old Testament scripture, appeals to ancestors and Maaori Gods and invocations to stars; with the Pai Maarire reserved only for tribal events. It is not to be chanted at non-traditional Maaori events and only outside Waikato if by the experienced kaumaatua Kairarahi. The Tariao Karakia can offer strength to stay strong in health, strong in spirit, to be steadfast

in the kaupapa Maaori now and in the future. Tariao can offer protection to taonga and it offers true believers healing and cleansing. There are three karakia within Pai Maarire, Te Kura o Te Ata, Te Kura o Te Ahiahi and Te Kura o Te Awatea (see Appendices E).

Support for the research culture and programme is planned for Te Kauhanganui, the governing body of Waikato tribes, on matters covered by Article II of the Treaty of Waitangi. In modern terms this implies equal access to, and benefits from the provision and delivery of government services and programmes. Such equality has not been achieved. The College will research the actions taken by Waikato tribes to close the gaps between Maaori and the general population, and to advance their development through their own actions. This research programme will focus on the development of Maaori owned projects and models that will improve the outcomes for tribal members of Te Kauhanganui in four areas: Health, Education, Housing and Employment. Health projects planned include: delivering and promoting well-being, a tribal health authority – the concept and its application, health promotions and Marae based health centres (Professor James Ritchie, as cited in Traditional Maori Oral History 2000, p. 6).

The Kiingitanga is undoubtedly to Tainui, the greatest taonga handed down to them from the past. But Te Kauhanganui is a taonga of the future. Tainui, with all its courage and resilience, did what many said could not be done by Maaori; it set up a system of modern governance to deal with the interests of its own treaty beneficiaries. It comes as no surprise to this Court that there should have been teething troubles. But they should be seen as no more than that. After all, Europeans have had Parliaments for centuries, and the course of those institutions has been far from smooth (Justice Hammond, 2000, p. 10).

The accumulated knowledge has strengthened the knowledge provided by my maternal grandmother Maa when we were fishing on the Manukau Harbour near where Pootatau Te Wherowhero, the first Maaori King lived at Awhina. The locations that have just been discussed actually include the place where Maa was born 22 August 1901 and raised in a traditional Kiingitanga Marae setting until she moved aged twenty-two after marrying.

Comparative analysis of the Data with the Method

I have drawn the comparative analysis on the practice and procedure for gathering eel/tuna as a demonstration of the holistic practice that qualified as a community health

intervention for the prevention of chronic diseases. I have attempted to present the procedure as a validation and identification of the (potential) benefits from omega-3 consumption; the dietary balance; exercise through the 'catch'; the tikanga/kawa, the whaanau participation and social interaction enhanced by the wairua and holistic wellbeing. Thus the practice as an intervention for hauora incorporating the physical, the social, the spiritual and the emotional well-being, plus the economic benefits as eel was traded as a commodity with other whaanau and hapuu. Hauora has been demonstrated through the example of gathering the eel, bringing it home, treating it, preparing it for immediate consumption or storing it as a food supply for future use by drying (hanging in the wind or the sun) or smoking over Maanuka. The process of eel/tuna gathering was very scientific and based on the Moon, with the Moon's age or phases divided into 30 days. Indeed this formed the basis for the long finned eel gathering. The steps for the hauora potential are initially through:

- exercise to walk to the eel-pot or to the Eel Weir
- exercise to paddle by waka to where the eel/tuna were available
- exercise in catching, carrying or transporting the eel home
- exercise in the eel preparation
- spiritual connection through karakia to Tangaroa as God of the Sea that always preceded the catch
- more karakia to prepare the food and then prior to eating
- link with the wairua from the river and the cosmic emery when eel gathering at night.

Towards the Academic Research Framework

Now turning to the thesis research findings and examining what was significant to then develop the academic research framework of Tuupuna Knowledge Base research methodology. The following are the findings:

- Personal responsibility to have a healthy body through exercise and scrupulous cleanliness including internally, externally and spiritually.

- Water played a very significant role both in daily consumption to cleanse the body internally (consumed without food in the morning) and externally from both a physical and spiritual dimension.
- Diet and food through gathering, preparation and consumption of the staple long finned eel/tuna, rich in omega-3 and quality unsaturated fat with fish and a variety of seafood provided protein.
- Exercise participation when gathering food with transportation either by foot or waka and then more exercise during food preparation. Exercise during entertainment with special dances, games, music and songs. Exercise was part of the daily traditional Maaori life.
- Whakapapa knowledge of the ancestors' provided every person with an identity each having intimate knowledge of their past and the role that each person would likely play within the hapuu society.
- A spiritual dimension with a total respect for the available resources through sustainability for future generations.
- Tikanga and kawa was known and everyone constantly participated in with the daily lifestyle.

Health and healing programme maintained through the following skills:

- Mirimiri
- Rongoaa
- Water
- The Tohunga.

The Academic Hauora Framework

First the objective of this research thesis has been to address a significant health issue for contemporary Maaori, bringing together science, history and the values derived from lore and tikanga providing credibility to our ancestors' knowledge and their way of thinking.

Second the method used has a Kaupapa Maaori Base but introduces accumulated and acquired ancestral knowledge that I have called a Tuupuna Knowledge Base. Thus using Type II diabetes as a case in point with the omega-3 derived from the dietary

consumption of eel/tuna as a staple to demonstrate a holistic practice with nutritional, other physiological benefits and broader wellness outcomes. But does explain if an omega-3 eel/tuna dietary intake is the reason why there is an absence of the diabetes mellitus Type II symptoms from the historical records. It examines the theoretical framework for a health intervention using current academic health intervention theorist frameworks, and surveying if it is possible to combine knowledge traditions in a contemporary setting.

Table 27. Eel/Tuna Practice comparing a Traditional and Contemporary Setting:

Tuupuna Knowledge Base	Traditional Setting Around 1350 to 1950 (waka arrival to urbanisation)	Contemporary Setting 1950 to 2006 (1950 Urbanisation to today's environment)
tinorangatira	Hapuu rural setting health and wellness was the individual's responsibility, directed and monitored collectively; hapuu and whaanau hierarchical structure (Tohunga, tapu/noa rules). Universal access through Social Welfare programmes including a Public Health system 1935 first Labour government	With urbanisation people moved away from long established traditional social structures (health) and adopted the European way of life where the State provided a Public Health system through taxes and Western Medicine practices with medical General Practitioners'/Specialists' and universal access to free medicines/pharmaceuticals – not holistic. The responsibility for maintaining good health and wellness transferred to the services provided by the Public Health System but since 1990 policy is a more holistic approach and responsibility for wellness.
wai	consumed daily with local waterways spiritual connection	none or very little water consumed but high sugar commercial beverages (including alcohol) readily available and heavily consumed through influential marketing offered to the consumer
kai	Freshly gathered (or stored) eel/tuna, seafood (omega-3) cooked haangi (preserved nutrients) variety of vegetables and fruits seasonally available from 1880s introduction of domestic meats from farming whaanau cooked	Limited eel/tuna dependent on supply, some seafood but predominantly domesticated meats high in saturated fat (often cooked in lard) and high dietary intake of convenient 'take-away' type foods cooked in saturated and trans fats. Some vegetables and fruits but diet heavily driven by consumerism, marketing, convenience, low cost easy availability but not usually prepared by whaanau
tinana	Daily exercise was part of daily living such as food gathering, cultivation, invasion, travel by walking or waka, the motor car introduction sparingly used	The motor car was universally available and used as a convenience with no regular exercise but some played social weekend sports, thus obesity mainly due to lack of exercise has now become an issue for chronic non-communicable diseases
whakapapa	Universal knowledge and identity where everyone knew their tuurangawaewae. Tobacco was introduced as a commodity.	An immediate alienation where the whakapapa knowledge was not used with the knowledge not handed on people had an identity problem a cause in mental health problems and wellness a cause toward drugs, alcohol, smoking, obesity
wairua	Connection through	No connection unless people participated in their

	knowledge and local rural environment	Maaoritanga in an urban environment or returned back to their hapuu tuurangawaewae rohe (area)
Maaoritanga	Cultural capital provided	Very little opportunity for Cultural Capital until the revival from 1980s and from that time available in education institutions.
Tikanga/kawa	Has remained consistent with some evolution over time with participation to prevent any extinction. Ceremonial historical occasions supported.	Limited opportunity, the tikanga/kawa modified to suit the occasion rather than the tikanga/kawa dictating the occasion. In traditional hapuu settings the tikanga/kawa has remained consistent with some evolution, ceremonial inclusion (State).
te reo Maori	Maaori language was the only language but colonisation and non-Maaori population dominance the language eroded. Education institutions refused the language spoken, children punished for using.	English became the dominant language, remains the dominant language but tangata whenua aggressively campaigned for Maaori language to survive establishing Koohanga Reo's for pre-school children and its introduction into schools and University. It is the official language and has undergone a revival since 1970s with Kapa Haka.

Table 28(a). Traditional Worldview for the Tuupuna Knowledge Base Framework.

tinorangatira	specific health monitoring roles with personal health responsibility
wai	Eel/tuna live in the water metamorphosis from salt water to fresh water consumed water daily to cleanse the body internally
kai	regularly consumed staple, unsaturated omega-3, beneficial saturated fat
tinana	physical exercise pertaining to the eel/tuna gather (associated exercises)
whakapapa	Karakia to the Ancestors' to assist and intergeneration skills
wairua	from Awa (Waikato) and wholism through the holistic view (of the people)
Maaoritanga	Tainuitanga (Waikato River, the land as the tuurangawaewae, Taupiri)
tikanga/kawa	set procedure from Tainui waka Hapuu
te reo Maori	language spoken for the "tuna"

**Table 28(b). Contemporary Worldview for Tuupuna Knowledge Base 2006.
Asking the question – What is Tainui trying to achieve?**

tinorangatira	ownership through education and community health programmes
wai	Waikato River (Part B Claim to return guardianship) healthy river/people
kai	economic development (Aquaculture/Eel Farming/'Sealord's') healthy food options as a policy for omega-3 dietary intake
tinana	exercise and health programmes for body fitness and holistic wellness
whakapapa	Kiingitanga values and whakapapa knowledge underpin
wairua	through the Waikato River and the people
Maaoritanga	Tainuitanga and Kiingitanga participation (Poukai, Koroneihana, sports)
tikanga/kawa	Hapuu development and is still a set procedure from Tainui waka
te reo Maori	the language used particularly at formal Tainui occasions

Table 29. Applying to an Intervention for a Healthy Lifestyle – TKB Framework.

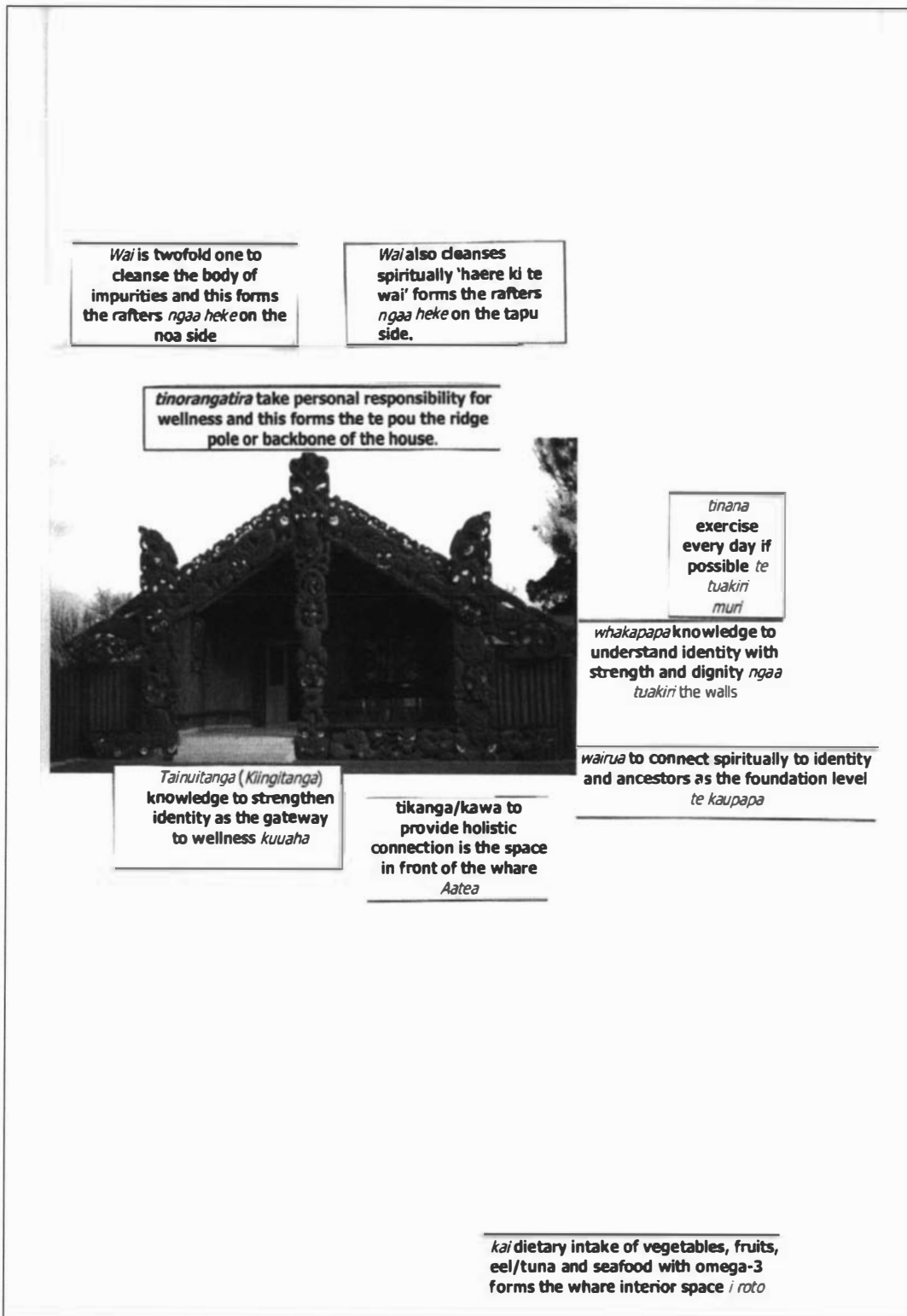
tinorangatira	empowerment
wai	dietary consumption daily to cleanse the body internally spiritual connection to the Waikato River and its return to be healthy
kai	healthy eating (unsaturated foods rich in omega-3, vegetable and fruits)
tinana	exercise programme (daily/weekly)
whakapapa	knowledge learning
wairua	wholism (holistic)
Tainuitanga	collective outcome
tikanga/kawa	rules and discipline
te reo Maaori	knowledge learning

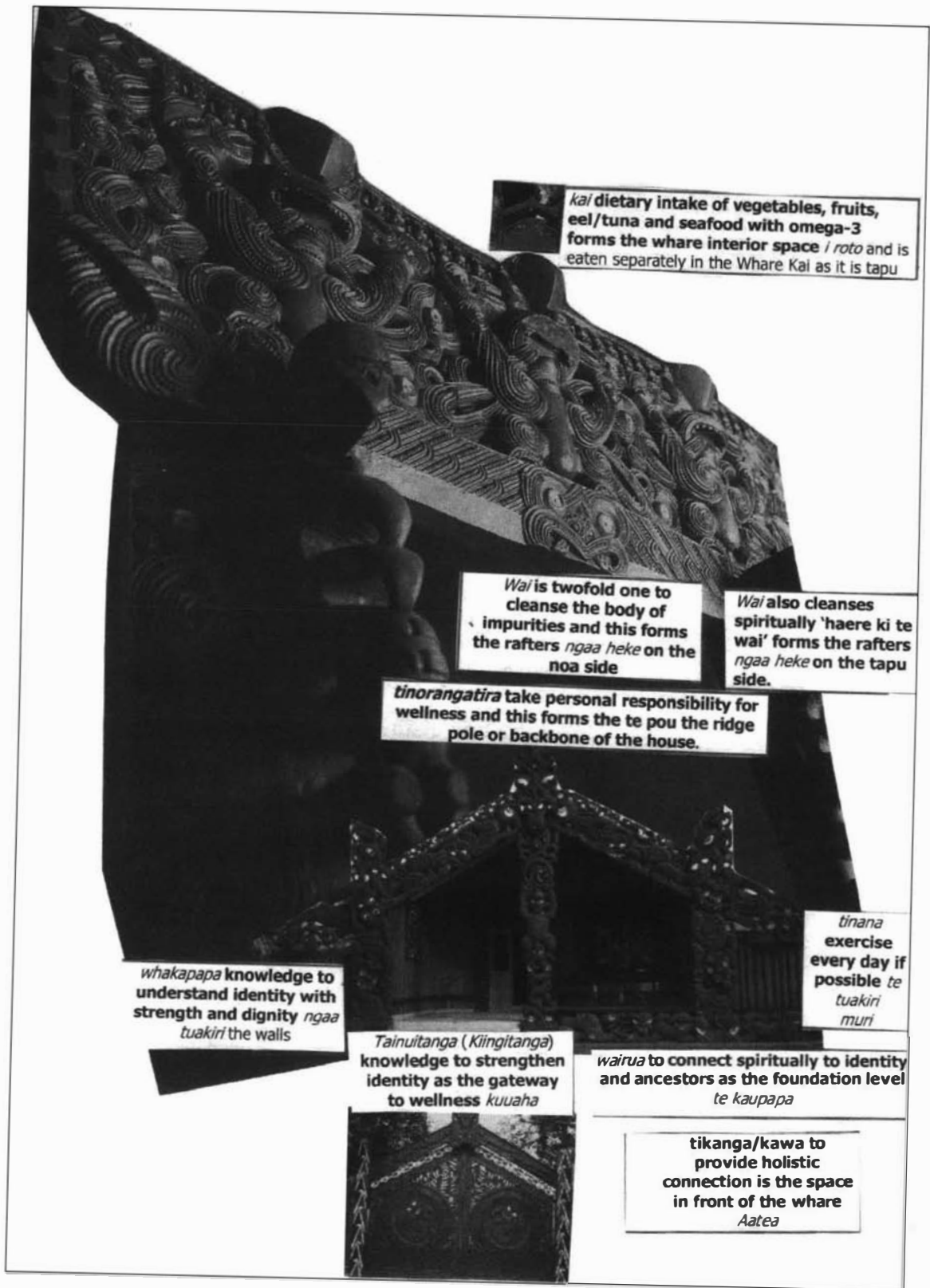
The final component for the academic framework is the conclusions or the outcomes and these are presented in a community Health Intervention designed specifically from the traditional ancestral knowledge paradigm. While at the same time related to the determinants of health through the holistic hauora framework that considered a broad range of different kinds of evidence, including scientific as omega-3 assay testing.

To sum up, I have introduced the Tuupuna Knowledge Base framework as a health intervention on the next page and to demonstrate its significance I have created a wharenuī structure and called this framework the House of the Ancestral Knowledge Base *te Whare o Maatauranga o ngaa Tuupuna*. I have used a wharenuī structure because it can relate more directly to the message of a health intervention based on a structure that is used by contemporary Maaori and is an established part of Maaoritanga would remain intact in the future. In other words the wharenuī as a structure directly equates and relates to Maaoritanga. The Tuupuna Knowledge Base Health Intervention outline is presented on the next page and the concept has been called The House of the Ancestral Knowledge Base *te Whare o Maatauranga o ngaa Tuupuna*. The visuals used are copied from The Tainui Maaori Trust Board Annual Report (1998, pp. 5-14).

Figures 30(a) and 30 (b) *Te Whare o Maatauranga o ngaa Tuupuna* introduce the nine point health intervention that has been designed and developed from the Tuupuna Knowledge Base research methodology. The wharenuī concept has been used to be more inviting to a Maaoritanga audience therefore more the concept more likely to be accepted.

The House of the Ancestral Knowledge Base *Te Whare o Maatauranga o nga Tuupuna*:





kai dietary intake of vegetables, fruits, eel/tuna and seafood with omega-3 forms the whare interior space *i roto* and is eaten separately in the Whare Kai as it is tapu

Wai is twofold one to cleanse the body of impurities and this forms the rafters *ngaa heke* on the noa side

Wai also cleanses spiritually 'haere ki te wai' forms the rafters *ngaa heke* on the tapu side.

tinorangatira take personal responsibility for wellness and this forms the *te pou* the ridge pole or backbone of the house.

whakapapa knowledge to understand identity with strength and dignity *ngaa tuakiri* the walls

tinana exercise every day if possible *te tuakiri muri*

Tainuitanga (Kiingitanga) knowledge to strengthen identity as the gateway to wellness *kuuaha*

wairua to connect spiritually to identity and ancestors as the foundation level *te kaupapa*

tikanga/kawa to provide holistic connection is the space in front of the whare *Aatea*

Academic Hauora Research Explored

Research, in the context of development, relates not only to collecting data, but also providing direction for future decisions with other recognised Maaori scholars contributing such as Professor Chris Cunningham.

Cunningham (2000) says that research at the interface has implications for methodologies, research ethics, and technology transfer describing four types of research, science and technology according to the methodological approach adopted and the ways in which they impact on Maaori:

- research not especially relevant to Maaori (such as quantum chemistry)
- research involving Maaori (as participants or possibly junior members of a research team, such as analysis of ethnic differentials in disease rates)
- Maaori centred research Maaori participants, largely Maaori researchers, methods of analysis using mainstream standards for research)
- Kaupapa Maaori research (Maaori researchers and participants, analysis based on Maaori knowledge systems).

When these four types of research are seen along a continuum, interface research typically involves the second and third types. Although the incorporation of indigenous methods is variable, common to both types of research is active Maaori participation, as researchers and respondents, and the use of mainstream as well as Maaori tools for analysis (p. 144).

Cunningham (2000) then says that a five-part framework, made up of outcomes, principles, research paradigms, capability, and effective policies, can provide a useful way of conceptualising the relationships between indigenous, research, science, and technology. The central component of the framework is the outcome dimension; research should add to knowledge that will contribute to Maaori economic, social, and cultural advancement and environmental sustainability, and should be measured in ways that are consistent with Maaori world-views. Four particular principles have been noted: mutual respect, shared benefits, human dignity, and discovery. They acknowledge different perspectives, common aims, regard for people involved in research, and an orientation to the future. The first, mutual respect has also been called 'mutual mana enhancement' and

recognises the validity of each system of knowledge. The second principle, shared benefits allows indigenous communities to share benefits of research including intellectual property and commercialisation. The third principle, human dignity is where cultural and spiritual beliefs and practices are reinforced by research and indigenous worldviews are not compromised. The fourth principle, discovery allows for innovation and exploration using indigenous methodologies and scientific methods (p. 148).

Professor Mason Durie's Hauora Model as a four-sided approach to health has been established as a health model benchmark for both Maaori as taha wairua, taha hinengaro, taha tinana, taha whaanau or for non-Maaori: the spiritual, the psychological, the physical, and the family.

Durie (2003) says that good health requires sound planning over a long period of time and the capacity of Maaori to plan ahead in a comprehensive manner is essential for improvements in Maaori health. That it would be shortsighted to assume that planning for health should be a function of the health sector or the sole responsibility of government. Unless Maaori are actively leading that process then the focus will remain tied to the sectors and largely outside Maaori frameworks, opportunities for substantial advancement will be lost (p. 167).

Ratima (2004) discusses the findings of a research project which has aimed to conceptualise Maaori health promotion indicating that it is based on a broad concept of health, which can be expanded as the basis for a more general argument for Maaori advancement. Maaori health promotion is described as the process of enabling Maaori to increase control over the determinants of health and strengthen their identity as Maaori, and thereby improve their health and position in society. Its defining characteristics have been identified and presented in 'Kia uruuru mai a hauora', a framework for Maaori health promotion. Aspects of this framework are likely to have wider application to both indigenous and non-indigenous peoples. It identifies six key health promotion strategies:

- reorientation health services towards cultural and health promoting criteria
- increasing Maaori participation in society
- Maaori capacity building
- public policies that affirm health and culture

- cross-sectoral action for health
- adequate resources (pp. 5-7).

Durie (2004) comments that *Te Pae Mahutonga* is a schema identifying practice parameters and signposting strategic directions for states, health and education sectors and indigenous peoples themselves. Indigenous health promoters can help bridge the gap between the indigenous world and the world dominated by science, technology and global imperialism (pp. 705-718).

Tuupuna Knowledge Base Framework Intervention Planning

The Tuupuna Knowledge Base Community Health Intervention model is based on Rothmans and Thomas Framework (1994) and presented as Table 31 (p. 7).

Framework Outcomes	Knowledge Development information about human behaviour in the form, for example, of concepts, hypotheses, theories, and empirical generalisations	Knowledge Utilisation such applications as changes in the understanding or practices relating to populations, problems, interventions in human service	Design and Development such technical means of achieving human service objectives as assessment and intervention methods; or service programmes, systems and policies
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The Rothmans & Thomas (1994) Outcomes Framework with the following range of outcomes addressed as the focus in the Tuupuna Knowledge Base Health Intervention relating to the Hauora principles and presented in Table 32.

Outcomes Holistic lifestyle from Tuupuna Knowledge Summary	Knowledge Development Evaluation from the introduced concept commencing each week by examining the diet, loss of weight, fitness, spiritual wairua connection and general well-being.	Knowledge Utilisation Personal health to be collective within hapuu as a weekly meeting to share exercise, food, diet, new knowledge and any problems arisen.	Design and Development Introducing Eel/Tuna Tuupuna Knowledge Concept as lifestyle habit changes to collectively work together for whaanau and hapuu good-health and well-being.
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The outcomes that are being addressed are primarily a change to a holistic lifestyle based on the Hauora principles that include the following:

- Lifestyle choices such as regular exercise and drinking water regularly (to hydrate to cleanse the body).

- A diet that includes green vegetables, seasonal fruits and omega-3 rich foods in particular the long finned eel/tuna.
- A spiritual component to connect to the wairua with an understanding and credibility of customary traditional knowledge.
- A community involvement through the whaanau and hapuu to participate in a holistic hauora lifestyle to prevent chronic diseases becoming established.
- A regular participation in Maaoritanga.

Therefore the Tuupuna Knowledge Health Intervention creates these outcomes:

- An understanding of the interaction between health and lifestyle choices.
- Addressing intervention strategies at the community whaanau/hapuu level.
- Improving health literacy through shared knowledge.
- Exploring the potential of health communication strategies.

This thesis was to draw a distinction to:

- An historical exploration by gathering evidence.
- The knowledge outcomes through access to information.
- The methodological frameworks examined with additional alternative created.
- The eel/tuna investigation and conceptual omega-3 metaphor development.
- The community health intervention design for implementation.
- The practice outcomes through health intervention design.

Finally, what is the new knowledge that this thesis represents?

- The strength of tuupuna knowledge developed into an academic methodology.
- The credibility of Tuupuna Knowledge as a science.
- The literal nutritional value of the eel/tuna staple diet.
- The spiritual value and health with wellness in a holistic lifestyle.

The evaluation of evidence must distinguish between the fidelity of the evaluation process in detecting the success or failure of the intervention itself. Proper interpretation of the evidence depends upon the availability of descriptive information on the intervention and its context, so that the

transferability of the evidence can be determined (Rydetnik, as cited in Rothmans & Thomas, 1994, p. 17).

Has a good process been used?

The health promoting (chronic disease prevention) framework for the Tuupuna Knowledge Base Health Intervention that are presented in *Chapter four* link into the Nine Intervention Concepts based on the healthy holistic hauora practice that our tuupuna lived and evolved through well established principles, values and ethics. I have modified these traditional values that still existed for many Maaori up until the Maaori urbanisation and have converted into a framework of action that is an holistic hauora concept but able to be implemented today. Thus implementation of the Tuupuna Knowledge Base health intervention with an evaluation of its success or failure will be a post-doctoral project.

Teenei te whaikoha atu ki a koutou.

To my forebears dead and living, I dedicate this work to you.

Chapter four

***Part one* — Western Intervention Research Design**

i. Introduction

This chapter merges three paradigms Science, Cultural and Intervention by bringing the three things together producing a contextualised intervention design. The question is. If this was an excellent intervention operating at a high level of performance, what would it look like? Initially the intervention is conceptual or a theory to solve a problem.

Then the abstraction is transferred into a feasible planning framework that is adapted in such a way that it can be successfully implemented through appropriate management and finally evaluated to ensure the original problem was solved or the objectives met.

Thus to ensure the acceptance from both a mainstream academic and an medical perspective the globally recognised intervention research framework developed by the theorists Jack Rothman and Edward Thomas has been thoroughly examined. The outline developmental structures recommended by both these health intervention specialist theorists are very logical and able to be adapted to a community health intervention culturally acceptable to Maaori.

ii. Intervention Methodology Framework Literature Review

Rothman & Thomas (1994) say that although still in its early stages, intervention research sets forth systematic procedures for designing, testing, evaluating and refining needed social technology, and for disseminating proven techniques and programmes to professionals in the community. Then they note that the human service professionals are in dire need of a research methodology that links knowledge with practice. This is cogently illustrated in social work with three fundamental themes abstracted as follows:

- conceptualisation of intervention research present allowing social theoreticians/researchers to distinguish intervention research
- specified new research model on design and development of interventions
- guidelines are provided for conducting intervention research in direct practice with individuals and families, as well as community organisations (pp. xix-5).

The objective of intervention research is to systematically develop innovative social work technology by applying knowledge and other 'ways of knowing' to solve social work problems. In doing so, this approach spans qualitative and quantitative research methods and helps bridge the gap between research and practice (Bronson, as cited in Rothman & Thomas, 1994, p. 2).

Cutlip, Center and Broom (1994) address problem-solving and change processes from a more scientific public relations perspective using a four-step problem solving process achieving a positive outcome in the following proven theory method.

1. Defining the Problem (or opportunity)

This first step involves probing and monitoring knowledge, opinions, attitudes, and behaviours of those concerned with and affected by the acts and policies of an organisation. It provides the foundation for all other steps in the problem-solving process by determining, what is happening now? Therefore by replacing the word *organisation* to the *person with Type II diabetes* the theory is still the same but the problem actually defined and it is how to prevent Type II diabetes.

2. Planning and Programming

Information gathered in the first step is used to make decisions about programme publics (the defined group), objectives, action and communication strategies, tactics, and goals. This involves factoring the findings from the first step into policies and programmes of the organisation, and is based on what we know about the situation, what should we change or do, and say. Indeed tikanga and kawa Maaori are the policies and the Tuupuna Knowledge Base Intervention is underpinned by what we know from the success of traditional Maaori with no Type II diabetes and with good health and lifestyle habits to prevent the disease.

3. Taking Action and Communicating

The third step involves implementing the programme of action and communication designed to achieve the specific objectives for each of the publics (the defined group) to accomplish the programme goal. The questions in this step are, *Who should do and say it, and when, where, and how?* As the philosophy and values of tangata whenua Maaori are collective that involve the family aggregated, then initially they should be in control of the intervention implementation. While at the same time the situation will education all

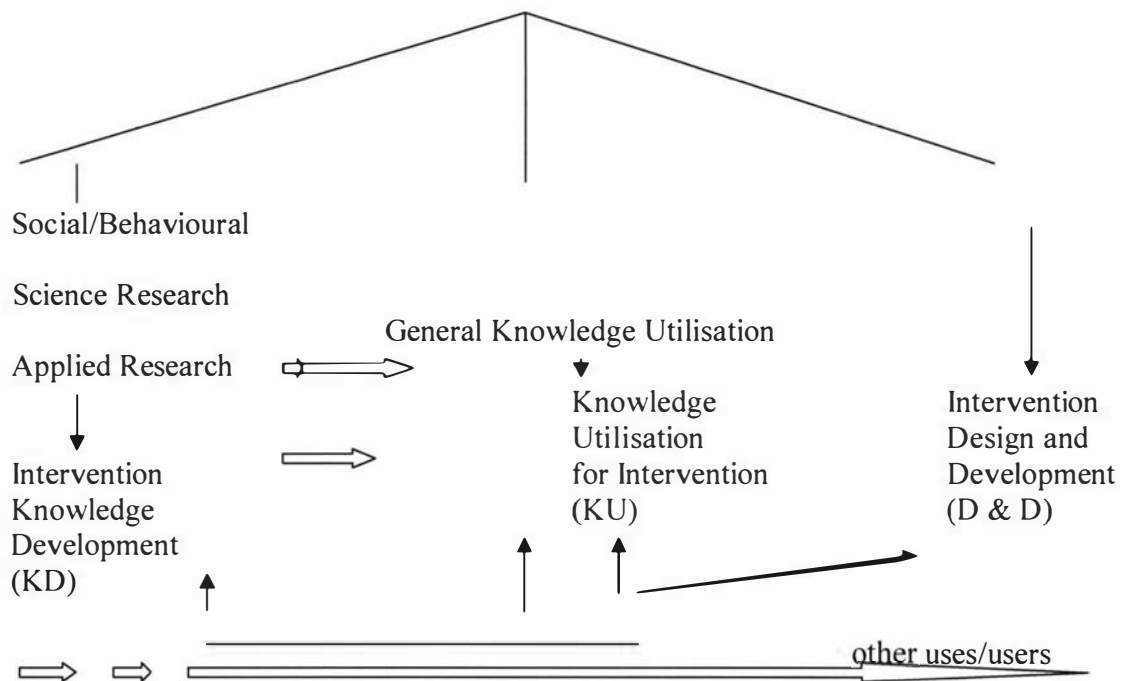
the members of the family, including the extended members, therefore creating a flow-on to many other families.

4. Evaluating the Programme

The final step in the process involves assessing the preparation, implementation, and results of the program. Adjustments are made while the programme is being implemented, based on evaluation feedback on how it is or is not working. Programmes are continued or stopped after learning. Therefore this will provide an opportunity to assess what is actually working and what is not – and then what could be adopted or adapted that would be culturally acceptable and appropriate (p. 317).

In conclusion, each step is as important as the others, but the process begins with gathering intelligence to diagnose the problem.

Figure 33. Facets of Intervention Research Rothman & Thomas (1994).



Rothman & Thomas (1994) comment that for some time now, researchers in human service areas such as social work, mental health and public health have sought approaches to research which yield results that can be put to practical use by

practitioners, administrators and policymakers. They have addressed such questions as how to search out and make appropriate use of available research findings which have potential application, how research methodology may be used to design and develop human service technology. However more generally, how research for practical use in human service differs from conventional behavioural and social science research. Varied approaches have been employed to address the practice application of research (p. 3).

Table 34(a) Rothman & Thomas (1994) on the next page gives a summary of selected differences intervention research and these Intervention Research Facets (p. 7).

areas of difference	Knowledge Development (KD)	Knowledge Utilisation (KU)	Design and Development (D&D)
objectives	contribute knowledge of human behaviour	apply knowledge of human behaviour	evolve new human service technology for example treatment methods, programmes, service systems, policies
methods	conventional and social behavioural science research methods	transformation and conversion of available knowledge into application concepts and theories relevant to given target populations, problems and intervention methods	emerging methods include the means of problem analysis, intervention design, development, evaluation and dissemination and related techniques
outcomes	information about human behaviour in the form, for example, of concepts, hypotheses, theories, and empirical generalisations	such applications as changes in the understanding or practices relating to populations, problems, or interventions in human service	such technical means of achieving human service objectives as assessment and intervention methods; and service programmes, systems and policies

iii. Classification of Intervention research models

There appear to be three main types of endeavours that reflect that intent:

- Empirical research to extend knowledge of human behaviour relating to human service intervention referred to as Intervention Knowledge Development (KD).
- The means by which the findings from Intervention Knowledge Development research may be linked to, and utilised in, practical application (referred to as Intervention Knowledge Utilisation (KU)).

- Research directed toward developing innovative interventions referred to as Intervention Design and Development (D&D).

Although there are critical differences in their objectives and methodologies, these three endeavours have a dual commonality: they are in the genre of applied research and they have a specific intervention message. As applied research, all three are directed toward shedding light on or providing possible solutions to practical problems. The intervention characteristic is more specific and salient because most of the questions about use addressed on such research involve some aspects of interventions (pp. 7-9).

Intervention Knowledge Development (KD)

Rothman and Thomas (1994) confirm that KD research provides important foundation knowledge for understanding aspects of the interventions and for carrying out subsequent D&D. Areas of particular interest in intervention KD include learning more about the *relevant behaviour of potential clients and client symptoms* such as:

- depression
- substance abuse
- anxiety
- family disorganisation
- organisation disorganisation

The *relevant intervention behaviour* such as:

- therapist warmth
- empathy
- social support
- social networks
- advocacy
- coalition building

The *relevant behavioural, social, contextual, environmental conditions* such as:

- supportive
- organisational
- community structures

For example if the alcohol abuse were the target behaviour of interest, KD research could involve examining the correlates or predictors of excessive alcohol consumption through:

- the variables that bear a relationship to effective intervention methods with alcohol abuse
- the effects and effectiveness of alcohol intervention programmes
- the social, cultural and environmental correlates of drinking behaviour for example personal predisposition or the effects of alcohol tax legislation

In conclusion the methodology of KD research consists largely of the research methods and techniques of conventional behavioural and social science research, including particular applications of these methods such as those to be found in conventional social welfare research, evaluation research and single-case experimentation and needs assessment (p. 14).

Intervention Knowledge Utilisation (KU)

Rothman & Thomas (1994) suggest that the findings from research generally cannot be applied to practice without some intermediate process to put the knowledge into more usable form. The processes and activities by which knowledge from research may be made practical have come to be known as knowledge utilisation. They typically involve disciplined judgement and appraisal augmented occasionally by empirical research methods such as meta-analysis. The processes of KU range from the selection, retrieval, appraisal, codification and synthesis of relevant knowledge to formulating generalisations, stipulating practice guidelines and making them operational say (Thomas 1980a; Thomas 1980; 1984; Mullen 1987; as cited Rothmans & Thomas, 1994). This reflects the previously described Knowledge-Driven Model of KU as identified by Weiss 1979 (as cited in Rothman & Thomas, 1994, p. 18).

Rothman & Thomas (1994) then say that each of the aspects of the KU process involves critical analytical work which may not be immediately evident. For example, in selecting and appraising knowledge from behavioural and social science, a number of selected criteria have been proposed, such as the content of relevance of the findings, the power of

the knowledge, and the identifiably, accessibility, and manipulability of the knowledge referents (Thomas 1964, as cited in Rothman & Thomas, 1994). Others who have given attention to knowledge appraisal and selection criteria include: Bloom (1975); Gouldner (1957); Fischer (1978); Hanrahan and Reid (1984); Tripodi, Fellin and Meyer (1969); and Zetterberg (1965; as cited in Rothman & Thomas, 1994). Although not as well developed as the conventional research methods of KD, much more attention has been devoted to KU than to D&D, to illustrate Glaser, Abelson and Garrison in 1983; Havelock in 1973; Rogers and Shoemaker in 1971; and Rothman in 1991; as cited in Rothman & Thomas, 1994, p. 19).

The processes of KU may lead directly into and be an integral part of the information gathering and design phases of D&D, or they may involve the transformation of knowledge for other uses and users as shown in the facets of intervention research. Said another way, the Knowledge Utilisation model described is always an inherent activity in intervention research, as is the use of other sources of information such as allied technology or professional practices in developing new human service interventions.

Although not proposed as a new paradigm, intervention research is an integrative perspective that provides a view of research that has important implications for the conduct of research and practice, as well as for their relationship. First, the intervention research perspective offers one provisional answer to the oft-repeated question of type or types of inquiry and research relevant to human service. From this perspective of intervention research, the answer is KD, KU and D&D (Rothman & Thomas, 1994, p. 19).

Rothman & Thomas (1994) concludes by commenting that the purpose of analysis is being to offer a perspective on a research relating to human service intervention that integrates several important contemporary research modalities. This endeavour has encompassed two different types of integration, different facets of intervention research and different approaches to D&D. In the first instance, research modes have been identified as Intervention Knowledge Development, Knowledge Utilisation, and Intervention Design and Development, each of which is viewed as a facet of intervention research. Each type of research has a separate and established methodology, the integrity and distinctness of which should not be affected by viewing it as part of intervention research. However, by grouping these types together in this way, their relevance to

interests involving intervention in human service is emphasised, along with relationships between and among the facets that might otherwise not be evident.

The same applies to approaches to D&D (particularly developmental research and social R&D) that have been brought together in the Intervention Design and Development facet of intervention research work. Nonspecialists have often viewed these to be separate and different, but we have tried to demonstrate that they, indeed, can be fitted comfortably under one conceptual roof. It is anticipated that the integration achieved by assembling these otherwise divergent or only loosely coupled approaches to research will stimulate further advances along these lines. It is also anticipated that this effort will make available to human service researchers and practitioners a more coherent, authentic, and useful frame of reference for conducting productive research to enhance working tools in the human services (p. 21).

iv. Systems of Innovation

Edquist (1997) says it is almost universally accepted that technological change and other kinds of innovations are the most important sources of productivity growth and increased material welfare, and that this has been so for centuries. They are also a major cause of the destruction of old jobs as well as the creation of new employment. Systems of innovations is a new approach for the study of innovations in the economy that has emerged, thus innovations are new creations of economic significance. They may be brand new but are more often new combinations of existing elements. Innovations may be of various kinds such as technological and organisational. The processes through which technological innovations emerge are extremely complex; they have to do with the emergence and diffusion of knowledge elements, with scientific and technological possibilities, as well as the *translation* of these into new products and production processes. This translation by no means follows a 'linear' path from basic research and further to the development and implementation of new processes and new products. Instead, it is characterised by complicated feedback mechanisms and interactive relations involving science, technology, learning, production, policy and demand. Innovation processes occur over time and are influenced by many factors. Because of this complexity, firms and organisations almost never innovate in isolation. In the pursuit of innovation

they interact with other organisation to gain, develop and exchange various kinds of knowledge, information and other resources (p. 1).

Edquist (1997) then says the systems of innovation of various countries can be quite different. The same is true for regional (or local) systems of innovation and for sectoral ones (technological systems). Various national systems of innovation differ in their structure of production or the pattern of specialisation in production. In some countries raw material based on production is important, in others knowledge-intensive production is more dominant. For these and other reasons systems differ in the amount of resources spent on R&D and innovation. The systems also differ in their performance in terms of technology development and diffusion (p. 19).

Edquist (1997) also says that the *system of innovation* approach is associated with various kinds of ambiguities. He says some conceptual problems have to do with the fact that different definitions of the *systems of innovation* concept are used by different authors with other problems related to the vagueness of some concepts upon which the approach is based (p. 27).

Technological innovations are regarded by many as the introduction into the economy of new knowledge or new combinations of existing knowledge. This means that innovations are looked upon mainly as the result of interactive learning processes. Through interactions in the economy different pieces of knowledge become combined in new ways or new knowledge is created and, sometimes, this results in new processes or products. Such interaction does not only take place in connection with R&D but also in relation to normal and everyday economic activities such as procurement, production and marketing. The interaction occurs within firms (between different individuals or departments) between firms and consumers, between different firms, or between firms and other organisations like public agencies (Edquist, 1997, p. 42).

Rothman & Thomas (1994) say that several challenges must be addressed by intervention researchers when developing the concept; (or the conceptual intervention) to be introduced at a later time. First, intervention design and development takes a long time, with a given project usually exceeding the expected lengths of commitment for a graduate student's thesis or dissertation. Accordingly, it is often necessary (and

appropriate) to arrange shorter-term rewards for graduate student collaborators, such as publications of pilot research or descriptive reports about the project and interim findings. Second, the work of the intervention research is complex, demanding a variety of research and interpersonal skills, ranging from collecting and analysing data to puzzling through how to embed an intervention in a politically sensitive context. Third, the methodological challenges of conducting research in real-world contexts and the presumption that applied work cannot be scientific make the professional rewards uncertain (Fawcett, 1991, as cited in Rothman & Thomas, 1994, p. 23).

v. Intervention Design and Development

Rothman & Thomas (1994) assert that in recent years Design and Development (D&D) has emerged as an explicit paradigm, largely out of frustrations with the inability of conventional research methods to guide the generation of human service interventions. The D&D approaches (for example Social Research and Developmental Research [R&D], developmental research, model development research) have evolved up to this point largely through independent and concurrent efforts that have been based upon different D&D enterprises and have taken somewhat different form. However, considering the shared objectives of D&D approaches and their methodological similarities within the broader context of intervention research, these seeming differences between D&D formulations can be viewed instead largely as parallel means to achieve common D&D goals.

D&D may be conceptualised as a problem-solving process for seeking effective intervention helping tools to deal with given human and social difficulties. But unlike many other types of problem solving D&D is a process that is systematic, deliberate, and immersed in research procedures, techniques, and other instrumentalities. In its aim to produce workable human service technology, rather than generalisable knowledge *per se* (although it may achieve the latter), the methods of D&D are more akin to the field of engineering than to the traditional behavioural sciences. At the same time, it borrows from and exploits these sister fields. Instead of emphasising the interrelationship of variables, as in conventional research, the primary focus throughout D&D is on the interventive technology to be evolved. To illustrate: an assessment instrument or

intervention technique for addressing given individual problems; a service system or policy to deal with problems of a large cohort of individuals; or a legislative programme to remedy a structural defect in a social system.

In this connection, a key difference is that D&D takes as its original point of departure a given real-world problem and practical goal, rather than a hypothesis to be tested or a theory to be explored. Thus, at the very inception, the fundamental perspectives of D&D and the basic social sciences diverge. The identification of the problem to be addressed does not necessarily fall into the D&D research team. The focal point may be identified by agency staff, clients, agency administrators, grassroots citizens, or combinations of these groupings; (Rothmans, 1989, as cited in Rothman & Thomas, 1994) presents a case study involving agency staff problem identification (p. 9).

Abell and Wolf (2003) say that rigorous experimental research examining the effectiveness of practice interventions rarely appears and among the reasons often cited are the difficulties of conducting such research. Then they comment early optimistic conceptualisations of the scientist-practitioner notwithstanding, more realistic contemporary opinions and policy statements (cf. National Association of Deans and Directors, 1997) argue for the active promotion of practice researchers. Translating the goals of outcome-related research into successful educational models is easier said than done (pp. 3-4).

These shortcomings can reduce the willingness of agency staff to participate in evaluation efforts, and contributed to Polansky's caution that if one is not absolutely convinced from clinical experience that a treatment works, there is seldom any point in subjecting it to large-scale testing (Nugent, 1996, as cited in Abel & Wolfe, 2003, p. 4)

Abbell and Hudson (2000) say that maintaining the strengths of rigorous, experimental research designs, and the preference they often receive in competition for external funding, contribute to the emphasis placed upon them in education and training recommendations. Numerous challenges confront those interested in examining practice effectiveness. Among them are the limitations on conclusiveness and generalisability inherent in single system designs, and the expense and complexity of group designs. These include problems ranging from informed consent, random assignment, and loss of

subjects to data analytical strategies that can severely limit the acceptability of results to specific clients (as cited in Abbell & Wolfe, 2000, p. 4).

Table 34(b) Rothman & Thomas (1994) Adapting design and development phases:

Design/Development	Curriculum Components	Research Agenda
<ul style="list-style-type: none"> ● Problem analysis ● Problem planning 	Philosophy of Science in (Social Work) Theories and Models of (Social Work) Theory, Design and Problem Formulation	Validation or Development Preliminary application of theory to practice Beginning methodological considerations
Information Gathering Information Synthesis	<ul style="list-style-type: none"> ● Statistics ● Research issues in direct practice ● Specialisation area 	<ul style="list-style-type: none"> ● Systematic research synthesis
Intervention Design	Second statistics Assessment/measurement Advanced research Research practicum	<ul style="list-style-type: none"> ● draft prospectus ● refining proposed evaluate/methods
<ul style="list-style-type: none"> ● Early develop ● piloting 	<ul style="list-style-type: none"> ● effective method ● research practicum ● prospectus 	Completing pilot study Defending proposal for outcome evaluation
Evaluation and advanced development	<ul style="list-style-type: none"> ● dissertation 	<ul style="list-style-type: none"> ● Randomised experimental trial
<ul style="list-style-type: none"> ● Dissemination 	<ul style="list-style-type: none"> ● Publication ● Presentation 	Articles on validation, pilot, formal evaluation

Seekins and Fawcett (1987), stated, This is a process in which local residents determine the goals and agenda is a D&D. The process may also be driven by knowledge breakthroughs in the scientific realm, but, as studies at industrial R&D show, it is more frequently stimulated by expression of consumer need and demand (as cited in Rothman & Thomas, 1994, p. 12).

Thus social work research methodology will be used as a template amicable with Western practice and then adapted to harmonise with tangata whenua and tikanga Maaori. While at the same time the Tuupuna Methodology and Kaupapa Maaori methodology detailed in the first chapter of this thesis will be woven to provide practical assistance to address the current rampant health problem of Type II diabetes afflicting our people. It is also anticipated that other nations who have traditionally consumed eel as a staple food detailed in Chapter eight of this thesis will not eliminate eel from their diet

but continue to regularly consume it to prevent the onset of Type II diabetes mellitus. Equally that globally people will understand and recognise the health benefits of diet consumption of the fatty acid omega-3 to prevent many of the chronic non-communicable diseases such as heart disease, respiratory diseases and mental illnesses.

The Design and Development process

Rothman & Thomas (1994) say that one important aim of intervention is to create means for improving community life, health and well-being. A form of applied research, it examines relationships between conditions identified by clients as important-such as drug abuse or discrimination and personal or environmental factors that contribute to such conditions. Intervention researchers attempt as much as possible to fuse the dual purposes of applied science in the same endeavour: promoting understanding of individual and community conditions and contributing to their improvement.

There are five related traditions that are particularly useful in conducting intervention research: experimental social innovation, social research and development, developmental research, model development research, and behavioural community research. The paradigm of experimental social innovation of Fairweather 1976; Fairweather and Tornatsky 1977, (as cited in Rothman & Thomas, 1994), and uses experimental designs to evaluate the effects of treatment programmes and other innovations designed to address social problems. Social research and development (Rothman, 1980, as cited in Rothman & Thomas, 1994) applies an Engineering Model from the physical sciences to characterise the process of developing intervention programmes relevant to human services (p. 25).

Developmental research (Thomas, 1984, as cited in Rothman & Thomas, 1994) incorporates applied research methods, empirically orientated practice, and other action research strategies to design interventions for the helping professions. Model development research examines how human services proceed from innovation to standard practice from Paine, Bellamy; and Wilcox 1984; as cited in Rothman & Thomas, 1994).

Finally, behavioural community research uses concepts and methods of behaviour analysis and community psychology to design and implement interventions relevant to community change say: Fawcett 1990, 1991; Fawcett, Mathews, and Fletcher 1980;

Fawcett et al. 1984; Fixsen, Phillips, and Wolf 1978; (as cited in Rothman & Thomas, 1994, p. 30).

vi. Phases and Operations of Intervention Research

Table 35. Rothman and Thomas (1994).

1. Problem analysis Project planning	2. Information gathering Synthesis	3. Design	4. Early development Pilot testing	5. Evaluation Advanced development	6. Dissemination
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1. Problem analysis Project planning

Rothman & Thomas (1994) say problem analysis and project planning: identifying and involving clients, gaining entry and co-operation from settings, identifying concerns of the population, analysing identified problems, and setting goals and objectives. Each operation involves collaboration between researchers and clients, helping gain the co-operation and support necessary for conducting intervention research.

Identifying and Involving Clients

Intervention researchers choose a constituency or population with whom to collaborate, such as people who are at risk for heart disease or Type II diabetes mellitus in tangata whenua (which will be the population for this intervention research). We select a population whose issues and problems are of current or emerging interest to clients themselves, researchers and society. In collaboration with the project's clients, researchers identify the specific targets and goals of the intervention. Research that addresses the critical strengths and problems of important constituencies has a greater chance of receiving support from the target population, professional community and general public.

Analysing Identified Problems

A critical aspect of this phase is analysing those conditions that people label as community problems. Some key questions help guide the process of problem analysis. What is the nature of the discrepancy between *ideal* and *actual* conditions that defines the problem? For example, if the problem is adolescent pregnancy, what is the actual incidence and prevalence and how does this compare with the normal or ideal incidence

for this community? Whose behaviour (or lack of behaviour *caused* the conditions that people label the as the problem? Whose behaviour (or lack of behaviour) “maintains” the problem? This analysis helps to frame societal problems in terms of the behaviour of key actors and the resulting outcomes or conditions that people label as problems. The following questions explore the consequences that help explain why the problem exists and why interventions have not succeeded or been attempted.

- For whom is the situation a problem?
- What are the negative consequences of the problem for affected individuals?
- What are the negative consequences of the problem for the community?
- Who (if anyone) benefits from conditions as they are now?
- How do they benefit?

Who should share the responsibility for “solving” the problem? What behaviours (of whom) need to change to establish or support needed change. What conditions need to change to establish or support needed change? What is an acceptable level of change? This analysis shines the lantern beyond those typically blamed for the problem to others in the immediate or broader environment.

At what level should the problem be addressed? Does the problem reside in the behaviour of key individuals, in the immediate physical or social environment, with broader structural conditions such as chronic unemployment, or with governmental or business policies? Is this a multi-level problem requiring action at a variety of levels of change? Is it feasible (technically, financially, politically) to make changes at each identified level? Answers to these and other related questions help guide the choice of intervention research goals.

Setting Goals and Objectives

A final operation in this phase is setting goals and objectives. Goals refer to the broader conditions or outcomes that are desired by the community of interest. A substance abuse initiative, for instance, might cite the following as one of its goals to be within two years reducing the incidence of alcohol use among teen-age youths in the country by twenty per cent. Broad goals specify the outcomes, such as risk reduction or goal attainment that are the end points of intervention efforts. Objectives refer to those more specific changes in programmes, policies, or practices that are believed to contribute to the broader goal.

Thus in this phase, a careful problem analysis yields potential targets for change and possible elements of the intervention. Stating broad goals and more specific objectives clarifies the proposed ends and means of the intervention research project. These refined purposes help to structure the next phase of knowledge to gathering and synthesis (pp. 25-31).

2. Information Gathering and Synthesis

Rothman & Thomas (1994) say this phase might be subtitled *Not Reinventing the Wheel*. When planning an intervention research project, it is essential to discover what others have done to understand and address the problem. Knowledge acquisition involves identifying and selecting relevant types of knowledge and using and integrating appropriate sources of information. Particularly useful sources are existing forms of archival information and natural examples of successful practices of individuals or organisations. The outcome of this phase is a list of apparently functional elements that can be incorporated into the design of the intervention. There are several key aspects of this phase: using existing information sources, studying natural examples, and identifying functional elements of successful models (p. 31).

Rothman & Thomas (1994) then say that a literature review usually consists of an examination of selected empirical research, reported practice and identified innovations relevant to the social or health concern. However intervention researchers must look beyond the literature of their particular fields. This is essential since societal problems do not confine themselves neatly to the disciplines of psychology, social work, architecture, education, public health, or other bodies of knowledge or practice. Thus, intervention research must contribute to both the *scholarship of discovery* or the generation of new knowledge about behaviour-environment relations-and the *scholarship of integration* thus establishing new linkages between concepts and methods of various disciplines (Boyer, 1991, as cited in Rothman & Thomas, 1994, p. 32).

Studying natural examples

A particular useful source of information is observing how community members faced with the problem, or a similar problem, have attempted to address it (Wolf and Ramp

1991, as cited Rothman & Thomas, 1994). Interviews with people who have actually experienced the problem, such as clients, or those with knowledge about it, such as service providers, can provide insights into which interventions might or might not succeed, and the variables that may affect success. Studying unsuccessful programs and practices may be particularly valuable, since non-examples help us to understand methods and contextual features that may be critical to success (p. 33).

Identifying functional elements of successful Models

Rothman & Thomas (1994) specify that once information is gathered researchers analyse the critical features of the programs and practices that have previously addressed the problem of interest. Some questions to ask are:

- Is there a model program, policy or practice that has been successful in changing targeted behaviours or outcomes?
- What made a particular program, policy, or practice effective?
- Is there a model program, policy, or practice that was unsuccessful?
- What caused it to fail?
- Which events appeared to be critical to success (or failure)?
- What conditions (such as organisational features, client characteristics, broader environmental factors) may have been critical to success (or failure)?
- What specific procedures were used in the program, policy or practice?
- Was information provided to clients or change agents about how and under what conditions to act?
- What modelling, role-playing, practice, feedback, or any other training procedures used?
- What positive consequences, such as rewards or incentives, and negative consequences, such as penalties or disincentives, helped establish and maintain desired changes?
- What environmental barriers, policies, or regulations were removed to make it easier for the changes to occur?

Thus by studying successful or unsuccessful models of programs that have attempted to address the problem, researchers identify potentially useful elements of an intervention. This synthesis of existing knowledge helps to guide design and development activities.

3. Design:

Two types of products result from intervention research:

- First the research data that may demonstrate relationships between the intervention and the behaviours or outcomes that define the problem of interest.
- Second the intervention –which may include a strategy, technique or program: informal or training materials; environmental design variables; a motivational system; a new or modified policy; or other procedures.

There are two particularly important operations during this phase: designing an observational system and specifying procedural elements of this intervention (p. 33).

Designing an Observational System

Rothman & Thomas (1994) then say that researchers must design a way of observing events related to the phenomenon naturalistically, a method system for discovering the extent of the problem and detecting effects following the intervention. This is critical to pilot testing. The observational system is closely linked to the process of designing an intervention; it serves as a feedback system for refining early prototypes. Clients, especially those most affected by the issue, should be involved in specifying the behaviours and environmental conditions that need to be changed (and observed).

Once the focus of change is identified, it is necessary to define these behavioural events in ways that can be observed (Baer, Wolf and Risley 1968; Bijou, Peterson and Ault 1968; as cited in Rothmans & Thomas, 1994). The observational system consists of three working parts. First, definitions of the behaviours or products associated with the problem are defined in operational terms. For example, in a substance abuse prevention initiative, the key behaviours that compose peer refusal skills might be specified and defined. Second, examples and non-examples of the behaviours or products are provided to help discriminate occurrences of the behaviour or product. Third, scoring instructions are prepared to guide recording of desired behaviours or products. Relevant behaviours and outcomes may be measured using direct observation by independent observers or

self-monitoring or self-reporting for events that may be difficult to observe directly (Barlow, Hayes and Nelson 1989, as cited in Rothmans & Thomas, 1994).

This strategy-also known as functional analysis-helps to establish relationships between environmental changes and behaviours related to the problem. But (Skinner 1969, as cited in Rothmans & Thomas, 1994) emphasised the importance of observing environmental conditions present before the behaviour to be changed occurs (antecedent conditions), the response to these antecedent conditions (behaviour), and what changes in the environment occur following the behaviour (consequences or outcomes). Intervention research using such measurements can help to establish general statements about behaviour-environment relationships and the conditions under which they are applicable. For instance, in an intervention research study designed to promote courteous treatment of clients by receptionists of human service agencies, researchers measured whether receptionists' greetings and other statements showing courtesy (the behaviour) occurred when clients entered the agency (antecedent conditions) (Johnson and Fawcett 1988, as cited in Rothmans & Thomas, 1994). Results suggested that courteous treatment (the behaviour) could be increased by a combination of training, feedback and incentives (the intervention) and that these effects may generalise to increased client satisfaction with the agency after training (consequences of outcome).

The type of measurement system chosen depends on many factors, including how many individuals and behaviours must be observed, the length of the observation sessions, the size of the intervals within the session, and the availability of trained observers (Cooper, Heron and Heward 1987, as cited in Rothmans & Thomas, 1994). The reliability and validity of the observations are affected by observer training and experience and by the complexity and obtrusiveness of the measurement system. Preliminary results from the observation system help to guide the selection of procedures and their refinement (pp. 33-36).

Specifying procedural elements of the Intervention

Rothman & Thomas (1994) note that by observing the problem and studying naturally occurring innovations and other prototypes, researchers can identify procedural elements for use in the intervention. These procedural elements are:

- the use of information

- skills and training for their acquisition
- environmental change strategies
- policy change or enforcement strategies

Thus reinforcement or punishment procedures-should be specified in enough detail so that they can be replicated by other *typically trained* change agents Fawcett, Fletcher and Mathews 1980, (as cited in Rothmans & Thomas, 1994, p. 35).

Framing Objective

Rothman & Thomas (1994) comment that closely linked with conceptualisation of the problem requiring attention is framing the design objective. It is useful to distinguish between design objectives and intervention objectives. An intervention objective is a statement of a desired change in a social problem or in some condition related to a social problem. A design objective refers to a task to be achieved in the design work. In Thomas's (1984, as cited in Rothman & Thomas, 1994) concept of developmental research, determination of the design objective is the first step in the design phase. In the social R&D formulation, specification of the objective precedes design, providing focus to the information retrieval and design work.

In its broadest sense, the objective of intervention research is development of a social technology to ameliorate a social problem. Social technology is broadly viewed to include all those artefacts used by service professionals or change agents to achieve their intervention objectives. Egea 1975 (as cited in Rothmans & Thomas, 1994) contrasts embodied technology (a product-a machine, a software programme) and disembodied technology (a concept or process). In engineering as in industry the focus most often may be tangible technology, while in social intervention the technology often may be of an abstract form. But says Haeffner 1973 (as cited in Rothman & Thomas, 1994) similarly contrasts innovations which are products from those which are ideas. For Haeffner, products are innovations which have been demonstrated in practice, whereas product ideas are innovations only tested in the laboratory. In social work, Thomas 1978 (as cited in Rothman & Thomas, 1994) has proposed a classification which identifies a broad range of technologies spanning micro and macro levels of intervention. He identifies categories of technology including physical frameworks, electromechanical devices,

information systems, assessment methods, intervention methods, service programmes, organisational structures, service systems, and social welfare policy. It may be useful to examine how design methods might differ across levels of innovation or technological abstractness and to explore the extent to which the principles of design which have been developed for tangible technologies fit abstract technologies. These distinctions can guide consideration of design methods (p. 167).

Objectives Examples

Rothman and Thomas (1994) suggest using the prior social problem examples, design objectives could be as follows:

- to develop an efficient and effective clinical intervention procedure for use with individuals experiencing depression
- to develop a computer programme capable of assessing the probability of a child's risk of harm from a caretaker.

These examples illustrate different technology types. The first sets an objective the development of an abstract technology, an interpersonal strategy which could be used to affect the problem of depression experienced by individuals. The second example sets as an objective the development of a software programme, which is a tangible technology. The computer programme would be used to deal with the problem of insufficient numbers of available experts to assess a child's risk of harm from abuse and neglect. This is an interesting example since the expert knowledge is abstract, whereas the software programme which encodes the knowledge is material (p. 168).

Design Domain

Rothman & Thomas (1994) imply that even more specific objectives must be formed to focus design activities. Thomas (1984) proposes specifying a domain of design in which some intervention elements are assumed to be fixed and, therefore, do not need to be designed, whereas other elements are singled out for attention. When this can be done it simplifies the design task. Mullen (1978, as cited in Rothman & Thomas, 1994) suggests a system of formulation of social work practice with intervention conceptualised as a set of interacting elements. Accordingly, an intervention system would include the social

worker, the client, the agency, as well as the particular techniques used. Such conceptions of intervention and its components can be used in design work to frame the areas for design activity. For example, fixed elements might be agency context variables, whereas elements needing to be designed might be particular techniques to be used by a clinician. In community intervention, aspects of the economic system may be fixed and not subject to modification, but relevant statutes can be changed through advocacy with the state legislature (p. 169).

Rothman (1980, as cited in Rothman & Thomas, 1994) suggests additional factors to guide design including structural, administrative, interpersonal, and ethical factors. Another useful classification has been proposed by Thomas (1984, as cited in Rothman & Thomas, 1994). He identifies a detailed set of helping strategy components which could be selected as design elements such as assessment methods, monitoring methods, termination procedures and implementation methods. To illustrate the idea of a design domain with the example pertaining to clinical intervention for depressed individuals, the decision might be to design only two components, intervenor relationship qualities such as skilled use of empathic communication and intervention techniques such as cognitive procedures. The fixed parameters could be elements in the environment, for example the client's job, agency characteristics such as fee scale and client qualities such as the ethnicity of clients (p. 89).

Design Requirements

Rothman & Thomas (1994) claim having specified the design domain, design requirements, the conditions the intervention is to satisfy, should be determined. To illustrate using a computer programme as an example, it could be decided that the computer program be developed must be capable of: use by relatively untrained protective service investigators; assessing risk of harm indicators, which are typical of those factors used by protective service experts; making clear how the conclusions reached by the system had been derived from information provided; and determining how much confidence the user could reasonably have in the conclusions reached. Such requirements focus the design work (p. 170).

Design Problems

Rothmans and Thomas (1994) state to further the design activities, Thomas (1984, as cited in Rothman & Thomas, 1994) proposes the specification of design problems, that is, identification of unresolved issues regarding the elements of the intervention under development. Continuing with the computer programme example, design problems might include:

- What systematic coding system will be used for representing the knowledge to be included in the computer programme?
- What method of knowledge acquisition should be used-should the programme learn by being fed new knowledge propositions or should the programme be capable of generating and modifying knowledge propositions in interaction with an expert?
- Or, should the programme be capable of discovering new concepts and relationships?
- Should the system be capable of reasoning from antecedents to consequences as well as reasoning from a goal or conclusion?

These design problems provide further focus. Thus the statement of design objectives, design requirements, and design problems provides a foundation for subsequent steps in the intervention research process (p. 170).

Rothmans & Thomas (1994) then say having settled on a problem and objective, additional analysis and information retrieval proceeds with a decision about the type of information to be retrieved. First, will the information retrieved be limited to empirical research findings or will the search include retrieval of theoretical work or experiential data? Second, will the information search be limited to the literature or will it extend to retrieval of information from additional sources, such as experts in the problem area? Frequently retrieval is limited to information available in the literature, but other sources such as experts should be considered.

In the example of clinical intervention with depressed individuals, the type might be a retrieval programme including information derived from both empirical research as well as theoretical formulation. Because both sources of information can be useful, Mullen

(1988, as cited in Rothman & Thomas, 1994) has described systematic procedures for this type retrieval. In the case of computer system development, the source could be experts who assess a child's risk of harm for abuse and neglect. Experts could be interviewed and their knowledge codified and used in the design of the computer programme. Alternatively, case examples involving a risk or abuse or neglect assessment could be collected and the programme designed to infer knowledge rules from the examples (p. 171).

Thomas (1978, 1984); Rothman (1980); and Havelock (1960; as cited in Rothman & Thomas, 1994) do propose the use of various sources of information in the analysis and retrieval stage. Rothman's (1980, as cited in Rothman & Thomas, 1994) work in the Community Intervention Project was focused on social science empirical knowledge, and the literature served as the primary data source. Typically, social R&D efforts do focus on empirical research data. Rothman (1989, as cited in Rothman & Thomas, 1994) also reports on the use of a survey of community knowledge to enable it to supplement existing empirical knowledge (p. 171).

Patti (1981) stated, "Design should draw from whatever sources of information appear relevant to the goal or problem at hand" (as cited in Rothmans & Thomas, 1994, p. 172).

Thomas (1978, 1984) stated, "A variety of possible sources including basic and applied research, scientific technology, allied technology, legal policy, social innovation, indigenous research, and practice experience" (as cited in Rothmans & Thomas, 1994, p. 172)

Conversion and Intervention Design

Rothmans & Thomas (1994) discuss that from a developmental perspective, we are deep into design at this point of the social intervention process. However, from the social research and development perspective, having acquired the necessary information, retrieval ends and design begins.

Rothman (1980) stated, "Having acquired information from the knowledge base, it is now necessary to manipulate that information in some meaningful fashion, to convert it into a form that will yield workable design concepts" (as cited in Rothman & Thomas, 1994, p. 83).

Rothman (1980, as cited in Rothman & Thomas, 1994) sees these concepts as being formulated through a two-step process of conversion and design. However if the research base is already interventive or action-orientated in form, a conversion phase may not be

necessary. Thus the information accessed in the retrieval stage is converted into basic action constructs, and through design processes these basic action constructs are used to formulate more specific situational intervention concepts. These resulting concepts form the conceptual plan for development. The task of design, then, is creation of a conceptual formulation or plan that specifies the general form of an intervention which satisfies the goal requirements. In the conversion step, descriptive generalisations developed during the retrieval stage are used to form prescriptive assertions about how to intervene.

While conversion and design are information-based, these processes require creativity and imagination since intervention plans can not simply be inferred from a body of information. Furthermore, information gleaned from the retrieval stage will not include important contextual information required for the design of a situation-specific intervention. Therefore because of the difficulties of logically moving from information gathered during the retrieval stage to conversion and design concepts (pp. 40-41).

Patti (1980) stated, In the final analysis the task of conversion is an attenuated, idiosyncratic one largely dependent on the blend of personalities, perspectives, and biases of those involved, the time available, and a host of other factors peculiar to each R&D undertaking. Stated differently, it appears unlikely that two R&D teams operating from the same set of generalisations would arrive at the same application concepts. The ability to replicate the conversion processes seems highly problematic (as cited in Rothman and Thomas, 1994, p. 41).

Rothman & Thomas (1994) stated, "Patti's observation actually underscores the fact that conversion and design include a heavy dose of creativity and imagination and thus cannot be reduced to *pure logical inference*" (p. 42).

Rothman (1980, as cited in Rothman & Thomas, 1994) also notes that design is partially art, tentative and exploratory. It has been suggested previously that design activities are not indicated if, during the initial analysis phase, it has been determined that appropriate interventions already exist for the social problem of concern, such as through a state-of-the-art review or a review of a meta-analysis. However, it is probably more often the case that even when interventions already exist, some design work is required to fit the intervention to the particular context. For example, in Mullen's (1978, 1981, 1983, 1988; as cited in Rothman & Thomas, 1994) work on personal intervention modeling, it has

been found that existing technologies need to be embedded into each practitioner's own personalised model, and this requires that each practitioner engage in design work. It is probable that these individualised designs could be grouped or clustered into common design types and, therefore, existing interventions could be adapted for a limited number of cluster situations. Thus these prototypes could be then made available without much further design work by those choosing to adapt them to their needs. The nature of design work varies depending on how deep the particular research is in the development cycle (p. 173).

Munson and Pelz (1980, as cited in Rothman & Thomas, 1994,) suggest that the need for design, as well as the design methods, differ by level of technological development. Examining innovation in organisations, they describe a matrix of stages and levels of innovation development. They include in the stages diagnosis, design (an innovative solution is developed, adapted, or adopted, and detailed action guidelines are generated), implementation, and stabilization (p. 174).

Glaser, Abelson and Garrison (1983, as cited in Rothman & Thomas, 1994) describe Munson & Pelz's levels of development as follows:

- Innovating occurs at the level of origination when no solution to a problem is known to operate elsewhere.
- Innovating occurs at the level of adaptation when a few prototype solutions exist but are not well packaged.
- Innovating occurs at the level of borrowing when many well-packaged innovations exist.

For example, at the origination level design is central, giving shape and form to the innovation, whereas borrowing level design is much less significant since the intervention is well developed (p. 176).

Rossi and Freeman's (1985, as cited in Rothman & Thomas, 1994) differentiation of programme stages results in similar conclusions since it distinguishes innovative programmes, established programmes, and those in between needing *fine-tuning*,

modification, or refinement. Conceptual activity in design and evaluation varies depending on the stage (p. 174).

4. Early Development and Pilot Testing

Rothman & Thomas (1994) say that during the early development and pilot testing phase, a primitive design is evolved to a form that it can be evaluated under field conditions. This phase includes the important operations of developing a prototype or preliminary intervention, conducting pilot testing, and applying design criteria to the preliminary intervention concept.

Developing a Prototype or Preliminary Intervention

By this stage in the design process, preliminary intervention procedures are selected and specified, to develop a prototype for use in pilot testing. Researchers may also need to establish and select a mode of delivery, such as workshops, telephone consultation, peer-mediated instruction, or other ways of communicating the intervention to intended users.

Conducting a Pilot Test

Pilot tests are designed to determine whether the intervention will work- to see if the beast will fly. Pilot tests are implemented in settings convenient for the researchers and somewhat similar to ones in which interventions will be used. When access to real settings is difficult, researchers sometimes test prototypes in analogue situations, such as initially testing a training program for low-income peer counsellors by using actors to play the role of actual clients Whang, Fletcher and Fawcett (1982, as cited in Rothman & Thomas, 1994). The observational system that was devised is instrumental here. These pilot tests help to determine the effectiveness of the intervention and identify which elements of the prototype may need to be revised (p. 36).

Applying design criteria to the preliminary Intervention Concept

The design process is informed by common guidelines and values for intervention research. There is considerable agreement about standards for appropriate community intervention in the related fields of behavioural psychology say Baer, Wolf and Risley (1968, 1987; as cited in Rothman & Thomas, 1994). Relevant questions should include:

- Is the intervention effective?

- Is it replicable by typical end-users?
- Is it simple to use?
- Is it practical?
- Is the intervention adaptable to various contexts?
- Is it compatible with local customs and values?

Finally, although such criteria do not suggest how to optimise these standards, they do help to guide the design of interventions that are subjected to pilot testing and formal evaluation (p, 178).

5. Evaluation and Advanced Development

Rothman & Thomas (1994) discuss how intervention research is distinguished from pure activism by its use of research methods to examine how and why a change programme does or does not work. Using pilot tests and field replications to test and refine the intervention sets intervention research apart from mere program evaluation. There are four major aspects of the evaluation and advanced development phase:

- selecting an experimental design
- collecting and analysing data
- replicating the intervention under field conditions
- refining the intervention

Selecting an Experimental Design

Experimental designs, whether single-subject or between-group designs (Hersen and Barlow 1984; Cook and Campbell 1979; Thomas 1984; as cited in Rothman & Thomas, 1994) help demonstrate causal relationships between the intervention and the behaviours and related conditions targeted for change. Factors affecting design choice include the goals and magnitude of change sought by clients, the types of behaviours and the desired immediacy of changes, the stability of the setting or context, and the goals of the research (p. 37).

Rothman & Thomas (1994) comment that single-subject designs, such as the interrupted time-series design Cook & Campbell (1979, as cited in Rothman & Thomas, 1994) or multiple baseline design (Baer, Wolf and Risley 1968, as cited in Rothman & Thomas,

1994) are particularly valued in intervention research. These designs control for historical artefacts that could be misinterpreted as changes due to an implemented intervention. Such designs also rule out other threats to internal validity Campbell and Stanley (1968, as cited in Rothman & Thomas, 1994). With these designs, repeated measures of the target behaviour are obtained before and after an intervention that is staggered across individuals, groups, or communities. Since demonstrations of experimental control require larger effects with single-subject designs, they are particularly appropriate to the usual goal of intervention research: producing socially but not only statistically produces significant results (p. 38).

Collecting and analysing data

Rothman & Thomas (1994) note during a pilot test and more formal evaluations of an intervention, data are collected and analysed continuously. Ongoing graphing of the behaviour and related outcomes helps to determine when initial interventions should be implemented and whether supplemental procedures are necessary.

Using one or more independent observers to collect data at the same time helps to ensure the reliability or replicability of the findings. As a general rule, levels of interobserver agreement of eighty percent or higher throughout the research suggest that the instrumentation is consistent over time. Such reliability assessments help readers to judge whether the measurements system will yield similar results if used by others (p. 38).

Replicating the Intervention under field conditions

Rothman & Thomas (1994) also comment that a primary goal of intervention research is to develop interventions that are effective in a variety of real-life contexts with those who actually experience the problem. Replication under various field conditions helps to assess the generality of the effects of the intervention.

Additional testing under actual field conditions is necessary if initial evaluations are conducted with analogue participants, under simulated situations, or implemented by other than the eventual users. By the time the intervention has reached this stage, instructions, manuals, and other tangible forms of the prototype will have been developed, tested and revised (p. 30).

Refining the Intervention

Rothman & Thomas (1994) say that errors are instructive: the results of full field testing are used to resolve problems with the measurement system and intervention. For example, a substance abuse prevention programme designed to encourage peer support among adolescents may be effective with middle-income, but not low-income, youths or vice versa. Adaptations in the language, content, and intervention methods may produce desired behaviour changes and outcomes for the full range of intended beneficiaries. Repeated tinkering with the intervention helps to ensure that it will reliably produce intended effects.

But to plan evaluation in light of the degree of interventional development and to select evaluation methods is necessary (for example non-experimental and or experimental) procedures and techniques.

They also say to conduct pilot evaluation and revise the intervention as necessary. The following components need to be addressed to ensure adequate knowledge depth:

- problem analysis and project planning
- information gathering and synthesis
- design
- early development and pilot testing
- evaluation and advanced development
- dissemination.

Evaluation is intervention research is empirical inquiry directed toward determining the effects of the intervention, including its effectiveness. Although there is typically some evaluation of aspects of the intervention at most points of the D&D process, major emphasis is placed on systematic outcome evaluation in the phase of evaluation and advanced management. As an integral part of the innovation process, evaluation should provide the necessary results to determine whether the innovation should be retained and utilised more or less as it was designed or should be redesigned and developed further.

Rigorous and systematic evaluation would generally be premature in early development, but becomes critical in later stages when the intervention is sufficiently well formed to justify the time and expense required to conduct appropriate evaluation. Although evaluation can be carried out with a developed intervention without undertaking

additional development, it is rarely the case in human service that interventions are sufficiently well developed so that additional improvements cannot be made. Repeated application of an already developed intervention generally provides many occasions to detect limitations that were or could not be addressed earlier, and to achieve more skilful and refined application. While it is possible at any point to prohibit further development and focus exclusively on evaluation, the gains of allowing selective development and focus exclusively on evaluation, the gains of allowing selective development to occur concurrently with evaluation generally outweigh possible limitations (p. 265).

Rothman & Thomas (1994) note that advanced development presupposes that initial design and pilot testing have been carried out with the intervention and that what has been learned in the earlier trial use is sufficiently positive to justify more systematic appraisal of intervention outcomes. Trial use provides occasions for development testing in which an innovation is systematically tested, revised, or designed says Thomas (1984, as cited in Rothman & Thomas, 1994). Advanced development thus involves further developmental testing of the intervention. Such testing provides for the replicated use of interventions that do not need to be revised when they are utilised in essentially the same way as they designed to be used. As the process of development progresses the practitioner-researcher moves from innovation to innovation and from case to case until most or all interventions in the domain of design and development have been implemented successfully and without needing major alterations or redesign. If performed appropriately, the additional developmental testing of the intervention should extend the depth of development and thus enhance its development validity (p. 268).

Good and Merkel (1993) say that learning from a Maaori perspective include the art, practice or profession of teaching and the systematised learning or instruction concerning principles and methods of teaching and guidance.

- Waiata song or poetry
- whaktauaakii proverbs
- koorero tawhito oral histories
- whaikoorero speechmaking (p. 412).

In fact the learning is collective and usually repetitive where the participants may be from a wide range of ages and skills but become part of group learning. The older generations teach the younger generations to ensure knowledge and skills are not lost and not modified when taught. In other words what is past on is usually intact and is similar and is a combination of the following three types of Western theoretical teaching and learning methods and pedagogy.

Figure 36. The Behaviourist Theory Model or top down as illustrated:

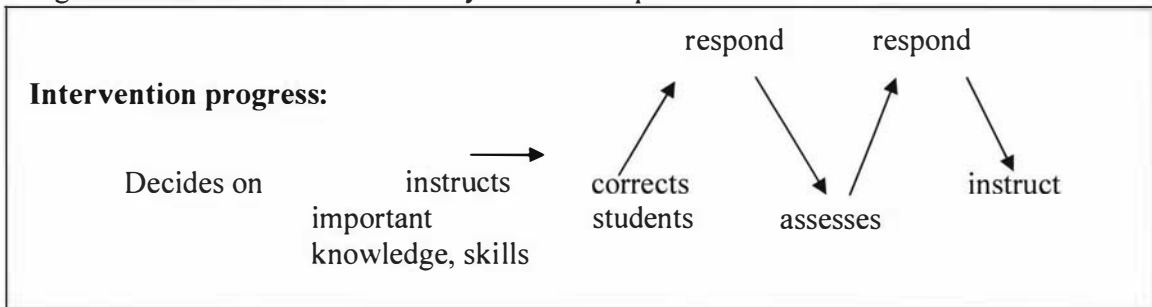


Figure 37. Constructivist Developmentalist Model Piaget 1971 and Ausubel 1990, (as cited in Cutlip et al. 1994, p. 80).

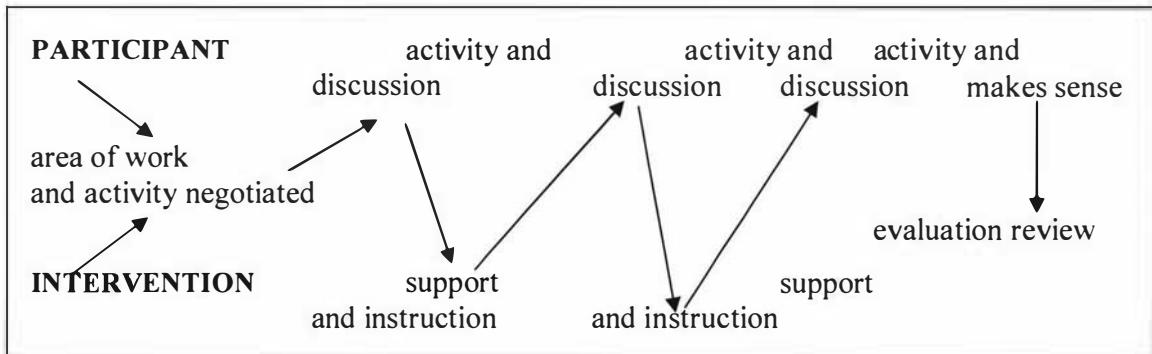
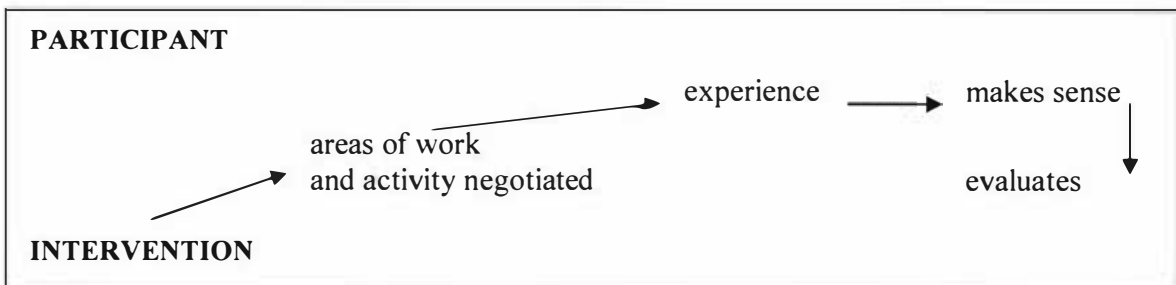


Figure 38. The Social or Co-Constructivist theory of learning and development as proposed by the theorists: Vygotsky (1930); Bruner (1986); Wood (1988); Slavin (1986); Johnson and Johnson (1987); (as cited in Cutlip et al. 1994, p. 80) with the concept also illustrated in the next visual on the following page.



6. Dissemination

Rothman & Thomas (1994) reveal that once the community interventions has been field tested and evaluated, it is ready to be disseminated or distributed to community organisations and other target audiences. Several operations help to make the process of dissemination and adaptation more successful: preparing the product for dissemination, identifying potential markets for the intervention, creating a demand for the intervention, encouraging appropriate adaptation and providing technical support for adopters. Then as the systematic appraisal of intervention outcomes develops; it is important to reflect and evaluate exactly how it succeeded. Thus examining the intervention progress and exactly how and why it was beneficial from an educational theorist perspective provides time for reflection and comment (p. 39).

Setting standards for use

By establishing guidelines for using community interventions correctly, researchers provide the basis for maintaining the integrity of the product. For example, the Concerns Report Method Fawcett (1982, as cited in Rothman & Thomas, 1994) uses an established protocol for conducting needs assessments and community forums.

Specifications about the conditions of local sponsorship under which it can be used, the procedures for involving clients and other features help to assure the integrity of the process and quality of the product.

Identifying potential markets for the Intervention

In defining a market of potential adopters for a community intervention, researchers should ask several questions.

- Which people can benefit personally from the intervention?
- Who (with the use of the intervention) could contribute most to solving the problem?
- Is the goal of dissemination broad-based adoption (a saturation of the market) or more restricted use by selected adopters?
- Which market segments or types of health or human service organisations would most likely adopt and benefit from the intervention if they were aware of it?

- Which media approach or public service announcement, direct mail, or other strategies or would be most appropriate and feasible to inform the targeted market segment? (p. 40).

Rothman & Thomas (1994) also note that it may also be helpful to identify potential *early adopters* whose use of the product may encourage others in the selected market segments to adopt the intervention. Researchers disseminating the Concerns Report Method, for example, targeted opinion leaders in the independent living movement as sponsors for early applications of this needs assessment process (Fawcett et al. 1988; Rogers and Shoemaker 1971; as cited in Rothman & Thomas, 1994) suggest that early adopters' potential influence may be associated with their relatively greater resources, sophistication, education, and willingness to try innovative practices.

Perhaps such characteristics put them in more frequent contact with their colleagues, increasing the chances that these potential adopters will see firsthand the benefits of using the innovation.

Creating a demand for the Intervention

Disseminators must convince potential purchasers that they will really benefit from the intervention. Seekins and Fawcett (1988, as cited in Rothman & Thomas, 1994) identified several strategies used in marketing of innovations, including modelling of the innovation, arranging sampling of the innovation and its benefits, and advertising.

Innovation(s) that result from intervention research can serve as powerful tools for community change. By developing methods relevant to the concerns of disadvantaged and marginal populations, scientist-practitioners can contribute to understanding of and attention to inequities that contribute to their problems in living. By involving clients as collaborators, design and development efforts build upon the experimental knowledge of those affected. When effective methods of addressing community problems are widely adopted, the effects of intervention research are multiplied. As such, intervention researchers can blend the roles of scientist and change agent as they attempt to understand and improve local communities and their organisations and initiatives (p. 41).

Encouraging appropriate Adaptation

Rothmans and Thomas (1994) describe adaptation as-sometimes known as *reinvention* Rice and Rogers (1980, as cited in Rothman & Thomas, 1994) of an innovation occurs when adopters modify the intervention to fit local conditions after its original development by others. Elements of interventions, such as the content and format of an educational programme, may be modified or deleted, and new elements may be added (Seekins and Fawcett, 1991, as cited in Rothman & Thomas, 1994).

There is, of course, a tension between permitting reinvention (adaptation) and preserving the quality of the intervention (model fidelity). Encouraging adaptation may accelerate the rate of adoption, but some changes may result in a loss of effectiveness, dependability, or other valued attributes of the innovation (Seekins & Fawcett, 1988, as cited in Rothman & Thomas, 1994). Disseminators are challenged to permit (and even encourage) necessary adaptation while collecting ongoing measures of process and outcome to determine whether the intervention continues to meet established standards (p. 42).

Providing technical support for Adopters

Intervention researchers and programme staff, as the innovation's designers and implementers, are the primary knowledge experts concerning the intervention. Adopters may require support personnel from the research or programme team to assist with troubleshooting or adapting the intervention to meet their specific needs (Ramp, 1984, as cited in Rothman & Thomas, 1994).

For example, adopters of the Concerns Report Method Fawcett (1982, as cited in Rothman & Thomas, 1994) for setting client improvement agendas received technical assistance that included help in establishing working groups, preparing surveys, conducting data analysis, and implementing community forums. Thus as private sector enterprises with a reputation for excellence have discovered technical support may be critical in implementing the product Peters and Waterman (1982, as cited in Rothman & Thomas, 1994). This is important since those innovations that reliably produce the intended consequences are more likely to maintain long-term client satisfaction (p. 43).

Rothmans & Thomas (1994) say the nature of design work varies depending on how deep the particular research is in the development cycle. Munson and Pelz (1980, as cited in

Rothman & Thomas, 1994) suggest that the need for design, as well as the design methods, differ by level; of technological development. Examining innovation in organisations, they describe a matrix of stages and levels of innovation development. They include in the stages diagnosis, design (an innovative solution is developed, adapted or adopted, and detailed action, guidelines are generated), implementation, and stabilisation.

Glaser, Abelson, and Garrison (1983, as cited in Rothman & Thomas, 1994) describe Munson & Pelz's levels of development as follows:

1. Innovating occurs at the level of origination when no solution to a problem is known to operate elsewhere.
2. Innovating occurs at the level of adaptation when a few prototype solutions exist but are not well packaged.
3. Innovating occurs at the level of borrowing when many well-packaged innovations exist.

For example, at the origination level design is central, giving shape and form to the innovation, whereas at the borrowing level design is much less significant since the intervention is well developed. Rossi and Freeman (1985, as cited in Rothman & Thomas, 1994) comment that there may be a differentiation of program stages results in similar conclusions since it distinguishes innovative programs, established programs, and those in between needing *fine-tuning*, modification, or refinement. Conceptual activity in design and evaluation varies depending on the stage (p. 178).

Disseminating Intervention Research in Academic Settings

Rothmans and Thomas (1994) claim research instruction in social work education and professional education generally has focused on increasing skills in the critical consumption of studies to inform practice and in conducting research in practice settings. While this focus assists in applying known technologies and assessing knowledge about well-studied problems, the approach does not prepare students to deal with emerging areas of practice, including the development of new intervention technologies.

(Thomas 1978, as cited in Rothman & Thomas, 1994) has proposed Intervention Research (IR) as the single most appropriate model of research for social professions, as it assists in the development of technology for addressing social problems.

However, the utilisation of IR in academic settings has not been studied, and critics claim that the paradigm contains barriers which inhibit widespread utilisation. (Rooney 1990, as cited in Rothman & Thomas, 1994) suggests a three-tiered approach for enhancing IR dissemination in academic settings such that increasingly sophisticated models and increasingly skilled model developers are produced. The methodology of intervention research has itself been formulated through a process of design and development, thus it too represents a product whose dissemination is appropriate and necessary (p. 353).

Barriers to the Dissemination of Intervention Research

Rothmans & Thomas (1994) remark as in other social professions, a gap between research and practice has plagued social work throughout history (Blythe and Briar 1985, as cited in Rothman & Thomas, 1994). Then they say IR provides one promising solution for this problem through its guidance in the design, product testing, evaluation, and dissemination of innovative solutions to practice problems (Rothmans 1989, Thomas 1989, as cited in Rothman & Thomas, 1994).

The primary product of IR is empirically based service approaches in the form of service manuals and program designs with knowledge development about practice as a by-product (Reid 1987a, as cited in Rothman & Thomas, 1994).

Hence, IR assists in the provision of practical guidance for practitioners, while focusing researchers on relevant practice problems. IR further promotes the integration of practice and research through training in the role of model developer. The promise of the IR approach for addressing the research-practice gap is largely unstudied in academic settings. Further, critics suggest that the paradigm contains inherent barriers and disincentives to utilisation. These barriers can be described as *forbidding complexity* and lack of *academic rewards*.

Forbidding Complexity

Rhino Patti suggests that the comprehensive nature of the design, development, and testing processes in IR precludes widespread adoption in practice settings facing short

policy and funding cycles. For example, agencies feel pressure to demonstrate results on innovative programmes in annual funding rounds which may short-circuit the time required to complete all the phases of IR. Rather than disseminating an aggregated approach involving all the phases, Patti recommends the development of disaggregated steps which better fit agency constraints (Patti 1981, 1989, as cited in Rothman & Thomas, 1994).

For example, the knowledge retrieval steps could be used in compact form to inform programme development and pilot studies may need to be conducted and completed within a single year for funding purposes.

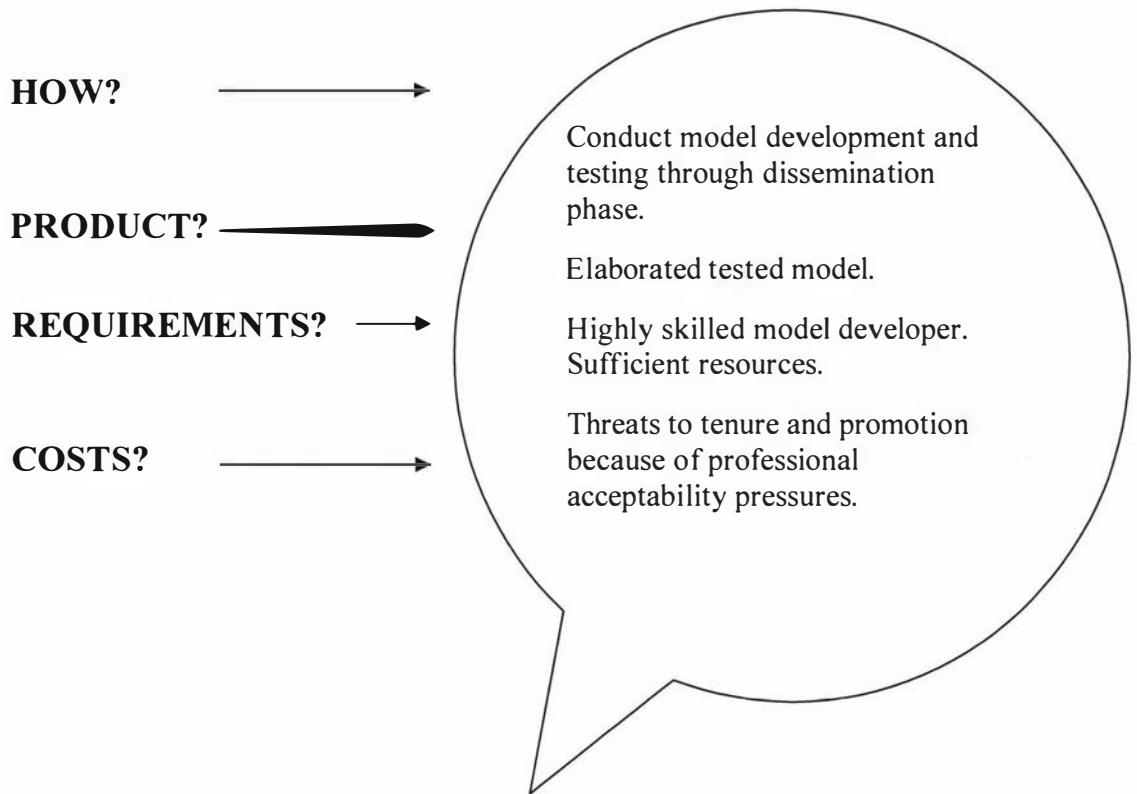
Lack of Academic rewards

Jeanne Giovannoni suggest that since knowledge development continues to be the main basis in academia for promotion and tenure, IR researchers are advised to include knowledge development products as well as practice and programme manuals in their career planning (Giovannoni 1989, as cited in Rothman & Thomas, 1994). For example research reports published in refereed journals assessing the effectiveness of models developed in addition to the development and dissemination of practice models are advised for junior faculty needing to satisfy conventional requirements for scholarship. These criticisms can be addressed in the light of knowledge developed inside and outside IR about effective dissemination and utilisation. Within IR, Thomas proposes that innovations will be successfully disseminated and utilised to the degree that they are behaviour guided, codified, simple, flexible, modular, inexpensive, and designed for usability from the outset (Thomas 1989; Paine, Bellamy and Wilcox 1984; Rogers and Shoemaker 1971; as cited in Rothman & Thomas, 1994). These criteria support research dissemination reports suggesting that those research methods which are readily encompass able and applied at a low cost are likely to be adopted (Blythe and Briar 1985; Fischer 1981; as cited in Rothman & Thomas, 1994).

Specifically, the use of rapid assessment scales, single organism designs, and the study of critical incidents have made research more accessible to students and practitioners (Levitt and Reid 1981; Edelson 1985; Davis & Reid 1988; as cited in Rothman & Thomas,

1994). IR dissemination has, however, emphasised multiple phases and advanced models which might be described as Programmes of Model Development (pp. 353-355).

Figure 39. Rothman & Thomas (1994) Model Development Programme (p. 356).



Rothmans & Thomas (1994) also provide an alternative three-tiered approach, modular in nature, but in an academic setting could also be considered.

The first tier comprises the presentation of IR modules in introductory research courses and practice courses; the second tier constitutes a doctoral course of intervention research, and the third tier represents IR dissertations. The activities involved in each tier are delineated and the potential costs and benefits of each are assessed. This three-tier approach produces increasingly sophisticated models and increasingly skilled model developers, with the concept plan of action demonstrated.

Tier-one:

- presentation of modules to research classes, concentration courses
- instruction in analysis, design phases

- learn how to develop summary generalisations and practice guidelines

Products:

- orientation to IR paradigm
- preliminary model guidelines
- preliminary model guideline developers

Advantages:

- low cost, widespread orientation

Disadvantages:

- evaluation phases not included

Tier-two:

- presentation of IR courses
- includes instruction in evaluation and dissemination

Products:

- preliminary untested models “models in waiting”
- some preliminary tested models
- preliminary model developers

Advantages:

- more elaborate models

Disadvantages:

- requires course development
- often lacks testing or only has had pilot study

Tier-three:**Products:**

- models which have undergone main field tests
- model developers

Advantages:

- prepares way to develop programmes of model development

Disadvantages:

- requires some preparation and orientation of committee members (p. 357).

First-tier use of IR as modules in Research and Practice courses

Rothmans & Thomas (1994) continue by saying IR in modular form may be introduced to a variety of potential users. Such courses frequently have a goal of enhancing informed consumption of research studies, and students in such courses are often called upon to select a problem of interest and analyse a certain number of studies, assess their adequacy, and provide implications for practice. However, students frequently reflect a problem that has not been well researched and they abandon the problem when few studies that are specifically focused on their chosen subject are found. If they do continue with the problem, their newly developed analytical skills mainly permit them to pick apart the few available studies. Too often, their learning becomes an exercise in critiquing the validity of studies, rather than focusing on the utilisation of suggestive but partially flawed studies (Hanrahan and Reid 1984, as cited by Rothman & Thomas, 1994). An unintended consequence may be continued reliance on practice wisdom because the research is *too flawed*.

While there is value in learning how to assess the reliability and validity of well-designed studies, the message that research is not useful with less well-studied problems is dysfunctional in applied fields. IR can be presented as a useful approach at an early stage of an inquiry where a problem with important consequences but lacking adequate solution has been identified. Instead of dismissing the problem or devastating the few available studies, initial steps from the IR paradigm can be presented. Following this route, students are taught to define the problem, to describe the benefits of dealing with the problem and the costs of ignoring it, and to engage in a broader scope of knowledge retrieval (Thomas 1984; Rothman 1980; as cited by Rothman & Thomas, 1994).

IR can help students consider potential information sources that are broader in scope through expanding the original conceptualization of the problem. Guidelines from IR about fruitful potential areas of inquiry, such as law, technology, ethics, and developments in parallel fields (Thomas 1984, pp. 180-181, as cited by Rothman & Thomas, 1994), can be shared.

Bounds are set around the search process to make the task feasible within the constraints of the course quarter or semester line. Students can learn about how to search the

literature with advanced bibliographic sources such as computerised social and psychological databases (p. 359).

Rothman & Thomas (1994) reflect saying that when the steps of problem definition, identification of relevant resources, and development of summary generalisations and practice guidelines were broken down with concrete examples, including those developed by other students, many proceeded successfully with the task. Production of preliminary model guidelines was typically a source of great satisfaction. They were, however, admonished not to overestimate the value of their guidelines without testing (Mullens 1978, as cited by Rothman & Thomas, 1994).

Nonetheless, it was indicated to them that the development of empirically derived practice guidelines is an improvement over practice ideas lacking any empirical backing (Reid 1977, as cited by Rothman & Thomas, 1994, p. 360).

Second- tier the development of a course in IR

In fact a doctoral course in IR evolved and developed that emphasizes evaluation and diffusion phases in addition to analysis and design. In addition, many global students have developed practice models which adapt Western technologies to non-Western settings (Haj-Yahia 1988, as cited by Rothman & Thomas, 1994). For example, a student from India developed a model for organising the homeless of India to build their own houses (Chandy 1988, as cited by Rothman & Thomas, 1994), (pp. 360-361).

Third- tier support of IR Dissertations

Rothman and Thomas (1994) claim dissertations can produce models which have undergone advanced field tests and so help train more advanced model developers (Reid 1978, 1979, as cited by Rothman & Thomas, 1994).

They say Chou completed an intervention research study to develop, implement, and assess a family intervention programme designed to assist the parents of developmentally disabled children in Taiwan. These difficulties are frequently compounded in Taiwan by shame influenced by beliefs that the disability was caused by sin of the parents or their ancestors. Consequently, North American intervention models which emphasize group interventions to provide alternative explanations for the cause of the disability. While at

the same time empowerment of the caregivers through expansion of support networks were modified by developing a family intervention approach to occur in the family's home setting based on the Family Problem Solving approach (Reid 1985, as cited by Rothman & Thomas, 1994).

The intervention included exploration of problems as perceived by family members, presentation of alternative explanations about the cause of the disability, and increasing social support resources for caregivers (Chou 1992, as cited by Rothman & Thomas, 1994, p. 362).

Summary and Discussion of the use of IR as Modules in research

Rothman & Thomas (1994) conclude the presentation of IR models taught in research and practice courses orients a large number of potential users and stimulates some to develop preliminary model guidelines. Use of IR in full course format produces preliminary untested *models in waiting* in many cases, preliminary tested models in others, and preliminary model developers. Finally, the dissertation tier produces models which have undergone a main field test as well as well-prepared model developers.

This three-tiered approach is suggested as a way of disaggregating the IR process such that potential users can assimilate chunks which are appropriate to their level of knowledge, interest, and skill. The approach also suggests indicators that could be used to assess the dissemination of IR in academic settings. At the first tier, the extent to which IR modules are utilised in research and other courses could be tracked through a national survey. At the second, the number of courses specific to IR could be monitored. The number and type of models produced through those courses could also be tracked, as well as the extent of model testing that they have undergone. Finally, at the third tier, the number of dissertations produced based in IR could be measured. Additional criteria might include tabulating the number of articles, manuals, and other products that are generated (p. 364).

Rothman & Thomas (1994) comments that these make a direct contribution to intervention research and may be utilised in existing forms, and that others need to be modified or reconceptualised for intervention research purposes. A unique character of the intervention research paradigm is the integration and configuring of these established

methodologies. To meet these research requirements, the tasks of intervention research call for special combinations of competencies. Which configuration is most appropriate depends upon the tasks to be addressed in the research and the particular facet of intervention research to which the tasks are closely related. A wide range of competencies presently appear to be relevant to carrying out the tasks of intervention research including:

- knowledge of social science theory and research
- knowledge of the specific intervention problem area of the research
- general knowledge of human service problems and practice methods
- methods of knowledge utilisation
- D&D methods
- selected special capabilities (p. 369).

Rothman & Thomas (1994) noted two types of competence are essential for all aspects of intervention research; first is familiarity with conventional social science theory and research methods applicable to the intervention research area. The second is familiarity with the specific intervention problem area of the research, as applied focus that distinguishes intervention research from the basic research conducted in the disciplines, which may have no applied relevance (p. 373).

Rothman and Thomas (1994) claim the following summary of competencies are needed to enable compilation of diverse D&D research Intervention projects:

1. Mastery of theoretical and conceptual background knowledge concerning human service problems, social science disciplines and research methodologies.
2. Ability to identify, define and conceptualise major social and behavioural problems, treatment methods and unresolved issues for intervention modalities.
3. Ability to identify relevant sources of knowledge and information for problem solution, (for example empirical research, related practice and technology, social innovation), and to retrieve, assess, order, and synthesise their contributions for application purposes.
4. Ability to design innovative intervention strategies and techniques derived from the diverse sources of knowledge and information. This requires familiarity with social

science and related data, with treatment and related technology, and a capacity to relate one to the other in new and potentially productive ways. It necessitates knowledge of the methodology of intervention design.

5. Ability to engage in developmental processes, that is, to operationalise appropriate intervention procedures, to submit them to pilot and developmental testing, to revise and proceduralise them as appropriate and to come up with innovative, field tested interventions.
6. Ability to employ multiple methodologies in development and evaluation – needs assessment; quantitative and qualitative approaches; basic research methods; single-case experimental designs; group and quasi-experimental designs; measurement instruments and practice related recording procedures; developmental practice and methods of proceduralisation; diverse techniques, such as those of human service practice (for example treatment planning), task analysis and flow charting; and selected aspects of programme evaluation now employed for assessing, modifying and developing intervention in a phased D&D sequence.
7. Ability to work co-operatively in practice settings, to gain the support of practitioners and other agency actors, and to handle the politics of field research generally and of outcome evaluation in particular.
8. Ability to communicate research results differentially both to the scientific community and to the community of professional practitioners and administrators (p. 372).

Rothman & Thomas (1994) then note that the skills required by intervention researchers in D&D are thus broad and varied. Fortunately, since projects are generally conducted on a team basis in an organisational setting, skills can be distributed among several different individuals and do not need to be concentrated in a single person. Systematic training for the different competencies is a requisite for advancing this work. However, as conceptual and methodological progress in intervention research is achieved, the need for appropriate training becomes more salient and a critical focal point for further attention (p. 373).

At this point in the thesis the Rothmans & Thomas (1994) theoretical framework has been adapted for Tainui hapuu participation within the boundaries and protocol of Tainuitanga tikanga. Therefore is totally and completely consistent with Tainuitanga as an intervention framework and is called the Tuupuna Knowledge Base Health Intervention (TKBHI). Thus the accessed inherited traditional and scientific knowledge discovered through an interface of customary and contemporary knowledge has been adapted for this nine point health intervention. Moreover it has been designed specifically for Tainui hapuu but adaptable for alternative hapuu Maaori participation because it has a robust design framework as depicted in Figure 30(a) & 30 (b) *Te Whare o Maatauranga o ngaa Tuupuna* has introduced the nine point health intervention that has been designed and developed from the Tuupuna Knowledge Base (TKB). The wharenuui concept has been used to be more inviting to a Tainuitanga and Maaoritanga audience therefore the concept is more likely to be accepted.

A community intervention needs to address and solve a particular problem usually where conventional mainstream methods have been ineffective, knowledge of a specific culture and beliefs system is absolutely essential. Thus being able to work in a trusted partnership is the only way any intervention will have the opportunity of succeeding and best to have the most influential people in the community to lead the programme where possible. Indeed for many Maaori organisations there is always the historical situation of colonisation lurking in the background, thus the collective trust issue between all the parties involved will need to be sensitively rationalised.

How are we doing, how did we do? Provision is made in the Tuupuna Knowledge Base health intervention for the whaanau to have control of the situation through the research, the participation and the evaluation and supported by a weekly hapuu gathering to share knowledge. Thus to reflect a healthy lifestyle the follow strategies will need to be incorporated because should be applied:

- to include drinking at least five to eight glasses of fresh water daily
- a daily exercise routine increasing to an hour each day
- minimising saturated fat and sugar dietary intake with an absence of smoking
- eating plenty of fresh vegetables and/or fruits
- incorporating aspects of Maaoritanga ngaa tikanga for a spiritual dimension.

***Part two* — Maaori Intervention Framework**

Tuupuna Knowledge Base Health Intervention

i. Introduction Innovative Health Intervention Strategies

Earlier in this chapter Rothmans and Thomas (1994) introduced three fundamental themes abstracted that form the platform for this health intervention plan and has been designed the intervention based on their theoretical framework as follows:

- conceptualisation of intervention research present allowing social theoreticians/researchers to distinguish intervention research
- specified new research model on design and development of interventions
- guidelines for conducting intervention research in direct practice with individuals and families, as well as community organisations.

Table 40. Intervention Framework Summary Phases and Operations of Research (p. 25).

1. Problem analysis Project planning	2. Information gathering Synthesis	3. Design	4. Early development Pilot testing	5. Evaluation Advanced development	6. Dissemination
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The TKBHI Intervention Design Development Design Framework

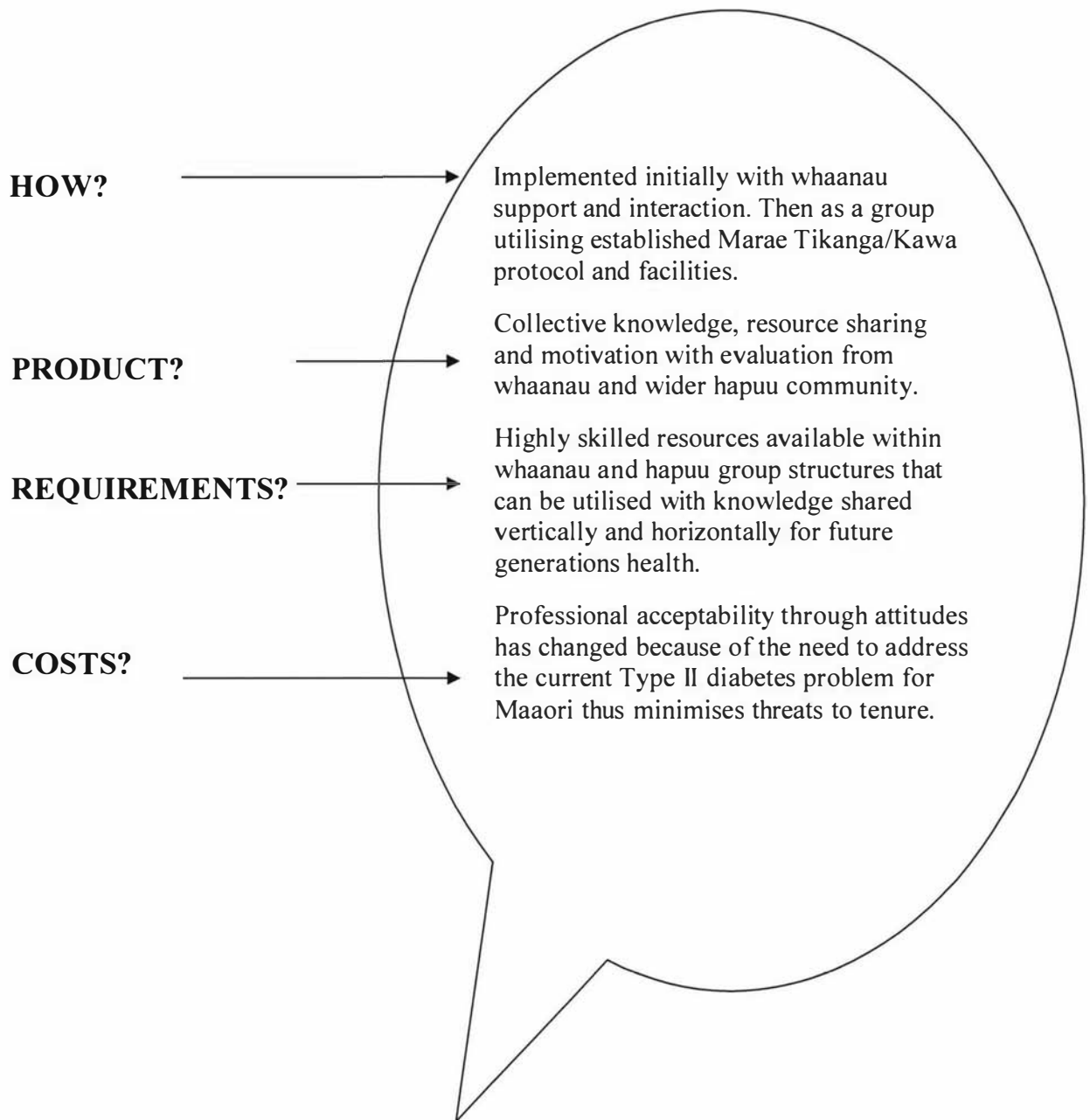
This Tuupuna Knowledge Base Health Intervention (TKBHI) has been designed from research, analysis and comparison to a time when chronic non-communicable diseases either were non-existent or far less prevalent. The specific contribution of this doctoral thesis is the combination of knowledge bases discovered through an interface of customary and contemporary knowledge. This thesis provides two frameworks for how contemporary knowledge can be accessed and verified; firstly in an academic environment for research using the Standards. Then secondly in a more practical way through the Tuupuna Knowledge Base health intervention presented with nine concepts based on customary knowledge used effectively as a health intervention to prevent chronic non-communicable diseases. The health intervention has been presented from a Tainuitanga viewpoint as a solution to a Tainui health issue; but adaptable to any Maaori group as a solution to prevent chronic non-communicable diseases such as Type II

diabetes. The health intervention includes a spiritual component of Maoritanga participation and personal knowledge acquisition that sets it apart from previous health interventions that may not have succeeded in addressing a health issue(s).

Table 41 Tuupuna Knowledge Base health intervention summary framework.

Areas of difference	Knowledge Development (KD)	Knowledge Utilisation (KU)	Design and Development (D&D)
Objectives obtain and maintain good health	Education to provide scientific evidence that Tuupuna Knowledge can be used today for contemporary tangata whenua to assist with the prevention of Type II diabetes mellitus and other chronic non-communicable diseases.	Using tikanga/kawa Maaori to underpin all the processes and activities in the nine point Tuupuna Knowledge Base lifestyle health intervention.	Personal health project supported by the interactive involvement of the whaanau to introduce lifestyle choices to obtain and maintain good health and well-being.
Methods as the tuupuna did	drink water to cleanse body by elimination <ul style="list-style-type: none"> ● saturated fat ● omega-3 kai ● whakapapa ● exercise ● vegetables/fruit ● tikanga/kawa ● te reo Maori 	Tuupuna Knowledge Base concept as an education tool for eight weeks using all the methods but focusing in depth each week on one then adding additional.	Concept format daily but with stepped knowledge and then each part of the concept to change and adapt the lifestyle habits that is interactive with the whaanau.

Figure 42. Rothman & Thomas (1994) Model Development Programme (p. 356).



ii. The Tuupuna Knowledge Base Health Intervention

Innovative Intervention Strategies health problem solution

What to do? How to do it?

Personal Preventative Programme through the Tuupuna Knowledge healthy life-style good habits model

- Each CONCEPT attempted every day as much as possible
- each week ONE CONCEPT (a different CONCEPT weekly) to be interactively participated collectively with the whaanau
- then with others in a group as a support and sharing knowledge
- following Maaoritanga protocol with tikanga/kawa Maaori
- NINE-WEEK PROGRAMME shared with the whaanau to support
- Each week a new CONCEPT investigated and knowledge shared

Tuupuna Knowledge Base Conceptual Design

1. drink room temperature water as often as possible between meals
2. remove as much saturated fat from the dietary intake as possible
3. include traditional foods with omega-3 such as eel/tuna most days
4. get some exercise most days between one and two hours
5. obtain knowledge of whakapapa to link spiritually to tiipuna/tuupuna
6. eat a variety of vegetables and fruits each day especially green vegetables
7. stop or reduce smoking, alcohol and processed foods
8. tikanga Maaoritanga knowledge and participate where possible
9. te reo Maaori skills and knowledge where possible

Table 43. Tuupuna Knowledge Base health intervention weekly Action Plan:

<i>Type II diabetes knowledge</i> to gain an understanding about the disease as possible through research/discussion	What to do to treat and prevent but working with other medical professionals where desired either Western medicine or alternative	Participants data recorded for assessment: weighed, blood pressure, glucose test, body mass index, 24 Hour food intake form
Week one: drink room temperature water often between meals	fresh running tap water bottled water (not carbonated) toilet nearby for increased urine	evaluate progress water consumption and excretion routine
Week two: remove saturated fat from the dietary intake as possible	<ul style="list-style-type: none"> • no takeaways or lard • reduce animal meat, processed meats • reduce dairy products 	evaluate progress complete dietary intake form for at least 5 days assess changes needed
Week three: eat foods with omega-3 such as eel/tuna most days	procure and eat eel/tuna and seafood ideally go fishing if time and resources permit to ensure fresh supply	evaluate progress eat eel/tuna 3 to 5 times weekly with other types of omega-3 foods
Week four: get some exercise most days either at once or several times daily best first in the morning because you and the air fresh	Should have now been exercising every day for 4 weeks that can be increased to between one and two hours suits individual or whaanau	evaluate progress weight taken recorded should be exercising for 1 hour daily (any type)
Week five: obtain knowledge of whakapapa to link spiritually to tiipuna/tuupuna	This may require going to Poukai or meeting extended whaanau and visiting tiipuna/tuupuna graves to connect with the wairua	evaluate progress should have obtained knowledge back 5 generations and visited
Week six: eat a variety of vegetables some grown above soil some in the soil and fruits each day	eat a small portion of five vegs and or fruits to ensure adequate minerals and vitamins but DO NOT DRINK A CUP OF TEA immediately afterwards causes the loss of nutrients from food	evaluate progress 5 vegetables/fruits to be incorporated into daily dietary routine with best source or garden started
Week seven: stop or reduce smoking, alcohol and processed foods weight and blood pressure compared to week one	this is a personal issue that needs to be addressed and overcome and may require more specialised help to assist with addictions	evaluate progress whaanau discussions appropriate source such as Alcoholics Anonymous or similar programmes
Week eight: tikanga Maaoritanga knowledge and participate where possible	this is to share knowledge and act as a role model or Mentor to others that may need help with Type II diabetes an opportunity to put into the kete given to you	evaluate progress participation of some kind to have happened with Mihimihi knowledge
Week nine: te reo Maaori skills and knowledge where possible Participants data recorded for assessment/comparison: weighed, blood pressure, glucose test, body mass index, 24 Hour food intake	this is to share knowledge and act as a role model or Mentor to others that may need help with Type II diabetes an opportunity to put into the kete given to you	evaluate progress able to give a Mihimihi and sing supporting waiata in te reo Maaori
Weeks 10, 11, 12 evaluate	discuss changes and implement	for pilot testing

Figure 44. Whaanau whakaaro kaupapa:

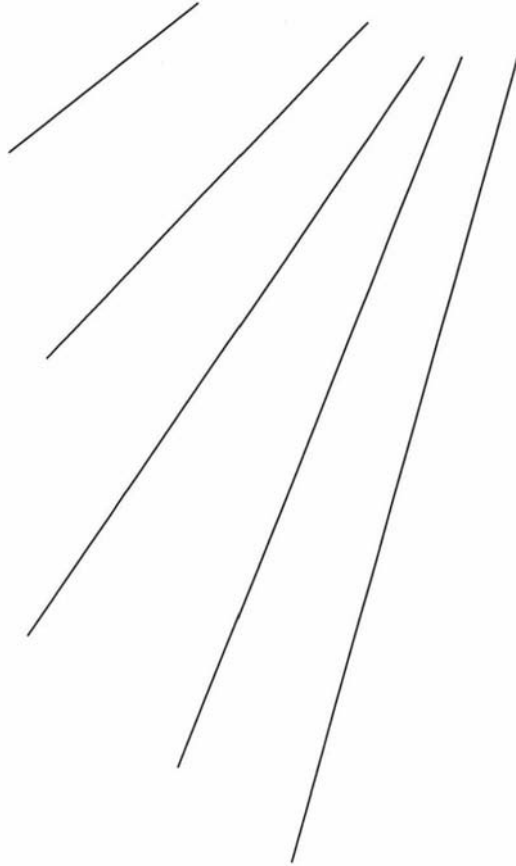
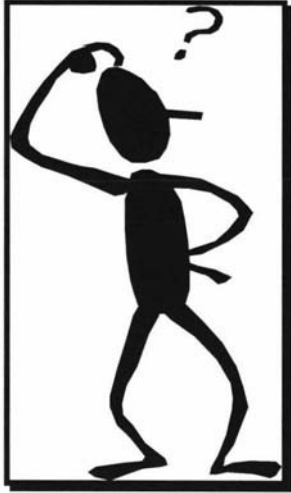


Table 45. Tuupuna Knowledge Base Health Intervention weekly support Hui Action Plan:

<p>Tikanga Maaori Kaupapa: weekly TII diabetes knowledge Poowhiri with tikanga Participants data recorded for assessment: weighed, blood pressure, glucose test, body mass index, 24 Hour intake</p>	<p>Resources:</p> <ul style="list-style-type: none"> • kaumaatua/kuia • whaanau/hapuu knowledge • Tuupuna Knowledge Base • University, Councils Library • ICT internet for www search 	<p>Community Links:</p> <ul style="list-style-type: none"> • Health Education • Tainui Health • Hapuu Marae • Medical profession • Health Ministry
<p>Week one: drink room temperature water often between meals</p>	<p>make fresh water available to everyone attending near some toilets and exercise area</p>	<p>WEEKLY HUI PROGRESS introductions tikanga introduce intervention programme distribute info and first eel supply</p>
<p>Week two: remove saturated fat from the dietary intake as possible</p>	<p>discussions on the type of foods to avoid and the type to include</p>	<p>WEEKLY HUI PROGRESS tikanga with individual stories, diet fat info</p>
<p>Week three: eat foods with omega-3 such as eel/tuna most days</p>	<p>discussions about where and how our tuupuna fished or going fishing as a group to get the kai FUTURE PROVISIONS FOR EEL/TUNA SUUPLY – farming it</p>	<p>WEEKLY HUI PROGRESS history of eel linked into traditional lifestyle prior to urbanisation and EEL education/farming talks</p>
<p>Week four: get some exercise most days between one and two hours</p>	<p>whaanau/hapuu fun run or hiikoi that involves and includes everyone for good health</p>	<p>WEEKLY HUI PROGRESS sharing eel recipes, health/fitness progress exercise demonstrations</p>
<p>Week five: whakapapa knowledge to link spiritually to tiipuna/tuupuna</p>	<p>sharing knowledge where whaanau are buried and visiting to connect with wairua for health</p>	<p>WEEKLY HUI PROGRESS attending Poukai share knowledge with others</p>
<p>Week six: eat a variety of vegetables and fruits each day</p>	<p>growing and sharing vegetables</p>	<p>WEEKLY HUI PROGRESS Cooking skills demo and gardening skills demo</p>
<p>Week seven: stop or reduce smoking, alcohol and processed foods</p>	<p>story telling about success and failures, losing people to alcohol accidents, drugs, eating disorder</p>	<p>WEEKLY HUI PROGRESS could involve a guest speaker or outside specialist organisation</p>
<p>Week eight: tikanga Maaoritanga knowledge and participate where possible</p>	<p>there have been an alienation of knowledge or circumstances that require addressing so help may be needed from the extended hapuu</p>	<p>WEEKLY HUI PROGRESS attending a Poukai or tikanga education</p>
<p>Week nine: te reo Maaori skills and knowledge where possible Participants data recorded for comparison: weighed, blood pressure, glucose test, body mass index, 24 Hour intake</p>	<p>there have been an alienation of knowledge or circumstances that require addressing so help may be needed from the extended hapuu</p>	<p>WEEKLY HUI PROGRESS attending a Poukai or te reo Maaori specialist</p>

Concept One:

Drink room temperature water as often as possible between meals.

Why should we drink water? The background.

For the same reason tuupuna drank water and lots of it to keep us healthy: in fact scientists and medical experts advise us today that to be healthy and keep healthy we must drink around five to eight glasses of water daily. Indeed this is exactly what our Tuupuna did and it was normally in the morning and without food; research informs us that if we drink water with our food the minerals and vitamins are washed through our system without the opportunity of being absorbed into our body.

Butterworth's Medical Dictionary (1980) confirms that water forms up to 80 per cent of animal and vegetable tissues, and more than 90 per cent of the natural secretions. Its functions biologically are to give rigidity to the tissues, transport nutritional materials in solution; take part in metabolic processes (synthesis and enzyme action), and to regulate heat by evaporation or sweating (p. 1812).

In fact should cause an increase in urination to cleanse the body of impurities, urine should be a light yellow colour and if it is a dark yellow your body is telling you it needs some more water. While at the same time the water will assist in the evacuation of the bowel (daily if possible) to remove all the waste from the food consumed; if the wastes remain in the body as decaying matter then cancers and ill-health will occur. In fact the tuupuna were meticulous in ensuring that the bowel was emptied daily and this was a contribution to disease prevention and the maintenance of good health. Equally insufficient water will make the body's stools hard and then become impacted in the colon area with the decaying food waste causing illness to the body.

Tuupuna also placed considerable value on water in a spiritual context thus water plays a significant role in the traditional Maaoritanga health practices and healing through traditional Rongoaa where water was used as a cleansing agent by the Tohunga. For Waikato Hapuu the Waikato River became a source of spiritual as well as physical cleansing where the conceptual—*haere ki te wai* – go to the water in the direction of the rising sun.

Swanson (2001) comments about the spirit of water claiming that just as a river carries minerals and sediment downstream, water also carries many meanings wherever it flows. Since ancient times water has been cherished and even worshipped as a source of life. Water has also been feared as a great destructive force through violent storms and raging floods. Water cycles have been forever tied to life and death. The cleansing power of water is recognised in most spiritual traditions. In the Moslem faith, for example, the ritual washing of hands and feet before entering the temple is an act of purification. Similarly in the Christian faith the baptism with water and the crucifix performed with the fingers dipped in water when entering many Christian denomination churches, demonstrates the spiritual significance of water. In ritual, we often seek to commune with that which is holy, that which has power. If rituals teach us anything, it is obvious but easily ignored respect for water (p. 24).

Water is globally fast becoming a limited and valued resource thus a water crisis is looming and to ensure a plentiful supply for the future questions are being asked, examined and provisions made for future generations. Conservation is something that our Tuupuna understood and practiced in their daily lives to only take is needed and to preserve the environment for future generations. Thus, the policy of preservation in the environment and prevention of chronic diseases (such as drinking plenty of water, getting regular exercise, eating an abundance of foods rich in omega-3 and having a spiritual connection through the wairua to past ancestors) all practiced by our Tuupuna; is now recognised throughout the world as the optimum lifestyle.

The world's water crisis is grave and should not be minimised. They say it is going to take massive effort on the part of the majority of nations and citizens to begin implementing the policies and practices that could build a water-secure future. But there are solutions. Many community groups, farmers, scientists, and environmentalists are working on proven alternatives. The single most important tool for a water-secure world is conservation of the world's fresh water supplies and the reclamation of polluted water systems. This will require a change in attitude toward water that will be a challenge to those working for water security. Simply put, we have to begin changing our ways, in order to meet our water needs with what is available.

Concept Two

Remove as much saturated fat from the dietary intake as possible.

Why should we limit our intake of saturated fat? The background.

To enable reflection and analysis of exactly what we may eat over a twenty-four period, everything that is eaten over each twenty-four hour period needs to be recorded – and recorded honestly. Therefore for three days everything eaten needs to be written down to enable the whaanau to discuss exactly where the problem may be, but unless completed accurately will not provide a realistic situation. Thus to derive benefit from the Tuupuna Knowledge Base programme one must be very aware of exactly what is being eaten or put into the body. Then once recorded everyone can see exactly where the diet can be improved by elimination of some foods and replacement with others to ensure appropriate nutrition is being provided to the body to ensure good health.

First what is needed is an explanation of exactly what saturated fat is simply that it is animal fat and they are called ‘saturated’ because the fat molecules are absolutely full of fatty, greasy and usually solid at room temperature and clog up the arteries in your body. The purest forms of saturated fat are butter, lard and coconut oil with meats especially processed meats like some sausages and tinned corned beef together with dairy products such as whole milk, cream and cheese. Saturated fats are oft referred as the ‘bad guys’ because when eaten they raise the level of the cholesterol in the bloodstream, because the body naturally produces cholesterol too much causes harm to the body by clogging up the arteries. Cholesterol, although is not technically a fat (but acts like one in the body) is the molecule that deposits the fat in your coronary artery walls causing these walls to narrow thus leading to high blood pressure, heart disease and Type II diabetes. While at the same time saturated fat increases the possibility of the blood to clot more easily causing a stroke to the brain or a clot to the heart causes a heart attack. As discussed earlier in the diabetes and Maaori health chapter a need to minimise the negative dietary intake of:

- higher energy from saturated fat
- higher saturated fat intake
- higher dietary cholesterol intake
- less likely to trim fat off meat

- less likely to remove skin off chicken
- less likely to use olive or canola oil
- use lard for cooking
- more likely to eat pork bones.

Therefore it is essential that food containing saturated fat be minimised as much as possible but not excluded as animal meats and products contain other essential nutrients such as: protein, minerals, vitamins and energy. All *Takeaway Takeout* should be eliminated as much as possible because of the use of saturated fat to cook everything in. What types of foods should replace the meat and animal fats to provide energy and a sense of fullness that food containing fat gives us? First carbohydrates especially whole grains and natural foods such as oats, bran, legumes, lentils, nuts and all types of foods that contain unsaturated fat such as: eel/tuna, all seafood, fish especially cold and deep water fish such as conger eel, and vegetables. In fact the exact type of diet that our Tuupuna ate: lots of eel/tuna, conger eel, fish, all sorts of seafood as kai-moana and vegetables especially kumara and the greens puuhaa and water cress that grew abundantly in the rivers and streams.

Tuupuna protected and guarded their Eel/tuna Weirs as they knew of the health benefits that they contained and my research confirms the presence of the unsaturated fat or the ‘good guy’ the fatty acid omega-3. As I have also previously noted lethicin binds with the saturated fat in the artery wall and naturally removes it from the blood, keeping the body healthy acting as a type of blood purifier. Eel/tuna contains lethicin and this with the omega-3 kept our tuupuna healthy because they ate it very regularly as a staple food – virtually every day.

Concept Three

Include traditional foods with omega-3 such as eel/tuna most days.

Why should we eat traditional foods? The background.

The tuupuna were healthy and up until the urban migration the many chronic diseases afflicting tangata whenua Maaori today such as Type II diabetes, heart disease and mental illness did not exist. I say the explanation for the absence of Type II diabetes symptoms from the historical records was due to an omega-3 eel/tuna dietary intake that prevented Type II diabetes and many other chronic non-communicable diseases. In other words our tuupuna knew the benefits of eating eel/tuna regularly together with other seafood that was available. Indeed their holistic healthy lifestyle of drinking plenty of water, exercise, lots of omega-3 rich foods and having a spiritual dimension to their lives are the same good habits that we pursue today to ensure good health and chronic disease prevention.

The Australian Fisheries Research and Development Corporation (2004) say that humans can manufacture some types of fatty acid in the body, but must obtain those essential for good health (the polyunsaturated omega-3) from the diet. Omega-3 fats are best found in seafood and plants such as soybean, canola, flaxseed and purslane. The research also claims that Finfish (aquatic vertebrates having gills, fins and typically elongated body usually covered with scales) do not lose their positive health benefits by being canned (pp. 9-13).

Equally my scientific research demonstrated that eel/tuna did not lose the omega-3 content by smoking it as is the preferred way by many of preparing it to eat. Thus to emulate the good health and sense of well-being enjoyed by our tuupuna we need to regularly include eel/tuna and edible/consumer products in our daily diet but in a way suitable for the busy contemporary technology focused and global tangata whenua. Thus we now need to be innovative and inventive to first minimise the depletion of the valuable eel/tuna resource but also to be able to farm eel as an aquaculture enterprise to provide a ready supply to our whaanau and hapuu to ensure their good health. Taking all the current research knowledge about the health benefits from omega-3 derived from finfish and seafood, to develop an aquaculture industry to provide both health and economic benefits. To illustrate, Tainui Raukura Moana Fisheries Limited (a well

established fishing asset), and Ngaai Tahu Seafood Company formally agreed (23 December 2005) to a multi-million dollar fishing deal. They have agreed to supply each other with annual fishing catch entitlement for the next six years with Ngaai Tahu getting inshore fishing rights in the North Island and Raukura Moana getting deepwater fishing rights. In fact this is part of the 'Sealord's' Settlement Deal for all Maaori through the Quota Management System introduced in 2004.

Therefore it is now time to develop eel/tuna farming that can provide an available source of eel/tuna for our own people to eat but also to develop through innovation and technology products that can be marketed domestically globally. Education has played an important role in the re-building of the Tainui waka people and has been fought with trials and tribulations but the time has now come to evolve economic projects utilising the education and enthusiasm of many. Fishing is an area that we are inherently knowledgeable with accumulated information and science handed down; Tainui has succeeded in the fishing industry and now together with Ngaai Tahu also as a traditional supplier of eel/tuna, the situation is open to innovation.

Concept Four:

Get some exercise most days between one and two hours.

Why should we exercise? The background.

First traditional tangata whenua Maaori were very active and exercise always played a pivotal role in the society because things had to be done and in a certain way to ensure survival thus everyone contributed and everyone got regular exercise. However with urban migration away from the traditional rural environment where most people today have a motor vehicle immediately adjacent to where they live and in today's contemporary society we use a motor vehicle for convenience and to save us valuable time. But at a price and this is reflected in the large numbers of the population not participating in exercise, being unfit and overweight thus contributing to many diseases that are underpinned by the current lifestyle of very little exercise. Therefore we should exercise regularly to obtain aerobic capacity to utilise oxygen, in other words:

- your heart muscle will grow stronger pumping more blood

- your blood plasma will become slightly more diluted flowing more easily through your capillaries, also lessens the chance of blood clots
- the *good guy* fats work with your cholesterol to help preventing more capillaries the small blood vessels that feed your muscle fibres
- plaque and fats in your arteries helping with blood flow to the heart.

Any type of exercise that increases your aerobic capacity but it must be regular and best every day, for example walking, jogging, pilates, gym environment group exercise, swimming are all suitable. But it must be completed every day for at least half an hour to start, then increasing the exercise to one hour each day. Ideally in a whaanau or hapuu group to meet at the Marae or similar place to exercise collectively and to motivate each other to continue would be typical to ensure an exercise programme was started and then continued. However without regular daily exercise incorporated into part of a daily routine and hopefully with weight loss, then good health cannot be obtained and maintained.

Concept Five

Obtain knowledge of whakapapa to link spiritually to tiipuna/tuupuna.

Why should we obtain whakapapa knowledge? The background.

An integral part of being human is our spiritual dimension and the need for humans to connect socially thus spiritually to ensure good health and a sense of well-being. Thus those not spiritually aware and integrated do predispose themselves to indulge in activities such as alcohol consumption with binge drinking, recreational drugs and thrill-seeking activities to fill the void that a spiritual connection would fill. Indeed for some people it is religion that fills the void for others communing with the natural environment provides a peace and serenity that they seek through the spiritual dimension of the nature. Thus for tangata whenua Maaori knowledge of their whakapapa provides a distinct identity of whom and where they come from therefore where they belong and where they call *home* or *their tuurangawaewae* the place where they can stand. Whakapapa knowledge also provides a pathway connection to whaanau and a sense of belonging to people who share the same genes and are kin. While at the same time knowing our whakapapa introduces us to our tuupuna (over three generations back) and our tiipuna

(less than three generations back), and they are always there for us in a spiritual dimension. In fact part of the tikanga Maaori and kawa of the Tainui waka is to always stop at our sacred mountain Taupiri to pay our respects to those buried there but also to take them with us to guide and direct us. This is known as the *wairua*. Tainui people would never drive past Taupiri without stopping and there are areas set aside to accommodate vehicles that stop.

Also whenever trouble or problems arise our tuupuna are always available to assist us through the wairua and show their presence when the sky is clear as shining stars. Indeed knowledge of the whakapapa keeps us focused and safe from negative temptations because it makes us a whole person totally holistic without the desire or need to indulge in negative stimulants to fill the void when we are not connected to our wairua. This link has always existed in Maaoritanga and is universal among all waka, hapuu and whaanau forming the basis of all tikanga Maaori and Marae protocol.

It is also important to know exactly where our tuupuna/tiipuna are buried as we need to visit to acknowledge their wairua and connect us to them. However some people do not know where to obtain their whakapapa knowledge and feel overwhelmed by Maaoritanga because they may have been alienated for whatever reason. I do not see this as an issue but one does have to ask and search. It is a very strange thing but once you start asking or searching things start to appear and come to you both physically and spiritually. I know from my own experience I had a very strong and urgent need to seek my whakapapa and Maaoritanga knowledge at the funeral service of my Maa's youngest sister's funeral service. Although it was held in a European setting much of it was in Maaori and immediately I had a most unusual experience where tears flowed from eyes like a river but I was not actually emotionally crying. But from that moment in time my life was changed and there was an urgency to gain as much knowledge about Maaoritanga as I could and I was directed to go to certain places and read certain books. In fact all of these experiences and actions connected me to my whakapapa and my tuupuna's wairua that made me feel very complete although I was not incomplete as a person prior to these experiences. Thus as a result I have now written my doctoral thesis that may help and assist others as others helped and assisted me on my journey. But they are all different.

Concept Six

Eat a variety of vegetables and fruits daily especially green vegetables.

Why should we eat vegetables and fruits daily? The background.

To ensure that our bodies are fed properly to function properly we need to eat properly and that includes eating a variety of fresh vegetables and fruits preferably when each in season and readily available. Fresh is best because they will contain more minerals and vitamins to nourish the body and they taste better but when food is not fresh and that does include vegetables and fruits it becomes unsuitable because of fungi and bacteria breeding on it. If it is possible to grow some vegetables in the garden and the exercise of working the garden will also be beneficial, or to find a place that sells fresh produce.

Thus by trial and error together with research and whaanau discussion decide exactly what is best for your one situation and circumstances with food likes and dislikes. Moreover eat daily some green vegetables to cleanse the body of impurities as well as provide essential minerals and vitamins but also those that grow in the soil as root and have absorbed water, minerals and vitamins from the soil. However I am not suggesting a vegetarian diet and to eliminate any protein but we do need to eat fresh vegetables and that it makes good sense to grow some for ourselves and the exercise will also be part of the Tuupuna Knowledge Base programme.

It is anticipated that cooking skills that may be forgotten or lost may be revived as globally cooking skills have diminished and is a major contribution to not eating fresh produce. Now turning to understanding the concepts of Maaori medicine or Rongoaa which can be very beneficial in naturally cleansing the body from impurities and is worthy of consideration, but is not the purpose of this programme.

Concept Seven

Stop or reduce smoking, alcohol and processed foods.

Why smoke, alcohol binge or eat processed foods? The background.

First we need to reflect on why we smoke, or binge on alcohol, or drink to excess? Everyone will have an excuse or a story that they have convinced themselves why – with smoking the question should be asked. What are you hiding from that you need to have a

smoke screen around you? Because that is exactly what smoking does as well as pumping poisonous substances into the body and using up valuable oxygen that we need as humans to breathe properly. The bottom line is we need to at least reduce or ideally stop – quit the habit of mind altering substances and replace it with positive aspects of life. For example understanding our own identity, exercise, communicating effectively and filling up the void space with knowledge and actions to make and keep us healthy.

However the cause of why one smokes or binges on alcohol probably is more complex and complicated than this community intervention programme, therefore specialist help and assistance through outside agencies or alternative government funded programmes may be required. I have also suggested that at the Weekly Community Hapuu/Whaanau Hui gathering that an expert may be available to address the group about what services are available and what organisations can also help.

Smoking tobacco has a stimulating effect on the body working on certain areas of the brain, some people smoke to stay alert, keep calm, to relieve stress or to help them on a social situation. Other people consider smoking makes a person look sophisticated or rebellious but whatever the reason it is addictive, expensive and contributes to serious health problems. When a person smokes they breathe in tar that sticks to the lungs as well as poisons that cause cancers; but the poisons are blown into the air that other people breathe causing what is called *second hand smoke*.

Now turning to alcohol, illegal black market drugs and other addictive chemical substances that have a totally negative impact on our health; people still continue to indulge and suffer the consequences, such as accidents, bodily injuries, irreversible brain damage and diseases caused by the malnutrition that they produce.

To a lesser degree processed foods have harmful chemical preservatives in them that make it very difficult for the body to assimilate them, in a very similar but much milder way to other chemical substances. The ideal is to eliminate as much as possible any processed foods and eat as much as practicable and convenient each fresh food that if possible you prepare yourself. As food plays such an important role in any culture but

particularly in Maaoritanga where fresh food and produce has always been used and still is used at any traditional Marae gathering.

It is pertinent to mention additional vitamin and mineral supplements to ensure an adequate supply is provided daily, if financially affordable it does insure that the required nutrients are being supplied. However this is a very individual circumstance depended on a number of issues that include: the cost, having an understanding of exactly is needed for each person thus research and education is necessary, and then being able to digest without creating any more problems. Indeed there is an enormous range of products available to the consumer that indulging in some may simply be a waste of money, but after careful investigation and analysis of what suits to get results than it does become somewhat a trial and error situation. Equally if able to find exactly what suits then additional supplements will most certainly provide additional energy and vitality to enhance a healthy disposition.

Concept Eight

Tikanga Maaoritanga knowledge and participate where possible.

Why should we participate in our Maaoritanga? The background.

The whakapapa is the backbone to all that is Maaoritanga and knowledge of the whakapapa provides each of us to understand our own identity. But even with the same whakapapa we each follow a different path in our Maaoritanga journey, thus it is important to participate because we each play a role that together gives unity and strength. However without identity information peoples lives usually become chaotic and often without purpose as they drift from situation to situation generally lurching from one crisis to another – whether it through health, an accident, relationship or communication breakdown, binge drinking, illegal drugs or other excessive behavioural patterns. As a rule the causative factor of a climax is the loss of identity whereas people who have a strong sense of identity and where they belong gain a strength and purpose of life from the knowledge and support mechanisms in place, such as family support.

Concept Nine

Te reo Maaori skills and knowledge where possible.

Why should we speak te reo Maaori? The background.

Communication is an integral part of being human and we communicated in many ways: our voice through speaking, singing and chanting; our body language through gestures; our eye contact and how we project a situation with our eyes or other facial gestures. Indeed all these ways of communicating form the basis of the Maaori language and merge with a certain way of presenting the language for certain and specific occasions. Therefore it is essential to be able to present oneself in a credible way to tangata whenua and this requires some knowledge of te reo Maaori that is linked inseparably with tikanga and kawa Maaori. Whenever a group of tangata whenua meet it is fundamental that a certain structure is adhered to and that framework requires some knowledge and skills of te reo Maaori.

First a Karakia Timata or beginning incantation always indicates the start of something and equally a Karakia Whakamutunga always signifies closure. Indeed the paakehaa perception of a karakia is that it is a religious prayer but that is not correct, but if a karakia performed in a religious setting then the paakehaa equivalent would be a prayer. Maaoritanga has always been underpinned by karakia and karakia was a part of everyday life before anything commenced to ensure the activity was in alignment with nature. Another important part of Maaoritanga is the Mihimihi or Mihi which always follows the Karakia Timata, in short it is an opportunity for people present to explain where they come from and what their whakapapa or lineage is. The mihi descending structure is:

- first an acknowledgement is given to the gods, or higher beings (or one particular god), for me and all others that recognise the Kiingitanga, an acknowledgement to the leader is given to show respect to the Kiingitanga (Kiatinga represents traditional)
- second an acknowledgement to those deceased – te hunga mate’
- third an acknowledgement to the living – te hunga ora
- fourth an acknowledgement to the house – the whare – or te papa
- fifth to introduce ourselves (and this also has a descending structure) starting with our sacred mountain, then our waka affiliation, then the river we

associate with, then our urupa where our tiipuna/tuupuna are, next our Marae as our tuurangawaewae, then our hapuu, then our whaanau that also include our whakapapa, then us – our name and some information about our immediate family

- sixth is an acknowledgement of the kaupapa for the occasion
- seventh is followed by a suitable waiata to link into and harmonise

Therefore to fully connect the wairua into the daily lives of all the people you associate with some knowledge and te reo Maaori skills are necessary, but the skills are continually evolving. Thus it does not matter at what stage your language development is at support is also provided because tangata whenua understand that everyone is on a journey and that situation is greatly respected by all. There are times when a proverb or a whakatauaakii is used and these sayings usually reflect on some aspect of nature from the trees, birds, water, mountain, and from the negative or positive attitude(s) of human nature.

Riley (2001) stated, Ka kai te kiwi, ka noho weka; he aha te kai maa kiwi, ka rere atu a weka. When the kiwi searches for food the weka watches, however when the kiwi finds food, the weka then scurries over (to help himself). One supposes that Weka must be the protective elder brother, or sister, since both birds have the same mythological mother, Haere Awa Awa! (p. 211).

He kookoo kai kohe. Fat as a Tuii eating kohe, thus a Tuii that feeds on the berries of the kohekohe tree becomes very fat. A saying applied to a fat person. He Huia tangata tahi. There is but one man who is like the Huia. There is only one chief, Huia feathers are his emblem (Riley, 2001, p. 200).

Table 47. Tuupuna Knowledge Base Health Intervention Feedback Form:

Kia ora, now that you have finished the Tuupuna Knowledge Base Intervention nine concepts, overall what did you think of it?

Could it be improved? How?

Concept one: drink water

dislike it very much dislike it OK like it love it

Comment/Suggestions:

Concept two: minimise saturated fat food intake

dislike it very much dislike it OK like it love it

Comments/Suggestions:

Concept three: eat omega-3 rich eel/tuna and seafood

dislike it very much dislike it OK like it love it

Comments/Suggestions:

Concept four: exercise every day building up

dislike it very much dislike it OK like it love it

Comments/Suggestions:

Concept five: gain whakapapa knowledge

dislike it very much dislike it OK like it love it

Comments/Suggestions:

Concept six: eat vegetables some fruits daily

dislike it very much dislike it OK like it love it

Comments/Suggestions:

Concept seven: eliminate smoking, alcohol, processed foods

dislike it very much dislike it OK like it love it

Comments/Suggestions:

Concept eight: tikanga participation

dislike it very much dislike it OK like it love it

Comments/Suggestions:

Concept nine: te reo Maaori skills

dislike it very much dislike it OK like it love it

Comments/Suggestions:

Other comments or suggestions of how to improve the programme?

Kia ora koe, thank you very much for your time.

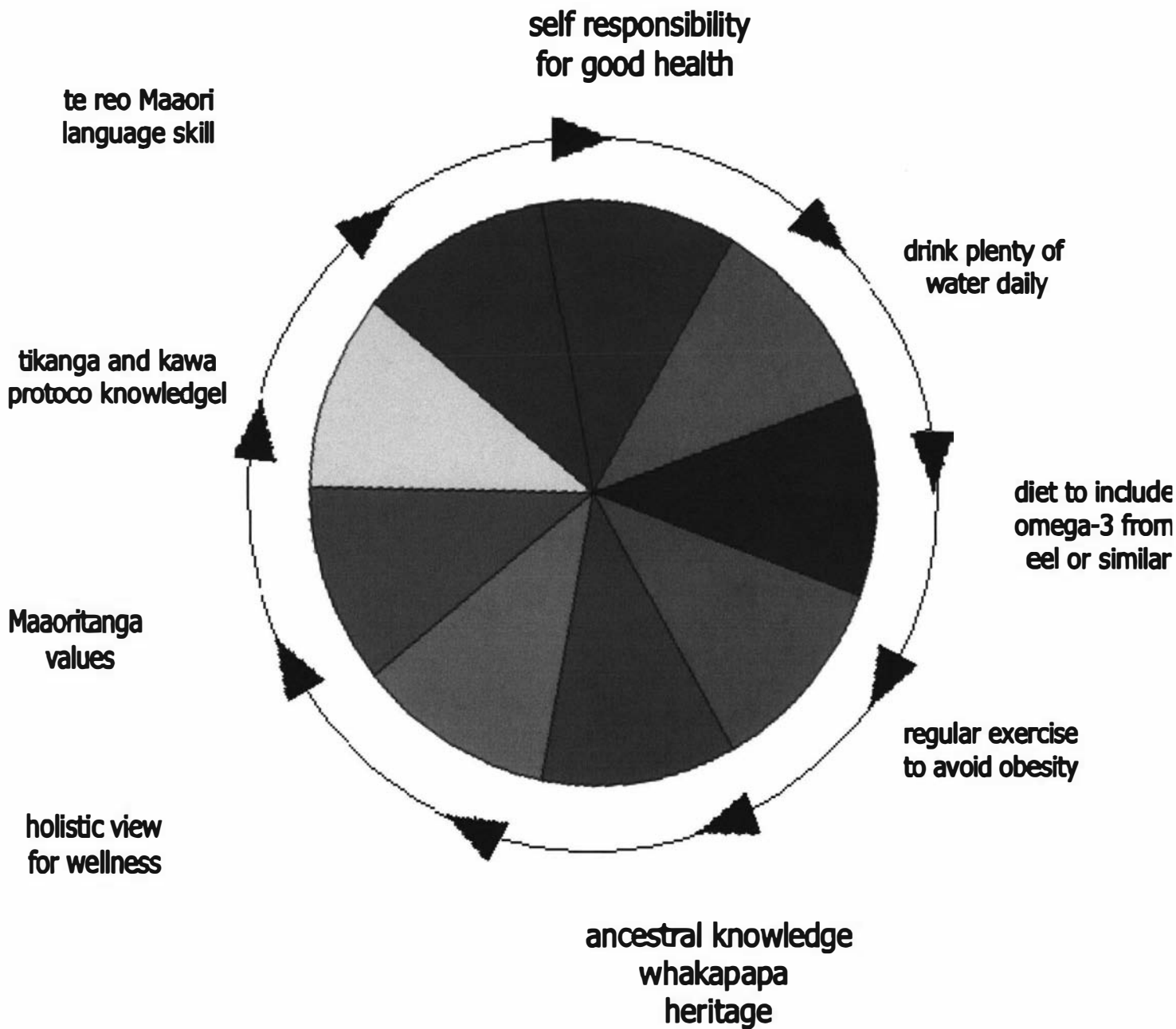


Figure 48. Holistic nine point health intervention from Tuupuna knowledge.

The carving is from (Tainui Annual Report/He Riipoata–A–Tau–1998) and was carved in 1886 for the people of Tukorehe o Ngaati Raukawa (p. 28).



Figure 49. The holistic integrated nine point TKB health intervention.



Conceptual identification Summary

Intervention Knowledge Development (KD)

Adapting Tuupuna Knowledge to be synthesised for contemporary Maaori context.

Intervention Knowledge Utilisation (KU)

Presentation of the nine-week programme for whaanau use supported by hapuu.

1. Problem analysis Project Planning

Identifying and Involving Clients

Type II diabetes symptoms manifested in whaanau to change lifestyle habits

Analysing Identified Problems

Tuupuna healthy no identification of Type II diabetes from omega-3 eel/tuna diet

Setting Goals and Objectives

Intervention is a nine-week whaanau integrated into a hapuu programme

2. Information Gathering and Synthesis

Studying natural examples

understanding how our tuupuna remained healthy with no Type II diabetes

Identifying functional elements of successful Models

Type II symptoms manifested because regular dietary eel/tuna removed

3. Design

Designing an Observational System

Type II whaanau/hapuu involved in specifying the behaviours and environmental

Specifying procedural elements of the Intervention

guided by established tikanga/kawa Maaoritanga protocol and principles

Framing Objective

design objectives is the desired change, intervention objectives refers to a task

Objectives Examples

desired change in Type II diabetes prevention utilising traditional knowledge

Design Domain

whaanau/hapuu involvement in weekly evaluation and hui discussions

Design Requirements

Intervention is to satisfy the urgent need to address Type II diabetes

Design Problems

control is at whaanau level but with support/education at hapuu level

Conversion and Intervention Design

conceptual plan specifies that whaanau/hapuu participation is pivotal

4. Early Development and Pilot Testing

Developing a Prototype or Preliminary Intervention

the mode of delivery is dictated by the whaanau/hapuu tikanga and kawa

Conducting a Pilot Test

designed to determine whether the intervention will work

Applying design criteria to the preliminary Intervention Concept

listening/evaluating to what the whaanau and hapuu have to say

5. Evaluation and Advanced Development

Selecting an Experimental Design

adapting and providing credibility in a modern context through scientific analysis

Collecting and analysing data

able to utilise modern technology to prove traditional methodology had credence

Replicating the Intervention under field conditions

people that had continued to eat eel/tuna did not manifest any Type II diabetes

Refining the Intervention

initially with whaanau involvement but with hapuu support at established Marae

6. Dissemination

Choosing a Brand Name

identification that is unique, understood and respected by all tanagata whenua

Establishing a Price

network settings exist in established Marae or similar infrastructure

Setting standards for use

establishing integrity of traditional tuupuna health and scientific knowledge

Identifying potential markets for the Intervention

informing a wider audience of tuupuna credibility to ensure participation

Creating a demand for the Intervention

Type II diabetes as a current health problem with an Intervention to correct it

Encouraging appropriate Adaptation

Modifying traditional Maaoritanga tuupuna knowledge adapting for Contemporary

Providing technical support for Adopters

current scientific and medical research provides credibility to Intervention

Disseminating Intervention Research in Academic Settings

linking into and adding to established Kaupapa Maaori research methodology

Barriers to the Dissemination of Intervention Research

Intervention to provide a link from Maaoritanga to Western health practices

Forbidding Complexity

Intervention programme shared with other Maaori health service organisations

Lack of Academic rewards

other indigenous or eel/tuna eating cultures with Type II diabetes problem use

iii. Discussion with Conclusion

Following the framework recommended by Rothman and Thomas (1994) the Tuupuna Knowledge Base Health Intervention concept objectives do identify a variety of possible sources that hopefully will benefit. These include:

- basic and applied research
- scientific technology
- allied technology
- legal policy
- social innovation
- indigenous research
- practice experience

While at the same time Rothman & Thomas (1994) comment that innovations should be successfully disseminated and utilised to the degree that they are: behaviour guided, codified, simple, flexible, modular, inexpensive, and designed for usability from the outset. While at the same time some potential areas of inquiry also include law, technology, ethics, and developments in parallel fields that can be shared. Thus bounds are set around the search process to make the task feasible and that when the steps of

problem definition, identification of relevant resources, and development of summary generalisations and that the development of empirically derived practice guidelines is an improvement over practice ideas lacking any empirical backing (p. 263).

There is a health disparity between many indigenous and non-indigenous people throughout the world especially where colonisation, invasion or immigration into indigenous land has occurred. To illustrate: Canada, the United States of America, Australia, New Zealand and many British colonies where the established indigenous culture and the entrenched beliefs system were challenged. Indeed the health difference is now reflected negatively and costing developed countries a diminishing quality of life and enormous financial expenditure in an attempt to treat the diseases causing the disparity. The historical cause where many of the indigenous people abandoned their lifestyle either by force or in search of a better way of life requires health intervention programmes that are designed specifically to address the health problem. It appears that conventional mainstream Western medical intervention has only assisted in a limited capacity and with an incorporation of what was successful from traditional historical indigenous health programmes.

The American Public Health Association (2005) say that the rationale of community intervention programmes currently being designed and developed focus on the striking inequalities that persist between the health status of Indigenous and non-Indigenous people in North America. Public health strategies to amend inequities have met with limited success. Drawing on the network of Indigenous scholars, we assert that one major reason for this failure is that externally imposed strategies rarely reconcile biomedical and social science ways of knowing with local knowledge systems and local understandings of health and illness. Thus their goal is: the development, implementation, and evaluation of Indigenous models of knowledge translation for health sciences research in the context of Indigenous communities. Their methods include:

- Multi-method participatory action research case studies with three Aboriginal communities in Canada.
- Baseline qualitative assessment of existing systems of health information dissemination and use through focus groups and key informant interviews.

- Customised design, implementation, and evaluation of specific public health interventions in each partner community.

Evaluation methods comprise focus groups, key informant interviews, and relative questionnaires. The results of baseline consultations will generate distinct and striking data about health information sources and dissemination strategies, decision-making processes, locally relevant concepts of health, local health services and programmes, community structures and mechanisms of interface with non-community systems. The participatory research approach successfully engaged community partners in the development and implementation of customised public health interventions. Evaluation of the impact of these interventions on specific health outcomes is ongoing. Therefore the conclusion of participatory models of health information dissemination and uptake based on local systems of health and health knowledge effectively engaged key community health stakeholders in the planning and implementation of customised public health interventions. Thus the participants at the conclusion of the community intervention will be able to:

- Recognise the need to customise indigenous public health interventions to local systems of knowledge and health.
- Describe a participatory action research process that elicits local Indigenous community partners in the design, implementation and evaluation of customised public health interventions.
- List research methods and evaluation tools that can be effectively employed in partnership with indigenous communities.
- Apply this new knowledge to own research, programming and policy (p. 23).

To sum up, I have extensively researched and written this doctoral thesis and I like many people had a theory about something and they were passionate about their theory; enthusiasm is needed because many people usually do not agree with the theory. Thus many historians recorded the lifestyle of tangata whenua Maaori in a negative and somewhat romantic way, that many people both Maaori and non-Maaori consider incorrect. Therefore this thesis provides the reader with a story told from knowledge gained and entrusted from within traditional Maaoritanga, initially from my maternal

grandmother born in 1901 and raised in the old ways at a settlement on the Waikato River at a place now called Churchill. Te Motu Kapita a kaumaatua at Tuurangawaewae Marae at Ngaaruawaahia told me that the land now called Churchill did have a Marae and was a settlement of the old Kiingitanga ways. Thus the knowledge shared to me about the wind, the clouds, the sky and the sea when we were fishing on the Manukau Harbour has provided me with the passion and desire needed to claim my hypothesis. The eel/tuna eaten regularly provided protection against Type II diabetes mellitus and many other non-communicable diseases now afflicting our people because of the omega-3 and lethicin they contained. The scientific analysis supported my theory that eel/tuna does in fact contain omega-3 and it is anticipated that the TKB Lifestyle Intervention Programme will benefit many people by providing a lifestyle framework in a modern time-frame for contemporary tangata whenua.

To support the conceptual intervention for the TKB I have included a summary of Professor Mason Durie MD good health and well-being model. It is a four-sided approach to health that has been recognised by Maaori as the Maaori health perspective; but has also been included in the Health Curriculum for all New Zealand schools follow known as the Hau Ora Health Model. In fact the Core Health, Health and Home Economics curriculum have also included the Hauora Model as the basis of their education programmes.

Table 50. Professor Mason Durie good health and well-being model:

taha whaanau the family	taha tinana the physical
taha wairua the spiritual	taha hinengaro the psychological

Durie (2003) says because indigenous world-views are more likely to place greater emphasis on connectedness as an explanation of illness or a sign of well-being, assessment procedures and outcome measures, for example should be able to capture those views so that there is greater congruence between medical practice and world-view (p. 284).

iv. Intervention Implementation

Implementation would follow existing tikanga and kawa Maaoritanga structures and would vary according to the kaupapa of that particular group of people and the perceived benefits to be derived. In other words the traditional structures and frameworks where tangata whenua meet always have a defined kaupapa or theme where a Karakia Timata starts things, followed by Mihimihi, supported by waiata, then the purpose of the meeting – in this instance the Tuupuna Knowledge Community Base Intervention Concept(s). It would be necessary to inform that the main benefit or objective is the improvement of health through a lifestyle programme that was successful for tangata whenua in traditional times and could be introduced to address the current health issue Type II diabetes in Contemporary tangata whenua. It would therefore be supported more easily if the Intervention linked into current existing Marae organisations with one person selected from each Marae organisation (or collective Marae organisation) to be trained to actually implement the Tuupuna Knowledge Base Intervention at a grass roots level.

Therefore a nominated person who could then be specially trained (and be paid appropriate remuneration for ten weeks with one week for training) as a leader to them implement the nine-week concepts in a grass roots setting. The usual financial outlay through an established koha would also be made to each Marae organisation facility that was used in accordance with whatever the charge was for hiring the facility and its kawa. In addition fresh eel/tuna (and tinned sardines as a comparative substitute) would also need to be supplied – enough for each participant to be able to prepare enough meals over the nine-week intervention time-frame and utilising recipes supplied. Thus this requires either paying people to catch enough eel/tuna or purchasing them from fresh a commercial outlet.

As the funding for the initial implementation would be through the Health Research Council of New Zealand (or similar research organisation), the process would be transparent with reporting structures currently well established as a government health research entity. The Health Research Council of New Zealand (HRC) was established under the Health Research Council (HRC) Act 1990 to improve human health by promoting and funding health research. The HRC Act also establishes four specific committees, three of which require a member of the Health Research Council Board as chair.

The committees established under the Act are:

- Biomedical Research Committee
- Ethics Committee
- Maaori Health Committee
- Public Health Research Committee

Some of the key functions of the HRC are to:

- Advise the Minister on national health research policy.
- Administer funds granted to the HRC for the purpose of implementing national health research policy.
- Negotiate the bulk funding allocations for funding of health research.
- Foster the recruitment, education, training, and retention of those engaged in health research in New Zealand.
- Initiate and support health research.
- Encourage initiatives into health research by soliciting research proposals and applications, particularly in areas considered by the Board to have a high priority.
- Consult for the purpose of establishing priorities in relation to health research.
- Promote and disseminate the results of health research.
- Ensure the development and application of appropriate assessment standards for assessment of health research proposals.

The role of the Board of the HRC is one of corporate governance comprising:

- setting strategic direction
- policy formulation
- risk management
- statutory compliance monitoring
- reporting on stewardship of the Crown entity
- appointment and performance monitoring of the Chief Executive Officer.

The HRC is a Crown agent, which means that it must give effect to government policy when directed. The Board is the governing body of the entity and all decisions relating to the operations of the HRC must be made by or under the authority of the Board as provided for in section 25 of the Crown Entities (CE) Act 2004. The Board consists of ten members appointed by the Minister of Health (the Minister) in consultation with the Minister of Research, Science and Technology. The Minister appoints one of the members of the Board as Chairperson pursuant to clause 1(1) of Schedule 5 of the CE Act. The collective duties of the Board, as outlined in the CE Act, include ensuring that the entity acts consistently with its objectives and functions that it performs its functions efficiently, effectively and consistently with the spirit of service to the public, and that it operates in a financially responsible manner

[HRC Web site: <http://www.hrc.govt.nz/Crown Entity and Performance 2005/2006>].

To conclude, the HRC has promoted and developed the establishment of indigenous Maaori research methods and frameworks with many scholarship recipients contributing to the establishment of now recognised and accepted health research standards. As a recipient of a Doctoral Research Scholarship for Maaori health research, the opportunity and support is very valuable and does contribute to the wider Maaori community.

Implementation by fostering Participation

Rothmans and Thomas (1994) comment that the promotion of a positive health programme is closely connected to active and meaningful *participation*, where clients must be motivated to participate in programmes. The pattern of implementation they found was that one general pattern was followed in all their field test cases.

This pattern consists of:

- goal determination
- selection of benefits to be used
- initial contact with potential participants
- follow-up contact with potential participants
- delivery of benefits, or operation of the event (pp. 381-385).

Goal Determination

Rothman and Thomas (1994) say that the first step is to select the goal of participation. In our experience, the guideline was used to form new groups or to maintain or increase participation in existing groups.

Selection of Relevant Benefits

The selection of relevant benefits for increasing participation is apparently a two-stage process. First, the practitioner must identify the benefits available; second, the benefits must be matched to the target population. (If the practitioner has access to ample resources, it may be possible to reverse the order of these steps). In our experience, the majority of the practitioners who used the participation guideline provided multiple benefits. Most chose a combination of instrumental and expressive benefits, frequently combining material and interpersonal; rewards (p. 385).

Initial contact with Potential Participants

Rothman and Thomas (1994) state that the method used for the initial contact varied according to the nature of the target system. The major difference in approach lay in the ease with which the potential membership could be identified and located, and in the degree to which the practitioner was in day-to-day contact with that membership. The types of initial contacts varied, ranging from direct personal conversations and telephone discussions, to flyers, mailings, and notices in the newspaper.

Follow-up contact with Potential Participants

Practitioners the Rothman and Thomas study tended to use a different medium for the recontact than was used for the initial contact. When the potential membership was individually identifiable, the contact and follow-up were usually by formal letter or

memo in alternation with an informal conversation, either face to face or by telephone. When the potential membership was diffusive or broadly defined, practitioners tended to use a different form of mass media for the recontact stage than they had used for the initial contact. The value of newspapers, radio, or television in supplementing handbills and poster should be considered. Note that a variation in the follow-up medium is not a necessity; it is simply common practice (p. 386).

Delivery of Benefits

Rothman and Thomas (1994) note that the actual delivery of the promised benefits is particularly important. When the benefits are in the form of a social event, the practitioner should oversee the proper operation of the event. They also note that several professionals in their study developed contingency plans, so that if one benefit turned out to be unavailable, another could be substituted. If the benefits were interpersonal, then more energy needed to be expended during an event (p. 387).

v. Intervention Implementation Conclusions

Rothman and Thomas (1994) conclude saying that the personal resources of the practitioner are the most effective tools. These could include: selecting appropriate benefits, announcing them, motivating people, and delivering both interpersonal and material rewards. It is advisable to choose a goal and a strategy that are consistent with (or which can be enhanced by) your experience. Choose a goal about which you have conviction and enthusiasm. Choose a programme that will be of specific interest to clients, or work hard at developing their interests. Several field workers warned that the intervention cannot be carried out in a mechanical, ritualistic manner. The art of practice has to shape the science of any intervention strategy. This involves the practitioner's attitudes, interpersonal skills, and a sense of timing.

As two of them advised:

There is a need to develop trust and a decent relationship with client groups. This takes time and demonstrated proof that you can deliver.

There is the consideration of the personal qualities of members, as well as the level of enthusiasm conveyed by the practitioners.

More specific observations include:

I found little difficulty in using the guideline. The only problem was self-imposed: a limited time in which to develop the offered benefits.

One difficulty was my lack of information about the community I was working in. Insufficient time forced me to form a group before I had adequate community information.

Finally Jack Rothman and Edwin Thomas say to realise also that clients and community people will have other activities that must compete for their time and interests. The benefits you offer must be strong enough to gain their attention and capture their motivation (p. 394).

vi. Evaluating the Intervention Programme

Evaluation means different things to different practitioners. Therefore we must not seek results or solve a problem; but we must be able to measure them to assess what was right and where we went wrong. Thus the key to evaluating what people have learned from a particular programme they have participated in, but is to measure the same knowledge, awareness, and understanding variables measured before the programme began.

Cutlip et al. (1994) say that to determine change, comparisons must be made between at least two comparable measures: by repeating the measures on the same or similar people or by making comparable measures in a control group of similar people not exposed to the programme. This same principle applies to all assessments of programme impact (p. 428).

Rothman & Thomas (1994) describe four major aspects of the evaluation and advanced development phases as follows:

- selecting an experimental design
- collecting and analysing data
- replicating the intervention under field conditions
- refining the intervention

Therefore on completion of these four phases an evaluation can be made as the final step in the process where adjustments through reflection, participatory feedback and assessment can be completed. Evaluation analysis is an opportunity to understand what happened and why, and if required how things could be improved or accomplished more competently (p. 31).

Cutlip et al. (1994) say that as part of the appraisal action some basic questions should be asked about the purpose of the intervention, the conceptualisation, the design and the programme (p. 410).

- What is the extent of the target problem?
- Is the programme designed in congruity with the intended goal?
- Is there a coherent rationale underlying it?
- Have the chances of a successful delivery been maximised?
- What are the costs in relation to the benefits derived?
- Were the financial costs and the budget expenses realistic?
- Is the intervention accountable to the specified target area?
- Has the intervention effort(s) kept to the programme design?
- Is the programme effective in achieving the intended goals?
- Is the programme having effects that were not intended?
- Can the programme results be from an alternative process?
- Was the programme an efficient use of resources?
- Was the time-frame (nine weeks) sufficient to implement?
- Could the results been obtained through any other programme?

The approach I have taken with this community Tuupuna Knowledge Base Health Intervention programme is initially structured from a conceptual perspective with a strong central point on tangata whenua Maaori health issues focusing on the inclusion of the essential fatty acid omega-3. Therefore the intervention programme encompasses eel/tuna dietary consumption (or similar such as sardines) to address the current Type II diabetes mellitus health issue afflicting tangata whenua Maaori where it has been previously canvassed in this thesis. While at the same time it is anticipated that the

intervention methodology design can be transferred or modified to suit most indigenous community needs where a health issues requires redress. However the actual application of this intervention design will be addressed through its implementation in the post-doctoral work that will be undertaken in the near future. Therefore as an integral part in the development of the framework, or the setting, or the environment for the Tuupuna Knowledge Base theory an examination of Tainui or Tainuitanga needed to be identified and clarified.

So I asked myself? Is there a recognised Tainui specific framework for research, for wellness and for culture? Could knowledge from a traditional holistic practice provide a new way of addressing the health problem in a contemporary setting?

Thus examining the traditional practices that have evolved over time with established principles, values and ethics as a method to demonstrate the suitability of traditional hauora and what would have to happen to provide a solution to a contemporary health problem using Type II diabetes in an Intervention.

vii. Pilot Testing

Rothman & Thomas (1994) comment that during the early development and pilot testing phase a primitive design is evolved to a form that it can be evaluated under field conditions. This phase includes the important operations of developing a prototype or preliminary intervention, conducting pilot testing, and applying design criteria to the preliminary intervention concept. Thus by this stage in the design process, preliminary intervention procedures are selected and specified, to develop a prototype for use in pilot testing. But pilot testing is designed to determine whether the intervention will work *to see if the beast will fly*. These pilot tests help to determine the effectiveness of the intervention and identify which elements of the prototype may need to be revised (p. 36).

Thus the first aspect of the pilot testing is to assess the following:

- Would the intervention be effective?
- Could it be replicable by typical end-users?
- Would it be simple to use?
- Is it practical?
- Is the intervention adaptable to various contexts?

- Is it compatible with the local customs and values?

Then the second aspect of the pilot testing would assess the following:

- What the participants overall comments are?
- Do the objective(s) actually meet the achievement criteria?
- Critical assessment of the strengths and weaknesses.
- The changes or modifications required.
- How and when to implement the intervention?

In conclusion, a primary goal of intervention research is to develop interventions that are effective in a variety of real-life contexts with those who actually experience the problem. Replication under various field conditions helps to assess the generality of the effects of the intervention and the Tuupuna Knowledge Base health intervention will be completed as a pilot test through an intended future Post-doctoral Research Programme.

***Ka whawkahokia e hau te taonga nei ki te take o ngaa maunga
takoto atu. Ka toimaha koe, tiikina atu.***

I shall return this gift to the base of the mountains to remain there.
In time of need, fetch it.

Chapter five

Summary, Conclusions and Recommendations

Summary

This thesis brings together science, history and the values derived from lore and tikanga addressing the Type II diabetes mellitus health issue for contemporary Maaori. The thesis conclusion has been derived through the interface of customary and contemporary knowledge synthesising knowledge bases from these two perspectives by combing traditional Maaoritanga/Kiingitanga knowledge and scientific knowledge. As I have said this is not a thesis about Type II diabetes mellitus and this thesis does not attempt to develop a pharmacotherapeutic formula for Type II diabetes prevention through dietary omega-3 intake. This thesis does draw a distinction that the staple long finned eel was pivotal in protecting traditional hapuu Maaori against the non-communicable disease Type II diabetes mellitus because of the omega-3 fatty acid nutrient and lethicin they contain. The narrative about the long finned eel establishes the credibility of the accumulated tuupuna customary knowledge handed down to subsequent generations.

This thesis presents a scientific standpoint through the story of the long finned eel that includes scientific analysis to verify that the long finned eel does contain the essential fatty acid omega-3. The chemical assay testing from the *AgriQuality* verifies that the long finned eel does contain the essential fatty acid omega-3 and with repeated testing from *AgriQuality* also confirms that the omega-3 oil remained stable over time, exposure to light and being smoked. This fact is very important to the credibility of this thesis because the literature review had indicated that the long chain fatty acid omega-3 structure would weaken over time and with exposure to light. But the omega-3 long chain fatty acid structure from the long finned eel remained stable thus supporting my original theory about the benefits of incorporating the long finned eel into the diet.

In short this research thesis has three viewpoints or findings to reach the conclusion, first the thesis presented an historical perspective to explore past records, through a variety of ways. It offered an approach by meticulously examining the past through the historical records thus bringing an answer forward that can be used; and has then offered a different

perspective as to the reasons for the current Type II diabetes health problem now afflicting contemporary Maaori. The various questions raised in Chapter one has been thoroughly investigated demonstrating the benefits and practice of combining knowledge-bases through awareness, access, validation and utility. Initially through the Tuupuna Knowledge Base research methodology designed with the mandatory articulated in Chapter two together with the methods used for data collection and quality assurance. Then the Tuupuna Knowledge Base health intervention has been designed as a solution to the current Type II diabetes epidemic in Maaori; but in addition both these academic tools are suitable for any other indigenous research and methodology.

As I have said a health intervention has been designed as a solution to the current Type II diabetes epidemic in contemporary Maaori but based on traditional tuupuna customary knowledge. The evidence gathered from the ten year data gathering study (regarding the dietary and lifestyle choices from Waikato hapuu (Ngaati Mahuta/Ngaati Pou) participants through continual discussions) has been incorporated into the thesis with the results of the study presented as two groups *Group A* and *Group B*. Thus the regular daily consumption of the omega-3 derived from the long finned eel/tuna certainly does explain explain the absence of the Type II diabetes symptoms from the historical record.

Thesis Discussion

Type II diabetesmellitus as an epidemic

This thesis provides an opportunity is to examine exactly why Type II diabetes mellitus abruptly manifested symptoms subsequent to Urban Maaori Migration of the 1950/60s and thereafter. I say the sudden occurrence of Type II diabetes is primarily due to the abrupt change in the staple diet, lack of exercise and holistic lifestyle. The staple diet was principally the daily consumption of eel/tuna that contained the unsaturated fatty acid omega-3 and lethicin; together with protein, some carbohydrates, fresh seasonal vegetables and/or fruits and drinking plenty of water (with daily cleansing of the bowels as part of the health routine). I have reached this conclusion because Type II diabetes did not apparently exist prior to the urban migration and then it was suddenly an epidemic. But the long finned eel supply was drastically reduced around this time because of the construction of numerous Hydro-electricity Stations constructed predominantly on the

Waikato River at the same time that the Maaori Urbanisation occurred. While at the same time those that relocated to an urban environment abruptly changed their lifestyle of regular daily exercise and strong connection to their Maaoritanga that contained a spiritual dimension. For the Kiingitanga hapuu it was the Waikato River that was pivotal in providing the strategies that contributed to wellness.

Urban migration brought instant change from a hierarchical social structure with historically established boundaries to where people could live as they pleased without the restrictions of the traditional hapuu and whaanau. They could obtain money and assets for themselves in their own name including a car, modern conveniences and readily obtain alcohol consuming as they desired. So while many had the freedom to do as they pleased and money to spend on what they preferred many of the long established values and habits were abandoned, but with consequences.

The possible link between Omega-3 derived from Eel and Type II diabetes

The thesis questions the possible link that the long finned eel/tuna had been the staple diet since arrival in approximately 1350 AD and had been regularly consumed. This thesis has carefully examined the possible link between omega-3 derived from the long finned eel in the diet and lifestyle choices of rural tangata whenua Tainui hapuu Maaori and the absence of Type II diabetes.

Modern science testing has been able to confirm that the oily component of the eel is in fact the unsaturated fatty acid omega-3 and medical research has indicated that a regular dietary intake of omega-3 derived from finfish does prevent Type II diabetes (and other chronic non-communicable diseases). Two interesting scientific factors are that the omega-3 from the long finned eel is very stable and the omega-3 quality does not deteriorate with handling, with time or with exposure to light.

There is strong evidence through clinical trials to suggest that regular consumption of the unsaturated fatty acid omega-3 appears to prevent Type II diabetes and other chronic non-communicable diseases such as cancer and mental illness. Thus tuupuna were aware that regular consumption of the long finned eel/tuna ensured good health but were not aware that the oily substance contained in the eel was an essential fatty acid required to ensure continued good health.

The last decade has seen an abundance of nutrition and nutritional supplementation data, information and scientific research. The results continue to demonstrate that the type of foods consumed determine health, wellness and longevity, and that some foods offer medicinal qualities; something the tuupuna knew through careful observation. They had an innate understanding that the food and the nutrition they contained were directly related to health, wellness, and longevity. In fact all aspects of food was revered through the tapu process to ensure survival, disease prevention, good health, well-being and longevity through a holistic procedure thus the result was that no chronic diseases manifested and that people were healthy.

Health intervention based on the diet and holistic Lifestyle choices

As I have noted there are nine components adapted from the past and developed for a contemporary setting that include nutritional and other physiological benefits such as exercise and broader wellness outcomes. The Tuupuna Knowledge Base health intervention proposes a theoretical model for health intervention based on the diet and holistic lifestyle choices based on inherited traditional disease prevention knowledge. This health intervention is different because it is developed from a synthesis of customary knowledge where lifestyle choices acted as a holistic health intervention that includes a spiritual component.



The following is a brief outline of what I proposed for each chapter and a summary of what I have done to reach the conclusion I did.

Summary of Chapter one outcomes

In Chapter one I provided a rationale of why I had undertaken the doctoral thesis research and what I was attempting to show but the motivating factor was to find a reason why there is so much Type II diabetes in Maaori and why it has suddenly occurred in 1960s. Therefore I needed to provide sufficient information to be able to present my argument from an historical, scientific and health (through lifestyle choices) perspective.

- The traditional Maaori research paradigm from an historical viewpoint.
- The traditional Maaori health hauora holistic methodology.
- The oral history and customary inherited knowledge entrusted to me.

Summary of Chapter two outcomes

In Chapter two I used the customary academic theoretical frameworks and then incorporated the established Kaupapa Maaori research methodology in tandem with an indigenous point of view. I then extended Kaupapa Maaori methodology and from a critical theory framework standpoint developed the Tuupuna Knowledge Base research methodology. Then I combined the knowledge bases by having an awareness and acceptance, being able to access it, being able to validate it, and being able to use in a contemporary sense through research methodology.

Moreover encouragement from my kuia during discussions about the cause(s) of Type II diabetes eventually led to more structured interviews with whaanau and hapuu members about lifestyle choices and the prevalence of Type II diabetes. I needed to establish exactly why Type II diabetes became an epidemic subsequent to the urban Maaori migration of the 1950/60s and thereafter. This was achieved through the informal kuia and kaumaatua discussions and then more formal structured interviews with the participants in the ten year data gathering study developed into a more structured piece of research. The Key Informant Data Gathering Study (from 1996 to 2006) clearly demonstrated a pattern that regular eel/tuna consumption appeared to prevent Type II diabetes. As I have noted I had regular contact with all the participants in both *Group A* and *Group B* and as I have said these two groups on nine in each group had been selected

from an original fifty. The number nine is a significant number in Tainuitanga kawa thereby using components of nine was important from a traditional perspective.

Summary of Chapter three outcomes

The Statement of Principal Findings for Chapter three is a compilation of research findings data focusing on Tainuitanga and the health prevention framework with a comparative analysis. The strengths in this chapter have been the access to customary hapuu knowledge to develop an academic framework, and the opportunity to utilise the Tuupuna Knowledge Base research methodology developed in Chapter. While at the same time this chapter has provided credibility to an alternative way of thinking and a new way of addressing the health problem in a contemporary setting. It is anticipated that clinicians or policy makers can provide an alternative holistic approach for Type II diabetes and chronic non-communicable disease but to date the treatment regime has only had limited success.

Summary of Chapter four outcomes

Part one of Chapter four focused on the health intervention initially from a Western theoretical framework perspective combined with the research findings. Indeed the strength of the chapter is that it provides substantial depth and detail for a community health intervention with a structured framework to combine customary knowledge traditions in a contemporary setting. In other words provides an opportunity to utilise the valuable inherited knowledge and adapt for a practical application from the Tuupuna Knowledge Base research methodology. As a result the end product will enable tangata whenua Maaori to implement a community programme at a grass roots Marae level incorporating and then providing credibility to customary knowledge. In fact most Maaori understand and relate to the Tuupuna Knowledge Base health intervention concept. It is anticipated that there will be a high level of acceptance and motivated participation through understanding of ancestral knowledge value and belief. Thus for any concept or intervention to be utilised by tangata whenua Maaori there first needs to be an acceptance by the community that it adheres strictly to tikanga Maaori and kawa because that is the way it is done in Maaoridom. Although maintaining a close

consultative relationship with my own kuia and kaumaatua, it was important to seek acceptance and approval from the wider community but it was also necessary to pursue an opinion of my eel/tuna theory from a wider audience.

Summary of Chapter five outcomes

In Chapter five as the concluding chapter I discuss the thesis primarily for an academic audience and then address a number of questions arising from the thesis that such an audience may wish to canvass. The presentation of Chapter five with a defined Summary, Conclusions and Recommendations provides an overview mindful of other scholars to peruse. Then the thesis data concludes with an appropriate ngaaa mooteatea waiata or ancient knowledge chant called *Teenei Au*.

Conclusions

Questions arising from the Thesis

The question of other omega-3 dietary sources addressed?

First it may be suggested that sufficient omega-3 was obtained from other dietary sources such as: fishes, seafood, birds or natural vegetation, for example the native flax and flaxseed called *Harakeke*. However to date research and chemical assay testing has not been completed (for either the existence or the amount if any of omega-3) on many of these species. It has recently been well documented the flaxseed contains omega-3, but while all parts the *Harakeke* were used extensively for weaving and medicinal purposes the actual small black seed found in the pod of the *Harakeke* flower was limited in its use. Omega-3 derived from plants is inferior in both the amount and quality to marine omega-3. *Harakeke* seeds were not consumed regularly as a staple food in the same way that the long finned eel was regularly consumed through daily dietary intake.

The significance of long finned eel consumption

Type II diabetes can be prevented through the regular consumption of eel and that ceasing to consume eel regularly as a staple food is the reason why tangata whenua Maaori has developed these diseases. While at the same time ensuring that a healthy lifestyle of regular exercise, drinking water, eating a variety of vegetables and fruits,

including other omega-3 rich unsaturated fat foods in preference to saturated fat food. In addition to ensure that the body is regularly cleansed through removal of waste matter through the bowel for disease prevention and the promotion of good health as the historical evidence clearly demonstrates this practice. It would appear that if the body's wastes are not eliminated regularly (daily is the optimum) then diseases such as cancers and obesity will quickly develop.

Eel/tuna certainly contained the nutrients required for good health and the long finned eels as the staple food for Maaori being consumed every day. Interestingly the Mediterranean diet is not dissimilar to the traditional tangata whenua diet (that was rich in omega-3 and other nutrients required for good health) prior to Maaori Urbanisation when the symptoms of Type II diabetes actually manifested. As I have previously noted societies such as parts of India, China, Japan, Italy Ireland and Spain that traditionally regularly consumed eel had a high incidence of Type II diabetes. But then since they have adopted a more Western style diet and abandoned eating eel then diabetes Type II has suddenly appeared. Scientific chemical assay testing was completed for the existence of omega-3 in eel (particularly the long finned) to complement my research on the two different species that Maaori ate staple the freshwater long finned and the salt water conger. In fact the omega-3 quality did not deteriorate over either a twenty-four hour or a forty-eight hour period. The samples were taken from different parts of the eel where the head had the least omega-3 content and the tail section had the most. However the head was never used by traditional tangata whenua Maaori because the head is considered tapu, in fact the most tapu part of the body, but the areas most favoured by our tuupuna had the highest content of omega-3.

Life expectancy questioned?

Next that prior to 1840 Maaori life expectancy was very short and diabetes mellitus symptoms may not have had time to manifest. I do not agree with this suggested question because tangata whenua Maaori prior to British colonisation in 1840 were very healthy and many lived to a great age. Pootatau Te Wherowhero I was aged one hundred and one when he passed away in 1858 although he was almost blind he enjoyed excellent health and well-being throughout his life. The Rangatira class or upper class of a traditional

Maaori society lived longer than the commoner or Tuutuu who lived longer than the captured slave or Taurekareka, the latter doing manual tasks. As my tuupuna all came from the Ariki or privileged upper class where they were looked after by others may have some bearing on their longevity.

However I consider that Captain James Cook would have recorded factual information in his diaries as the objective of his visits, especially the first two were for scientific research as well as mapping the land. Cook stayed for six months on the first voyage to New Zealand and from all accounts was a *hands on man* who preferred to experience a situation rather than as an the usual and expected norm, an aloof Navy Captain. He actually lived with tangata whenua and the inhabitants of the other Pacific Islands he visited, for example, the Society Islands of Tahiti, Raiatea and Huahine, Tonga and the Hawaiian Islands, the latter where he was killed.

Robson (2004) comments that Captain James Cook visited New Zealand three times, the first time (with a rank of lieutenant) was from 1769 to 1777 in the converted collier named the *Endeavour* HM Bark arriving (at the East Coast he called Poverty Bay) on 8 October 1769. Cook, a man interested only in facts navigated and mapped the New Zealand coast for six months spending time with mainly coastal Maaori but remarking on the old age of the people and their good health. Captain Cook's second voyage to New Zealand (ranked as a Commander) was in the *Resolution* HMS from 22 October 1773 until 25 November 1773 (leaving London in July 1772 and returning July 1775) (p. 124).

He again making his base in the area now known as Queen Charlotte and again came in contact with Maaori extensively.

Robson (2004) comments that with Cook's third voyage to New Zealand in February 1777 (ranked as a post Captain also in the *Resolution*) he did not stay but sailed through what is now called Cook Strait. Cook had left London in June 1776 and after sailing around the Pacific Ocean up to Alaska and the Arctic Ocean, was killed at Kealakekua Bay in Hawaii on the 14 February 1779 aged 51 years (he had arrived December 1778). A monument was erected in 1874 on the north shore of the bay where Cook met his death. A plaque marks the spot where he died. The settlement of Captain Cook is located

high above the cliffs of Kealakekua Bay. Cook's wife Elizabeth bore his six children but she outlived them all passing at aged 94 years. (p. 127).

Pool (1991) is quite non-specific surrounding Maaori pre-historical or historical population trends and life-spans. I question the life-span that Pool is quoting; my own whakapapa extends back to the arrival of the Tainui waka around 1350AD, some thirty generations ago with many of my tuupuna living to over eighty years well over the 25-30 year life-span he quotes.

Data and figures used to assess Maaori projected life span prior to 1900 are not in any sense definitive. Indeed given the current level of debate and intellectual ferment in Oceanic prehistory, it is almost certain that today are hypotheses and explanations will be rejected by the evidence unearthed tomorrow and the new theories it spawns (Pool 1991, p. 35).

Indeed the accumulated generations would be greater than thirty generations had the life span only extended to 25-30 years as Pool claims. I concur that some would have been killed prematurely due to hapuu conflict but these were specially trained Warriors and used for attack and defensive purposes. Traditional Maaori hapuu society designated roles and positions within the hapuu as a result a persons or family role were usually specialised and customarily inherited from birth (p. 30).

Pool (1991) also notes that his study has covered a history estimated to have commenced in the period around AD 500-800. The few hundred settlers arriving at that time increased in number over the next millennium to reach a population of over 1000,000 in 1769, when the first significant European contact was established. Pool also questions whether or not Cook's 100,000 populations were correct; but Captain Cook spent considerable time travelling around New Zealand coming into contact with numerous Maaori. The number of 1000,000 as a population of New Zealand has been well established since 1769 with most people accepting the 100,000 as a fact (p. 169).

Captain James Cook was a man a fact not of opinions or embellishments.

The question of inadequate nutrition addressed?

The third question the thesis may present is that tangata whenua Maaori had a subsistence diet with an under-supply of essential nutrients for optimum good health. Thus this created a familiar inherited gene that could predispose people to a number of chronic diseases such as Type II diabetes mellitus?

There is debate about whether levels of nutrition were satisfactory, but some direct and indirect evidence suggests that cultivation was not highly productive, and had to be supplemented by gathering, hunting and fishing, where this was possible. Therefore it can be argued that food supplies were marginal and perhaps inadequate; with levels of life expectancy at birth of only 25-30 years and at age 15 only 13-17 years (Sutton and Molloy, 1989, p. 33, as cited in Pool 1991), however just do not fit with what is known about the epidemiological transition (Omran, 1982, as cited in Pool, 1991).

Perhaps here the analyst is a victim of the difficulties inherent in the age estimation of skeletal remains. The daily and seasonal routines are not fully understood, moreover, calibration of dating is rather blunt, so that it is always difficult to ascertain whether or no paa were inhabited at the same time (Pool, 1991, pp. 33-36).

Rout (1926) says that most of the staple foods of the Maaori were of vegetable origin and their flesh food consisted of rats and birds snared and cooked at certain seasons only (when fat), fresh and smoked fish, sometimes eaten raw; shell-fish from the rocks eaten raw or lightly cooked by having boiling water thrown over them; eels and whitebait, eaten cooked, and crayfish from the rivers and lake, usually eaten cooked; and lizards, which were roasted. The principal vegetable foods were the sweet potato, the *Kuumara* and the *Taro*, generally steam roasted, sometimes boiled; pumpkins grown mostly for the calabash vessels and musical instruments; and the so-called Maaori Cabbage (which would be better described as Spinach), *Pikopiko* and *Puuhaa*. The former consisting of the young shoots of a native tree-fern, that has now become a very popular vegetable served in up-market New Zealand restaurants and the soft succulent stem of the *Ti*, the dwarf cabbage tree, which grows mostly in swampy land. Many berries found in the forest were eaten raw; others were boiled or roasted, then dried and eaten like nuts. According to the Maaori view diet should be so regulated as to keep the bowels in proper working order. When anybody felt out of sorts, they said the inner man was *unhealthy*. Or

out of order. Rest from food, followed by exercise, was necessary to put the inner man in *good form* again (p. 29).

Cultivation or agriculture for some hapuu was not the preferred staple food for the traditional Maaori rather it was a supplement secondary food source certainly not the primary staple as eel was. However generally in other Polynesian societies where resources were and still are much more limited (after all this was the reason for the original migration as the island land was too small to maintain the growing population) the crops cultivated played a more dominant role in the diet. New Zealand being a much larger land area than the Polynesian islands throughout the Pacific Ocean contained more resources with more opportunity for dietary variation through the changing seasons. Pool's comments appear to be that of an observer rather than a participant looking out.

Therefore based on knowledge handed to me that a daily pre-European diet consumed by tangata whenua Maaori included, first about two litres fresh clean water consumed usually in the morning, then around mid-morning to our lunchtime a meal of eel either fresh when available, smoked with a Maanuka flavour, steamed or boiled, or fried with oil derived from the eel and other oily fish such as the shark. The eel was accompanied with kumara also cooked in the same way as the eel, as well as waatakirihi *water-cress* and other native edible vegetation such as puuhaa a type of *sow-thistle*. Then in the evening a meal of bird, available and seasonal seafood's such as paaua *abalone*, pipi a *cockle*, iinanga *whitebait*, tipa *scallop*, paapaka *crab*, kooura *crayfish*, and kina *sea-egg*. Indeed preserved eel (both freshwater and salt-water conger eel), shark and bird were always available for when fresh seafood or the many variety of local fish such as taamure *snapper*, paatiki *flounder*, warehenga *kingfish* were not available to catch.

The historical knowledge was deficient question addressed?

Indeed another question that may arise from this thesis is that some historians claim that at the time of colonisation tangata whenua Maaori were clinically and medically naïve even described by historians as *savages*. Traditional Maaori were a very sophisticated society with highly developed health and well-being methods through the Tohunga spiritually healing, massage and medicines prepared from natural resources with some surgical intervention. Indeed historical recordings primarily through waiata and karakia make no mention most European chronic non-communicable diseases and after all diabetes mellitus had been diagnosed and recorded since the seventeenth century in the established European civilisations. It was not until the arrival of the European and with that contact communicable and infectious diseases that Maaori had no immunity to were introduced. As a result of the post WWII urbanisation and the sudden dietary and lifestyle changes that the non-communicable lifestyle diseases such as Type II diabetes manifested and then quickly became an epidemic.

The question of inherited genes causing Type II addressed?

Very little is known about the genetics of diabetes other than there is a gene-environment interaction with multiple genes involved. It is reasonable to think that that when linkage analyses are done, researchers may find Type II diabetes-related genes; they may be primary-related genes or modifying genes. This theory could no doubt be the basis of an alternative hypothesis and argued accordingly, but I consider it is more the life-style habits that are inherited by acquisition.

Dorin (1997) says Type II diabetes is associated with obesity and with aging. The problem seems not so much in insulin production, but that when the insulin reaches its target cells, it does not work correctly. Most Type II diabetes patients initially have high insulin levels along with high blood sugar levels. When a person takes in a high load of sugar, the sugar stimulates the pancreas to release insulin. The targets for insulin are muscle, fat and liver cells. These cells have insulin receptor sites on the outside of the cell membrane. For most people, when insulin has bound to the receptors, a cascade of events begins which leads to sugar being transported from the blood into the interior of the cell. In Type II diabetics, even when insulin is present on the cell membrane, the process

doesn't work. The glucose is never taken up into the cell and remains in the bloodstream. It is not high blood sugar that is the disease process of diabetes, but complications from the high blood sugar. Standard complications for many diabetics are: retinopathy (blindness), neuropathy (nerve damage) which leads to foot ulcers, gangrene and amputations, kidney damage, thus to dialysis and cardiovascular disease (p. 2).

Booth, Chakravarthy and Spangenburg (2002) say that the survival of *Homo sapiens* during evolution was dependent on the procurement of food, which in turn was dependent on physical activity. However, food supply was never consistent. Thus it is contended that the ancient hunter-gatherer had cycles of feast and famine, punctuated with obligate periods of physical activity and rest. Hence, gene selection in the late Palaeolithic era was probably influenced by physical activity and rest. To ensure survival during periods of famine, certain genes evolved to regulate efficient intake and utilization of fuel stores. Such genes were termed *thrifty genes* in 1962.

Furthermore, convincing evidence shows that this ancient genome has remained essentially unchanged over the past 10,000 years and certainly not changed in the past 40 to 100 years. Although the absolute caloric intake of modern-day humans is likely lower compared with our hunter-gatherer ancestors, it is nevertheless in positive caloric balance in the majority of the US adult population mainly due to the increased sedentary lifestyle in present society. They contend that the combination of continuous food abundance and physical inactivity eliminates the evolutionarily programmed biochemical cycles emanating from feast-famine and physical activity-rest cycles, which in turn abrogates the cycling of certain metabolic processes, ultimately resulting in metabolic derangement's such as obesity and Type II diabetes. In this context, they postulate that perhaps a crucial mechanism to break the stall of the metabolic processes would be via exercise through the regulation of *physical activity genes*, some of which may also be potential candidates for the *thrifty genes* of our hunter-gatherer ancestors. Therefore, the identification of such *thrifty gene* candidates would help provide insight into the pathogenetic processes of the numerous physical inactivity-mediated disorders (pp. 3-10).

The question of Exercise and its importance

Since the mid 1990s many studies have assessed people's exercise habits and participation, concluding that regular exercise or physical activity does minimise the risk of Type II diabetes development. But much of the research was undertaken with cross-sectional studies by assessing large numbers of people through questionnaires about their lifestyle habits where often the data was unreliable because incorrect information could be provided. Recently several notable research studies have been able to more accurately measure the impact of regular physical activity with the possible prevention of Type II diabetes.

When we start to exercise and examining exactly how the body reacts from any exercise by immediately responding and releasing *stress* hormones that work to increase our blood sugar. These *stress* hormones signal the liver to begin releasing more glucose, the pancreatic hormone called *glucagon* is the one with the most direct effect on that organ. Then epinephrine (more commonly known as *adrenaline*) raises our heart rate and then signals our exercising muscles to break down their stored glycogen together with some fat. Simultaneously our body reduces the amount of insulin that the pancreas secretes, thereby assisting the muscles from taking up too much blood glucose. The overall process is called *glucocorticoids* and is a group of hormones concerned with normal metabolism and resistance to stress called cortisol (hydrocortisone), corticosterone and cortisone with cortisol dominating and effectively redistributing more blood and fuel to work the muscles and the liver.

Humans have a limited supply of glucose stored in their muscles and liver as *glycogen* and even less circulating in the bloodstream. It is essential that blood sugar levels are maintained in the body to enable the brain and nervous system to function properly. Therefore because carbohydrates are the primary fuel that the body uses during exercise, our liver must act quickly to replace the blood sugar muscles use by breaking down into its glycogen to form glucose or making new through metabolism which is any chemical reaction of the body (like lactic acid). Hormones are the primary regulators of metabolism; however, hormonal control is ineffective without the proper minerals and vitamins.

When we are not exercising our body usually uses a mix of about 60 per cent fat and 40 per cent carbohydrate (with very limited protein use). However during exercise carbohydrates supply the majority of the fuel and the harder we exercise the more carbohydrate our body will use up. In addition fat can also be used but usually when we exercise in a mild to moderate workout. Then during recovery from exercise and when our body is restocking the fuel deposits that were used that is where the body uses up fat. Numerous research and studies have concluded that any type of exercise makes insulin work better in the body. And when less insulin is needed the pancreas is more likely to be able to produce enough insulin to meet the needs of the body with a substantial decrease in the risk of developing Type II diabetes, even without any loss of weight. So why is not exercising and leading a sedentary lifestyle so damaging to our body and health? It is because the insulin is not stimulated and the body becomes overburdened with increased blood sugar accumulating and does not allow the body's process to function properly that will eventually develop into a chronic disease such as Type II diabetes. To bring to a close, the human body has been designed to be used and if not used and maintained properly primarily through dietary intake and exercise then problems will start to develop and if not corrected then disease and death will occur.

The question of Multiple Risk Factors addressed?

There is the question about multi-factorial risk situation such as obesity, sedentary lifestyle with a lack of exercise, smoking (either tobacco or illegal substances), alcohol abuse, inadequate dietary intake because of poverty or a lack of education about appropriate nutrition. Then while each of these factors either singularly or collectively is known to contribute to the manifestation of Type II diabetes or most certainly need to be addressed; I do not attest that regular eel consumption will eliminate the disease. But I do say that if only regular eel consumption was included in the diet (say three times a week) then the omega-3 and lethicin content would contribute toward minimising diabetes mellitus Type II (and other chronic disease) manifestations.

Type II diabetes as a global issue so with global strategies

In fact health has now become a worldwide health problem with the World Health Organisation (WHO) projecting a global strategy with an overall goal and guiding principles. The overall goal of the strategy is to improve public health through healthy eating and physical activity. A few largely preventable risk factors account for most of the world's disease burden. Chronic diseases – including cardiovascular conditions, diabetes, stroke, cancers and respiratory diseases – account for 59% of the 57 million deaths annually, and 46% of the global disease burden.

This reflects a significant change in diet habits and physical activity levels worldwide as a result of industrialisation, urbanisation, economic development and increasing food market globalisation. Recognising this, WHO is adopting a broad-ranging approach and has begun to formulate a Global Strategy on Diet, Physical Activity and Health, under a May 2002 mandate from the World Health Assembly (WHA). This population-wide, prevention-based strategy is being developed through extensive consultation and was presented to the World Health Assembly in May 2004. The guiding principles are:

- Stronger evidence for policy:
Synthesise existing knowledge, science and interventions on the relationship between diet, physical activity and chronic disease.
- Advocacy for policy change:
Inform decision-makers and stakeholders of the problem, determinants, interventions and policy needs.
- Stakeholder involvement:
Agree on the roles of stakeholders in implementing the global strategy.
- A strategic framework for action:
Propose appropriately tailored policies and interventions for countries (WHO [Web site: <http://www.who.int/dietphysicalactivity/goals>]).

Recommendations with Thesis Findings

In Chapter one it was stated that this breaks new ground because it addresses a significant health issue for contemporary Maaori, bringing together science, history and the values derived from lore and tikanga providing credibility to our ancestors' knowledge and their

way of thinking. The thesis has provided credibility to inherited ancestral knowledge, then produced a research methodology with applicable Standards and then produced a nine point health intervention based on all these findings.

It was stated that this thesis would emphasise and then offer an approach:

- From an historical exploration by gathering evidence using customary knowledge.
- With a methodological framework examination as an alternative to research indigenous customary knowledge acceptable to academic audience.
- To develop with the mandatory Standards how to access customary knowledge.
- Along with knowledge outcomes though access to information.
- Through a conceptual investigation with the long finned eel metaphor.
- Produce a health intervention design for implementation.
- By way of practice outcomes through health intervention design.

This thesis found:

Firstly, that the historical evidence tuupuna gathered over numerous generations especially relating to the diet, health and lifestyle choices did in fact keep them healthy. Because not only survival depended on good health but also the quality of life they enjoyed was reliant on continued good health. Thus the methodological framework examination review has created an alternative research methodological framework with Standards suitable in an indigenous environment called the Tuupuna Knowledge Base Methodology. This research methodology is an extension of the academically established and accepted Kaupapa Maaori Research Methodology.

Secondly, that the long finned eel/tuna investigation confirmed it was consumed daily as either fresh when there was a surplus (or from the storage *corfs* pits), or smoked over Maanuka, or dried in the sun or wind. The chemical assay tests confirm scientifically that the long finned eel (as the staple) and the conger eel (when available) does in fact contain high quantities of high quality omega-3, the unsaturated essential fatty acid. Thus the conceptual omega-3 metaphor development of the long finned eel/tuna has in fact been proven.

Thirdly, that a community health intervention suitable for implementation in a contemporary Maaori society has been designed based on the preventative health

intervention strategies used until the Maaori Urbanisation of the 1950s/60s. The health intervention design was by way of *practice outcomes*.

This thesis has attempted to:

- Find a reason why there is so much Type II diabetes in Maaori.
- Why it has suddenly occurred?
- Validate methodologically and utilise tuupuna knowledge base.
- Ensure accessibility of this knowledge characterising as a research tool.
- Examine the multiple reasons to prevent non-communicable diseases.
- Characterise the prior status of Maaori health prior to urbanisation.
- Clarify the changes in diet and cultural practice.
- Draw associations between practice and health status in this case Type II diabetes mellitus.

Summary of what this thesis has achieved:

Establish why there is so much Type II diabetes in Maaori and why it suddenly occurred?

It has been found that Type II diabetes is a consequence of the move from a rural to an urban environment. As a result the staple long finned eel diet containing the unsaturated essential fatty acid omega-3 was substituted for a high saturated meat diet. While at the same time an urban living included: a diminishing lack of exercise because of the motor car, substituting fresh water for commercial drinks and beer that were high in sugar. But also the Hydro electivity developments had a profound effect on the supply of the elvers (from the glass eels) because the turbines destroyed them.

The drastic change in staple eel diet and lifestyle choices such as regular exercise, drinking fresh water, eating fresh seasonal vegetables and/or fruits and living a holistic has contributed to the sudden onset of Type II diabetes in Maaori.

The non-existence status of Type II diabetes has been conclusively established and that the disease manifested abruptly in tangata whenua Maaori as a consequence of Maaori Urbanisation. The changes in diet and cultural practice have been established throughout the thesis but particularly in Chapter three with time-line comparisons.

Associations between practice and health status have been drawn with an appropriate Health Intervention designed for implementation.

Type II diabetes mellitus has been canvassed from numerous dimensions.

The Tuupuna Knowledge Base has been established firstly as an academic research methodology called Tuupuna Knowledge Base Research Methodology. Then secondly as *The Tuupuna Knowledge Base Health Intervention* designed for a Maaori target audience and supported by the ten year Interview Data Gathering Study conducted from 1996 to 2006 with the focus on eel/tuna consumption and lifestyle choices.

Knowledge has been accessed and characterised as a research tool that has been accepted by academic colleagues through recent publications.

This thesis demonstrates the combining of knowledge base(s) by:

- having an awareness and acceptance
- being able to access it
- being able to validate it
- being able to use in a contemporary sense through research methodology
- being able to use as an intervention design
- being able to use in a comparative sense.

Summary of the recommendations from the knowledge base(s) combination are:

Through an awareness and an acceptance of the original hypothesis where the results (both in part and in full) have been recognised by peers, other Maaori organisations, the medical fraternity and the general public both in New Zealand and globally.

Through the TKB Research Methodology and the TKB Health Intervention that is able to be accessed and understood even by non-Maaori.

The long finned eel and conger eel chemical assay testing scientifically validated that the unsaturated fatty acid omega-3 does exist and does not deteriorate with time, light and handling. Thus proving that with the long finned eel as staple provided regular quality omega-3 from the essential fatty acid needed to ensure good health and in particular regulate the pancreas for optimum insulin production for the individual's body requirements.

Horrobin (1982) described essential fatty acids (EFA's) as dietary factors which were discovered in 1929 and like vitamins cannot be made in the body but must be taken with food (p. 3).

Thesis Findings

This ground breaking doctoral thesis brings together science, history and the values derived from lore and tikanga to address a significant health issue for contemporary Maaori. The specific contribution of this research thesis is the combination of knowledge bases from two perspectives, first from a scientific view, then a Maaori view, discovered through an interface of customary and contemporary knowledge.

Metaphorically from the past to the future:

- The historical exploration by accessing customary inherited knowledge.
- The analysis of the long finned eel/tuna as a metaphor for healthy behaviour.
- The acknowledgement to knowledge outcomes through access.
- The development of the Tuupuna Knowledge Base research methodology and providing credibility to customary knowledge as an extension of Kaupapa Maaori.
- The knowledge combination has produced a community health intervention.
- The credibility of traditional practice contributed to health intervention design.

Demonstrating the knowledge contribution by:

- The precise cause(s) and manifestation of Type II diabetes in Maaori.
- The establishment of the prior knowledge and health status.
- The demonstration of the exact changes in diet and cultural practice.
- The association between practice and health status of Type II diabetes.
- The validation and utilisation of tuupuna knowledge base (by producing scientific assay testing to validate the fatty acid omega-3 from the long finned eel/tuna)
- The ability to access the knowledge and characterise as a research tool.

Demonstrating the methods used through combining of knowledge bases:

- The awareness and acceptance of knowledge bases from two perspectives.
- The accessibility discovered through an interface of customary and contemporary.
- The ability to validate through a scientific view and then a Maaori view.
- The opportunity to use the in a contemporary sense as a research methodology and as a component of the nine point TKBHI and extended for other chronic diseases.

This thesis is an intervention which is cognisant of holistic knowledge; demonstrating the benefits and practice of combining knowledge-bases, awareness, access, validation and utility. This thesis introduces and develops the concept of inherited knowledge supported by the mandatory Standards required in an academic context. Therefore the major findings present a synthesis of the two approaches. The framework used is reproducible through an accepted or approved example of something against which others are judged or measured. Thus the accessed inherited traditional and scientific knowledge discovered in this thesis has been adapted for the nine point health intervention designed for Maaori participation. And these are consistent with modern scientific knowledge where the scientific findings from the thesis hypothesises are that the staple long finned eel diet contained the essential fatty acid omega-3, presented as a metaphor for Hauora.

The ngaa mooteatea is a lament about the three baskets of knowledge in Maaori Lore:

Teenei au, teenei au.
Ko te hookai nei o aaku tapuwae, ko te hookai nuku, ko te hookai rangi,
ko te hookai a to tuupuna a Taane-nui-a-rangi.
I pikitia ai ki te rangi tuuhaha ki te tihi o manono i rokohina atu ra.
Ko Io Matua kore anake.
I riro iho ai ngaa kete o te waananga, ko te kete tuauri,
ko te kete tuatea, ko te kete aronui.
Ka tiritiria ka pou pou a kia Papatuuuanuku, ka puta te ira taangata ki te wheiao ki te ao Marama
.....HUI...E...TAIKI...E.....

Pai Maarire

Glossary

atom	chemical element's smallest particle characteristics
atomic number	the number of protons in the nucleus of an atom
desaturation	creation of unusual compound from one already saturated
carbon	essential chemical component of all living matter
carboxylic acids	organic acids that contain a carboxyl group (-COOH)
carboxylic group	monovalent group COOH- which confers acidic properties from the majority of organic acids, the hydrogen atom is replaceable by elements and radicals forming salts/esters
catabolised	erosion from complex physiological state to less complex
catalyst	substance changing the chemical reaction rate - but intact
chemical reaction	interaction between substances in which their atoms are rearranged to form new substances
double bond	each carbon atom can form single bonds with four other atoms, or it can form double, or even triple bonds. In single bonds, each pair of atoms shares one pair of electrons, in double bonds they share two and in triple they share three.
elongation	the state of being lengthened or extended
enzyme(s)	protein substance which will catalyse a biochemical reaction
fatty acid	catalyst that speeds up a chemical reaction in living things
Gondwanaland	carboxylic acids found in natural fats and oils
gyre	Eduard Suess (1831-1914) a geological theory of <i>Pangea</i> two land masses or 'continental drift' the theory expanded by Arthur Holmes in 1930 and accepted as fact
hapuu	ocean currents large scale circulation (occupy half an ocean)
hui	sub-tribe connecting to an ancestral Maaori migratory waka
hydrogenation	formal gathering of whaanau, hapuu or iwi of Maaori culture
kaumaatua	additional reaction where unsaturated molecules are saturated by adding hydrogen atoms
karakia	respected knowledgeable mature Maaoritanga person
kawa	prayer, chant, incantation, religious service
Kiingitanga	local Maaori customs and protocol unique to a region
Koroneihana	originally created from the hierarchical Paramount Chief structure to ensure land and the cultural knowledge remained intact but today is the security of Maaoritanga and inherited knowledge and wairua spiritual through Pai Maarire
kuia	celebration of the Kiingitanga leader's Coronation
Maaoritanga	respected as the knowledge gatekeeper for Tainui and Kiingitanga
marangai	knowledge and serving a separate role to that of a kaumaatua
Marae	Maaori culture based on the traditional ancestral values
matrix	eel-rain when raining and considered suitable to catch eel
mauri	place where Maaori gather where protocol dictates format
mirimiri	any medium in which a thing is formed; as setting health and well-being of Maaori through respect and mana
	massaging with hands in traditional Maaori healing

mitochondria	responsible for cell respiration and respiratory chain phosphorylation and contain the enzyme of the citrate cycle of <i>B</i> -oxidation of fatty acids, the respiratory chain components and other enzymes
molecule(s)	the smallest particle of an element or compound that can exist on its own keeping its properties
moko	tattooing on the face or body usually depicting whakapapa elements and radicals with valency of one
monovalent	elements and radicals with valency of one
mooteatea	selection of traditional chanted Maaori songs and laments
motu	the people other than those from the Tainui waka
noa	unrestricted, safe, good
organic compound	made up of carbon atoms bonded to atoms of other elements
phosphorylation	formation of an organic phosphate in a biological system
Poukai	Kiingitanga gathering established in 1880 by King Taawhiao
prophylactic	disease development prevention often using agent
raranga	weave or plait to record the whaanau or hapuu history
renaissance	sixteenth century scientific knowledge of plants and anatomy
rohe	traditional Maaori boundaries relating to a Hapuu
rongoaa	Maaori medicine made from native flora
saturated	organic compounds with single bonds with no free bonds
Tainuitanga	values and established protocol of Tainui waka hapuu
tangihanga	funeral lasting several days where the deceased is present
taonga	treasures, something very special like the language, the traditional knowledge and skills, people, food health or land
tapu	restricted, confidential, sacred, forbidden to ensure safety
te rohe pootae	a defined area belonging to a hapuu
tikanga	Maaori customs, protocol, the Maaori way of doing things
tiki	a type of neck pendant
Tohunga	highly educated Maaori spiritual healer
tukutuku	interior woven panels inside a meeting house or whare
tuupuna	deceased linked to living through the wairua
unsaturated	organic compounds, double or triple bonds that can open up and join with other atoms without the original molecule(s) breaking up
valency	the number of electrons an atom must gain or lose to acquire a stable outer shell (or combining power)
wai	water used to cleanse in traditional Maaori healing
waiata	song written about life or something significant to hapuu
wairua	spirit or spiritual presence linking living with the deceased
waka	transportation vessel at a time in history
whaanau	close family relatives
whakairo	carve usually in wood or bone the history of the people
whakataukii	proverb, matrix, phrase with words of wisdom
whaikoorero	formal speech given on a Marae in Maaori usually by a male
whare wanaanga	higher education for specialist subjects similar to a University
whatu	woven garments or baskets depicting the local history

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Endnotes:

ⁱWith the arrival of European whalers', sealers' and early traders' in 1810 Ngaati Mahuta and other hapuu associated with Tainui waka, successfully traded supplying the raw material flax for the lucrative global trade required for sailing ships. They adapted to the technological techniques, equipment and farming methodology introduced by the European trader's and early settlers' in 1825, acquiring additional asset wealth of trading ships; simultaneously developing primary agriculture through dairy production and horticultural production from the rich fertile lands that the hapuu owned collectively. At the same time the collective Tainui hapuu developed secondary industry from the successful farming and agricultural activities, for example flourmills.

The existing mode of production adapted to the principles of capitalism through asset wealth and profit making, but was still characterised by a collective ownership of the land and collective means of production. In other words *collective capitalism* an efficient and effective hybrid of the capitalist economic system established since the sixteenth century. Collective capitalism was different from the pre-capitalist collective system in existence because while collective capitalism was generated by asset wealth accumulation through a collective mode of production based on and propelled by the needs, values and association of kinship, it was generated within the capitalist market. It was the Kiingitanga's primary objective to prevent the loss of the collectively owned hapuu land to white settlers and was established from 1850. Thus it was the loyalty of the collective hapuu kinship that was pivotal to the economic success of the Kiingitanga, the competent leadership, together with a strong spiritual connection through Pai Maarire. Through the generations there has been a devotion of all the Tainui waka hapuu to the Pai Maarire that has provided a collective strength of the people to overcome many obstacles. Therefore utilising the Kiingitanga's collective success where everyone contributed and had a role and a place, where everyone needed to participate and develop skills.

But the collective success of the Kiingitanga hapuu was not part of the Imperial British colonisation policy because collective ownership of land was a barrier to the full development of capitalism. Therefore a strategy was developed by the Crown to dismantle the Kiingitanga by military invasion of the Waikato in July 1863. Then New Zealand's first established Parliament in 1854 introduced the ruthless legislation known as The New Zealand Settlements Act 1863. This law enabled the Crown to confiscate the remaining collectively owned Kiingitanga hapuu land by classifying them as 'rebels'. Consequently over a million acres that was collectively owned by the various Kiingitanga hapuu was confiscated in 1865.

ⁱⁱTortora & Anagnostakos (1984) define nutrients are the chemical substances in food that provide energy, form new body components, or assist in the functioning of various body processes. There are six principal Carbohydrates, proteins and lipids are digested by enzymes in the gastrointestinal tract. The end products of digestion that ultimately reach body cells are monosaccharide, amino acids and monoglycerides. Some are used to synthesise new structural molecules in cells or to synthesise new regulatory molecules, such as hormones and enzymes. Most are used to produce energy to sustain life processes. Some mineral and many vitamins are part of enzyme systems that catalyze the

reactions undergone by carbohydrates, proteins and lipids. Water has five major functions. It is an excellent solvent and suspending medium, it participates in hydrolysis reactions, it acts as a coolant, it lubricates, and it helps maintain a constant body temperature due to its ability to release and absorb heat slowly (p. 630).

Tortora & Anagnostakos (1984) define Carbohydrate Metabolism as occurring during the digestion process where polysaccharides and disaccharides are hydrolyzed to become the monosaccharide – glucose, fructose and galactose which are absorbed into the capillaries of the villi of the small intestine. They are then carried through the hepatic portal vein to the liver, where fructose and galactose are converted to glucose. The liver is the only organ that has the necessary enzymes to make this conversion. Thus the story of carbohydrate metabolism is really the story of glucose metabolism (p. 630).

iiiThe history of modern medicine begins with a struggle – both for survival and for understanding of a world that seemed to its first human inhabitants, to operate by the whim of powerful forces. Indeed humanity practiced primitive preventative medicine – for this was all it could do – by appeasing the gods through ritual and sacrifice. Indeed this does not appear to be too different from the traditional tangata whenua Maaori philosophy and way of life.

van Urk (1992) comments that gradually, a body of knowledge built up, based on chance observation and trial and error. Slowly in measured steps over thousands of years 10,000 to 2,000 BC, the body of medical information developed, first from the ancient Egyptians who mixed magic spells with psychotherapy, while using animal fat and dung as their drug of choice. Then Hammurabi of Babylon 2,000 to 500BC codified medical practice, primitive and brutal as it was; next, Judaic law laid down dietary and hygienic proscriptions. But the first, tentative attempts to treat medicine as a science developed at more or less the same time in Greece, India and China (p. 8).

^{iv}Porter (1997) says a medical school was founded in Cyrene 429 BC with the Hippocratic School of medicine flourishing in Greece; the School of Alexandria marks development of medical education 310 to 250 BC, Celsus writes *De medicina* 25 AD. Then he maintains herbalism commonly distinguish wild from cultivated plants, such folk knowledge reflects a long-standing recognition of a relationship that exists between the medicinal properties of a plant and the nature of the environment in which it grows. Environment is important in the cultivation of medicinal plants, as has been appreciated for a long time, especially for plants cultivated as spices and perfume materials as well as medicines. Concerns about the quality of herbs and herbal preparations received even more attention in the nineteenth century, with concerned efforts to apply new scientific knowledge, especially from chemistry, to the subject. A significant development in the early 1820s was research with morphine and quinine; at least 47 alkaloids were isolated between 1817 and 1898. Since then, thousands have been investigated. Relatively few, however, have found and retained a place in medical practice (p. 10).

^vHowever in June 2007 questions are being asked by politicians as to the progress for the *Get Checked* that has received substantial financial assistance.

^{vi}The Romans absorbed elements of all the cultures they came into contact with adopting the Greeks gods as well as those of other peoples they conquered including the gods of: Mercury, Jupiter, Juno, Apollo, Flora, Bacchus, Minerva and Mars. The pre-Roman Celts of Europe and British Isles adopted some of the gods of the conquering Romans and the Nordic people who lived in a harsh climate worshipped gods of the element and nature such as Odin, Thor and Frey. While at the same time Christianity acknowledged Jesus Christ, the Church and dome, the Holy Trinity, the Virgin Mary and the rosary; the Cross as an identity, the Fish as a symbol, the sacred lamb as an offering, the crown of thorns and immortalized people as Saints such as Saint Christopher for a safe journey.

^{vii}Teenei au kei te koronga nau, e Tangaroa-aa-tai..e..i,
he koronga ka turuki atu nei ki a koe ki roto o Rangiahua,
ki roto o Huakipouri, ki roto o Awa-te-waiwai,
ki roto o Wharerimu, ki roto o Wharepapa,
he koronga ka tu ki a Hine-awa e..i.

Naumai, e ngaa tuna whakawaiwai a taaku aro e ki taumata matira, he koronga noo Ikatere awa kia tae ia ki te koronga ma Taane-maatua, kia tae koe ki ngaa uru kiokio ki runga o Ahurangi raa..e...

Kia whangaia koe ki te kai nana ai koe, kia kai koe i te ihinga nui,
i te ihinga whakaapuapu, kia tina i roto, kia tina tuna tere awa,
kia tina tuna riki, kia tina tuna whakatamatama, kia tina Tangaroa-whatu kia whakamara ai koe he eanga nuku, he eanga taurewa tamaua i roto, tamaua i te pu i roto, kitakita he eanga nuku, he eanga ki runga i to taumata whakawai ai koe”.

^{viii}“Heuea ki runga, heuea ki raro, heuea ki te po uriuri, heuea ki te po tangotango. Tuhia mai te tuhi e atua nui ana ra e patu nei, haee, whakataha ra Tutara kauika. Ana ra e patu nei, haere i te po uriuri haee i e po tangotango rua koiwi, haere ra i te po uriuri, i te po tangotango i te wherikoriko ka kai koe ki te matua e tu nei mihia mai te tere nui o te atua e patu nei haere i tua haere i whao. Ko uru koe e patu nei, haere i tua, haere i waho, Atua nui koe, haere i tua, haere i waho, haere i te rangi niu e tu nei, haere i te papa e takoto nei. Mahihi ora whakaarahia mai te kauae o te mate, ara mai te hau o te ora, kahu ana te tangata e patu nei, haere i tua, haere i te hau o tua, o waho, o te ora.

Koia, koia ngaa tapu nei, koia ngaa mate nei, koia ngaa atua nui e patu nei.

E ara kahukura i te rangi nei, haere ngaa atua whiu, haere ngaa atua ta, haere i tua, haere i ngaa koromatua, mahihi ora ki te whai ao ki te ao marama, ko rou ora.”

^{viii}Tainui Maori Trust Board, *Annual Report*, 1998, p. 3.

^{viii}Justice R. G. Hammond’s, *Oral Judgment* M208/00, September 21, 2000. Hamilton High Court, Waikato.

^{viii}Results from the 1982 and 1992 National Nutrition Surveys also provide strong evidence of this rapid transition in dietary pattern. The intake of all food groups increased over the 10-year period, with the exception of cereal intake, which decreased by 12%. The increased intake of animal foods influenced the sources of macronutrients, particularly the proportion of energy from fat. The national average percentage of energy from fat increased from 18% in 1982 to 22% in 1992. However, there is a wide range of

fat intake between urban and rural areas, and across areas with different levels of economic development. The results from the 1992 National Nutrition survey demonstrated that the average percentage of energy from fat was 28% in urban areas, but only 18% in rural areas. Within both urban and rural areas, the percentage of calories from fat increased as socioeconomic status increased.

Besides the changes in dietary pattern, other factors such as population aging, decreases in infectious diseases, decreasing levels of physical exercise and increasing prevalence of obesity are also contributing to the elevation of diabetes and other chronic diseases in China. Considering China has 1.3 billion people, a small increase in the prevalence of diabetes has a significant public health impact for Chinese population. The best way to deal with the problem is to control this disease before it even happens. To prevent diabetes, individuals need to keep a traditional healthy plant-based dietary pattern, exercise and keep one's body fit, and avoid other risk factors of this disease.

^{viii}John Robson (2004) says that in March 1768, the Admiralty instructed the Navy Board to purchase a vessel for an expedition promoted by the Royal Society of London to observe the Transit of Venus in 1769. The ship chosen was the *Earl of Pembroke*, three and a half years old, built by the Fishburn yard at Whitby and owned by Thomas Milne. She had been used as a collier in the North Sea. It was renamed HM Bark *Endeavour*, and fitted out at Deptford with square-rigging on all masts. She was 368 tons, 97ft 1in or 29.6m long with a breadth of 29ft 2 in (8.9m). The original cost was 2840 pounds 10s 11d; alterations for the first voyage cost 5394 pounds 15s 4d and subsequent refits 3563pounds 10s 10d (p. 191).

^{viii}John Robson (2004) says the Navy Board purchased two ships for Cook's second voyage. The larger ship, intended for Cook, was the *Marquis of Granby*, built by the Fishburn yard at Whitby in 1770. She was renamed *Drake* but it was soon realised that this name might offend the Spanish so the ship became HMS *Resolution*. She cost the Admiralty 4151 pounds. The *Resolution* impressed Cook greatly and he called her 'the ship of my choice, the fittest for service of any I have seen. She was 462 tons, 110ft 8in or 33.7m long, with a breadth of 35ft 1in or 10.7m. The ship was fitted out at Deptford and classed as a sloop (p. 190).

^{viii}Omega-6 fats are also found in seafood of all kinds: crustaceans, molluscs, and shellfish and, to a variable extent, finfish (aquatic vertebrates having gills, fins and typically an elongated body usually covered with scales). However, plant foods such as sunflower seed oil, corn and soybean are usually a better source of omega-6 fats.

^{viii}The Australian Government Fisheries Research and Development Corporation (2004) say that the cooking method could markedly alter the fatty acid content of a seafood meal. The best ways to cook seafood and maintain its health benefits by minimising omega-3 fat losses are steaming, microwaving, grilling or baking. It appears pan-frying and deep-frying seafood, with very high temperatures, could destroy some omega-3 fats, although some studies show no effect. Frying also causes more cooking oil to be absorbed into the finished product than by other cooking methods. It is recommended that if seafood is to be pan-fried or deep-fried, it is preferable to use cooking oil that is high in mono-unsaturated fats, such as olive oil or canola oil. If seafood is to be pan-fried, it

should be pan-fried in a small amount of oil rather than solid fat, which tends to be more saturated or be hydrogenated with higher *trans* fatty acid content. *Trans* fatty acids are similar in effect to saturated fat oils, and raise 'bad' cholesterol and decrease 'good' cholesterol levels. Most 'fish and chips' shops use saturated or hydrogenated oils because they last longer and are generally cheaper. The important consideration in deep frying is to use oils that are clean and replaced regularly. Other cooking methods such as grilling or steaming could be encouraged.

Cooking seafood with various herbs could also be beneficial to health, for example, supplementing seafood with garlic can significantly lower cholesterol and triglyceride levels. Herbs are normally anti-oxidants as well. They can also help preserve the essential fatty acid value of seafood and reduce the formation of potentially harmful chemicals such as heterocyclic amines (derivates of amino acids in proteins) if seafood is over-cooked. Finfish do not lose their positive health benefits by being canned. Finfish canned in fish oil have a particular advantage, but are now less available in the market place. Finfish canned in olive or canola oil bring with them the health benefits of these oils; canned in brine or spring water, there are less calories (p. 12).

^xRuiter (1995) says in 1991 the aquaculture producers by value were (p. 21):

- 1. China 33.5%
- 2. Japan 61.1%
- 3. Indonesia 5.5%
- 4. India 5.4%
- 5. Taiwan 3.9%
- 6. Thailand 3.0%
- 7. Philippines 2.9%
- 8. Former USSR 2.8%
- 9. South Korea 2.5%
- 10. USA 1.9%

^xOrbell (2003) says that the Kootare have remarkable eyesight and can detect movement from a surprising distance; that the Tuii was a treasured food reserved for persons of rank and important occasions. In the language of metaphor, the Kaahu could represent a rangatira or chief. The Kaahu's association with high rank and status is not always explicit, however, and some metaphors and similes may refer mostly to the bird's speed and its predatory powers. Its broad wings and soaring, effortless flight gave it an air of command and that it is symbolic of a noble rangatira (pp. 38-41).

Appendix A: Recipes from around the World

Maa's Eel recipe

- do not leave eels lying about for any length of time between the grilling and drying process
- store in a dry and airy place
- do not let them go damp as they will get mould
- when needed, steam for 15 minutes and then serve
- delicious with white sauce

Eel with Parsley Sauce from *New Zealand* (Paul 1996, p. 99).

- skin the eel and cut into 5-7 cm lengths
- put eel into cold, salted water
- add a sprig of parsley and one or two slices of lemon
- simmer gently for 45 minutes then drain (the liquid forms a tasty base for a Seafood Chowder Soup)
- serve with parsley sauce and parsley garnish

Stewed Eel from *Aotearoa/New Zealand* (Paul 1996, p. 92).

- cut a skinned eel into slices, clean and wash
- salt the slices and put into a casserole dish
- add a little water, lemon juice and butter or oil
- sprinkle breadcrumbs over the eel
- bake in the oven with the lid on for about 15 to 20 minutes, lower the oven temperature, remove the lid
- cook for a further 10 minutes
- serve with boiled potatoes and a green salad

Jellied Eel from *Africa* (Floyd 1999, p. 43).

- cut an eel into 5-7 cm lengths, having skinned it first
- put into cold water (use enough water to just cover), adding a little salt and a squeeze of lemon, simmer very gently for 45-60 minutes until the eel is very tender and lift out the eel
- arrange in a mould or dish, measure the liquid and, if a very firm jelly is required, add one teaspoonful of powdered gelatine to each 300 ml of eel stock. Strain over the eel and allow to set with additional herbs or spices

Jellied Eel from *Africa* (Floyd 1999, p. 45).

- flake the eel and place alternate layers of eel and sliced hard boiled egg into a wet mould
- soak one tablespoon of gelatine in one tablespoon of vinegar
- pour over one cup of boiling water and stir until quite clear
- add a little salt
- when cool, pour carefully over the eel and egg and allow to set
- turn out onto a dish with a green salad or vegetables

Stewed Eels *Cockney London Munro & Munro 1977, p. 55).*

- skin two kilo of eel and cut into pieces about 80 cm long (if a black fat-gland is present, remove this)
- slice three onions, fry in 30 g of butter or equivalent oil until soft
- gradually add 30 g of flour and 570 ml stock or red wine stirring into a smooth sauce, add seasonings of two bay leaves, three whole allspice, pinch of salt, pepper, nutmeg and pieces of eel
- simmer covered for about 45 minutes, taste the sauce
- and add lemon juice

Eel & Mushroom *North Italian recipe (Carluccio 1990, p. 73).*

- it is important not to use eel that are too thick, those that are about 2cm/1in in diameter are the best
- cut the eel into 5 cm/2 in chunks
- then fried in olive oil with onion and garlic for about five to six minutes
- add mushrooms, ginger, chili, anchovy fillets, parsley with salt to taste

Baked Eels from Italian Veneto Region (Boni 1982, p. 73).

The literal translation of this recipe is “eels on the sacrificial altar”. It is a favourite dish among the people of Murano, the island is renowned for its glass furnaces. The eels are baked in the ovens used for the famous glass.

- clean 2 medium-sized eels
- rub their skins with a piece of paper generously sprinkled with wood-ash to remove the fat
- wash them and cut them into largish pieces
- in a baking dish (a copper one if possible) arrange a layer of 12 bay leaves and place the pieces of eel on top
- salt generously, moisten with a little water
- cover with another 12 bay leaves
- bake in a moderate oven for one hour
- *serves four*

Aguilla Marinata (Marinated Eel) Italy (Boni 1982, p. 112).

Eels prepared in this manner will keep for some time, provided they are completely covered with the marinade.

- cut 2 or 3 unskinned eels into 2 inch lengths
- thread onto skewers with a bay leave in the middle of each skewer
- sprinkle with salt and pepper
- broil (grill) either under or over the heat until done turning the skewers from time to time to ensure even cooking

The Marinade:

- 6 cups of wine vinegar
- 2-3 sprigs of sage
- 2 cloves of garlic
- peel of 2 oranges or lemons

-
- 1 tablespoon of seedless white raisins (sultanas)
 - 1 tablespoon pine nuts
 - 1 teaspoon chopped candied peel
 - 5-6 black peppercorns
 - pour the vinegar into a non-metallic pan
 - add the next five ingredients and bring to the boil
 - after 25 minutes add the candied peel and peppercorns
 - remove the pieces of eel from the skewers
 - put them into another non-metallic pan
 - pour over the marinade and bring to the boil again
 - transfer to a large earthenware jar, cover and leave in a cool place for at least two days before using
 - *serves six*

Grilled Eel Japanese recipe (Kazuko 2003, p. 103)

Unagi no kabayaki (or grilled eel) is available ready-to-eat in packets, frozen or vacuum-packed.

- filleted eel is steamed
- then grilled (broiled) with a thick sweet shoyu sauce
- place on the top of hot boiled rice
- accompanying sauce sprinkled with seven-spice, chili powder

Steamed Eel Chinese Eel recipe (Quantum 1996, p. 27).

- place the eel in a basin and pour boiling salted water over it
- then washing the fin thoroughly
- slit the eel open, remove the intestines
- clean the inside carefully and pat dry
- make deep cuts (about three quarters of the way through the flesh at 25 mm intervals along the eel)
- place it on a plate, bending it to form a ring
- arrange ginger and spring onion on the top and steam the eel over a medium heat for twenty minutes
- remove the ginger and spring onions
- drain away the liquid from the plate
- heat peanut oil and pour over the eel
- again draining any excess from the plate
- put Chinese yellow wine, chicken stock, corn flour, sugar, salt and pepper into a pan and bring to the boil as a sauce
- that is poured over the eel

Sizzling Eel Chinese Eel recipe (Quantum 1996, p. 28).

- soaking eel in salted boiling water for about three minute
- then rinse eel under running cold water and separate the meat into one by five centimeter strips and set aside
- heat peanut oil until very hot, add the eel and stir

-
- then add chopped ginger, pepper, yellow wine, sugar, soy sauce, and chicken stock and cook for five minutes
 - make a small well in the centre of the eels
 - put into it the chopped spring onion
 - heat two tablespoons of sesame seed oil until very hot a
 - pour into the 'well'
 - add minced ham, garnish with fresh coriander and serve

Angulas *Spanish Eel recipe (Carrier 1999, p. 117).*

Angulas is the recipe for delicate baby eels of northern Spain and commercially chilled packs are readily available to the consumer in the major markets.

- place individual flat flameproof earthenware dishes on the heat
- add two tablespoons of extra virgin olive oil to each dish and place a small clove of thinly sliced lengthwise garlic cloves
- sauté the garlic slices in the piping hot oil, stirring until the slices are golden on both sides
- add the angulas, sprinkle with seeded and thinly sliced, seeded hot red chili pepper, turn the angulas with fork prongs and remove from the heat immediately (only a few seconds of heat)
- the delicate baby eels continue cooking in their little dishes while being brought to the table to eat

Eels Scallion Parsley Sauce *Irish recipe (Allen 1998, p. 47).*

Eels in Ireland were far more widely available in ancient times than nowadays. Eel Weirs, which have a long history, appear to have been the closely guarded property of individual families. To prepare eels – wash and rub with a green scratchy pad to remove the slime. Just below the neck cut from the underside through the spine, but not through the skin at the back. Holding the eel firmly, pull off the skin, then gut from vent to head end. Cut a little further down below the vent and carefully remove the sac and all the blood which is poisonous. Wash well under cold running water (Allen, p. 47).

- skin the eels, wash well to remove any trace of blood inside
- cut 1 lb (450g) of fresh eel into 3 inch (7.5cm) lengths
- put into a pot, cover with cold water and bring to the boil
- simmer for a few minutes to remove some of the oil, then drain
- boil 1 pint (600ml) milk with
- 2 tablespoons green part of the scallions or chives and
- 2 tablespoons chopped fresh parsley
- whisk in the previously made roux sauce until consistent
- season with salt and freshly ground pepper
- add the eels
- cover and continue to simmer in the sauce until eels are fully cooked

-
- serve with boiled potatoes
 - *serves four*

Pork & Eel Stew *Madagascar* recipe (Floyd (1996: 69:72)).

Pork and Eel Stew is the local delicacy and is a festive dish for happy occasions.

- first make the Sakay, a mixture of ginger, garlic and chili, is used as a condiment instead of salt and pepper and as it is very hot it should be used sparingly
- then make the Rougail that is a salad of red onions, spring onions and tomatoes
- lightly oil a large pan and seal the pork without colouring
- add enough water to cover
- simmer for 40 minutes to one hour
- cut the eel into pieces about 10 cm long and roll up
- sprinkle with salt, add to the pan with the onions and tomatoes
- simmer for about 15 minutes until the eel is tender
- serve with Sakay and Rougail.

Appendix B: AgriQuality Eel Omega-3 Chemical Assay Report 310956

Lab Network: Lynfield
 131 Boundary Road
 Blockhouse Bay
 PO Box 41
 Auckland
 New Zealand
 Phone: +64 9 626 6026
 Fax: +64 9 627 9750
 email: lynfieldcs@agriquality.co.nz



16/12/2003

Massey University Wellington
 School of Maori Studies
 PO Box 756
 Newtown
 Wellington

Submitted By
 Job Type
 Date/Time Received
 Order No

Massey University Wellington
 Routine
 10 Dec 2003 09:00
 2550 6940

Attention: Maarie Nixon

Final LABORATORY REPORT - Job Number 310956

Submission Comments					
Temperature on arrival: Chilled					
Lab Ref	Sample Description	State	Sample Dates	Test	Test Res
310956-1	Miscellaneous Long fin eel immediate testing			Alpha Linolenic C18:3n-3 %m/m Steridonic C18:4n-3 %m/m Eicosatrenonic C20:3n-3 %m/m Eicosatetraenoic C20:4n-3 %m/m Eicosapentaenoic C20:5n-3 (EPA) %m/m Docosapentaenoic C22:5n-3 %m/m Docosahexaenoic C22:6n-3 (DHA) %m/m Omega 3 fatty acids %m/m	1.2 0.1 0.3 0.3 2.1 1.4 1.1 6.3
310956-2	Miscellaneous Long fin eel 24 hr testing			Alpha Linolenic C18:3n-3 %m/m Eicosatrienoic C20:3n-3 %m/m Eicosatetraenoic C20:4n-3 %m/m Eicosapentaenoic C20:5n-3 (EPA) %m/m Docosapentaenoic C22:5n-3 %m/m Docosahexaenoic C22:6n-3 (DHA) %m/m Omega 3 fatty acids %m/m	1.2 0.3 0.3 2.0 1.4 1.0 6.3
310956-3	Miscellaneous Long fin eel 48 hr testing			Alpha Linolenic C18:3n-3 %m/m Eicosatrenonic C20:3n-3 %m/m Eicosatetraenoic C20:4n-3 %m/m Eicosapentaenoic C20:5n-3 (EPA) %m/m Docosapentaenoic C22:5n-3 %m/m Docosahexaenoic C22:6n-3 (DHA) %m/m Omega 3 fatty acids %m/m	1.2 0.3 0.3 2.0 1.4 1.0 6.3

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Lab Ref	Sample Description	State	Sample Dates	Test	Test Rt
290174-4	Fish & fish products 4 - raw eel			Alpha Linolenic C18:3n-3 %m/m Stearonic C18:4n-3 %m/m Eicosatrienoic C20:3n-3 %m/m Eicosatetraenoic C20:4n-3 %m/m Eicosapentaenoic C20:5n-3 (EPA) %m/m Heneicosapentaenoic acid C21:5n-3 %m/m Docosapentaenoic C22:5n-3 %m/m Docosahexaenoic C22:6n-3 (DHA) %m/m	0.2 0.2 0.1 0.4 5.7 0.3 2.9 6.1
290174-5	Fish & fish products 5 - smoked eel			Alpha Linolenic C18:3n-3 %m/m Stearonic C18:4n-3 %m/m Eicosatrienoic C20:3n-3 %m/m Eicosatetraenoic C20:4n-3 %m/m Eicosapentaenoic C20:5n-3 (EPA) %m/m Heneicosapentaenoic acid C21:5n-3 %m/m Docosapentaenoic C22:5n-3 %m/m Docosahexaenoic C22:6n-3 (DHA) %m/m	0.6 <0.1 <0.1 <0.1 1.3 <0.1 1.2 2.7
290174-6	Fish & fish products 6 - smoked eel			Alpha Linolenic C18:3n-3 %m/m Stearonic C18:4n-3 %m/m Eicosatrienoic C20:3n-3 %m/m Eicosatetraenoic C20:4n-3 %m/m Eicosapentaenoic C20:5n-3 (EPA) %m/m Heneicosapentaenoic acid C21:5n-3 %m/m Docosapentaenoic C22:5n-3 %m/m Docosahexaenoic C22:6n-3 (DHA) %m/m	0.7 <0.1 0.3 0.3 1.2 <0.1 1.5 1.1

Method Reference	Test	Reference
Alpha Linolenic C18:3n-3	/	JAOCs, 62 (1985)
Stearonic C18:4n-3	/	JAOCs, 62 (1985)
Eicosatrienoic C20:3n-3	/	JAOCs, 62 (1985)
Eicosatetraenoic C20:4n-3	/	JAOCs, 62 (1985)
Eicosapentaenoic C20:5n-3 (EPA)	/	JAOCs, 62 (1985)
Heneicosapentaenoic acid C21:5n-3	/	JAOCs, 62 (1985)
Docosapentaenoic C22:5n-3	/	JAOCs, 62 (1985)
Docosahexaenoic C22:6n-3 (DHA)	/	JAOCs, 62 (1985)

Pravna Chandra

Pravna Chandra
Analyst - General Chemistry

¹ Indicates an IANZ accredited test IANZ Reg Nos. 175, 278, 445

MAF Reg No. L1903

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Appendix C: AgriQuality Eel Omega-3 Chemical Assay Report 209174

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20/10/2003

Massey University Wellington
 School of Maori Studies
 PO Box 756
 Newtown
 Wellington

Submitted By
 Job Type
 Date/Time Received
 Order No.

Massey University Wellington
 Routine
 15 Oct 2003 10:30
 2550 6940

Attention: Chris Cunningham

Final LABORATORY REPORT - Job Number 290174

Submission Comments					
Project for Marie Nickson - Eel samples.					
Lab Ref	Sample Description	State	Sample Dates	Test	Test Result
290174-1	Fish & fish products 1 - raw eel			Alpha Linolenic C18:3n-3 %m/m Stearidonic C18:4n-3 %m/m Eicosatrienoic C20:3n-3 %m/m Eicosatetraenoic C20:4n-3 %m/m Eicosapentanoic C20:5n-3 (EPA) %m/m Heneicosapentanoic acid C21:5n-3 %m/m Docosapentanoic C22:5n-3 %m/m Docosahexanoic C22:6n-3 (DHA) %m/m	0.3 0.2 0.1 0.4 4.3 0.2 2.4 4.7
290174-2	Fish & fish products 2 - raw eel			Alpha Linolenic C18:3n-3 %m/m Stearidonic C18:4n-3 %m/m Eicosatrienoic C20:3n-3 %m/m Eicosatetraenoic C20:4n-3 %m/m Eicosapentanoic C20:5n-3 (EPA) %m/m Heneicosapentanoic acid C21:5n-3 %m/m Docosapentanoic C22:5n-3 %m/m Docosahexanoic C22:6n-3 (DHA) %m/m	0.2 0.2 0.1 0.4 4.5 0.3 2.2 4.3
290174-3	Fish & fish products 3 - raw eel			Alpha Linolenic C18:3n-3 %m/m Stearidonic C18:4n-3 %m/m Eicosatrienoic C20:3n-3 %m/m Eicosatetraenoic C20:4n-3 %m/m Eicosapentanoic C20:5n-3 (EPA) %m/m Heneicosapentanoic acid C21:5n-3 %m/m Docosapentanoic C22:5n-3 %m/m Docosahexanoic C22:6n-3 (DHA) %m/m	1.0 <0.1 0.3 0.4 2.6 0.1 2.0 1.0

Agriquality New Zealand Ltd - Report No 338

¹ Indicates an IANZ accredited test IANZ Reg Nos. 175, 278, 445

MAF Reg No. L1903

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Lab Ref	Sample Description	State	Sample Dates	Test	Test Result
310956-4	Miscellaneous Conger salt water eel.			Alpha Linolenic C18:3n-3 %m/m Stearidonic C18:4n-3 %m/m Eicosatrienoic C20:3n-3 %m/m Eicosatetraenoic C20:4n-3 %m/m Eicosapentaenoic C20:5n-3 (EPA) %m/m Heneicosapentaenoic acid C21:5n-3 %m/m Docosapentaenoic C22:5n-3 %m/m Docosahexaenoic C22:6n-3 (DHA) %m/m Omega 3 fatty acids %m/m	0.6 0.3 0.2 1.0 3.0 0.2 2.8 9.9 18.0

Comment																	
Lab Ref: 310956-1	Alpha Linolenic C18:3n-3 - Results are the percent Omega three fatty acids expressed as a percentage of the fat in. If the results are required on a sample basis then the fat content of the sample must be taken into account.																
Method Reference	<table border="0"> <tr> <td>Alpha Linolenic C18:3n-3</td> <td>JAOCS, 62 (1985)</td> </tr> <tr> <td>Stearidonic C18:4n-3</td> <td>JAOCS, 62 (1985)</td> </tr> <tr> <td>Eicosatrienoic C20:3n-3</td> <td>JAOCS, 62 (1985)</td> </tr> <tr> <td>Eicosatetraenoic C20:4n-3</td> <td>JAOCS, 62 (1985)</td> </tr> <tr> <td>Eicosapentaenoic C20:5n-3 (EPA)</td> <td>JAOCS, 62 (1985)</td> </tr> <tr> <td>Heneicosapentaenoic acid C21:5n-3</td> <td>JAOCS, 62 (1985)</td> </tr> <tr> <td>Docosapentaenoic C22:5n-3</td> <td>JAOCS, 62 (1985)</td> </tr> <tr> <td>Docosahexaenoic C22:6n-3 (DHA)</td> <td>JAOCS, 62 (1985)</td> </tr> </table>	Alpha Linolenic C18:3n-3	JAOCS, 62 (1985)	Stearidonic C18:4n-3	JAOCS, 62 (1985)	Eicosatrienoic C20:3n-3	JAOCS, 62 (1985)	Eicosatetraenoic C20:4n-3	JAOCS, 62 (1985)	Eicosapentaenoic C20:5n-3 (EPA)	JAOCS, 62 (1985)	Heneicosapentaenoic acid C21:5n-3	JAOCS, 62 (1985)	Docosapentaenoic C22:5n-3	JAOCS, 62 (1985)	Docosahexaenoic C22:6n-3 (DHA)	JAOCS, 62 (1985)
Alpha Linolenic C18:3n-3	JAOCS, 62 (1985)																
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Eicosatetraenoic C20:4n-3	JAOCS, 62 (1985)																
Eicosapentaenoic C20:5n-3 (EPA)	JAOCS, 62 (1985)																
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Docosapentaenoic C22:5n-3	JAOCS, 62 (1985)																
Docosahexaenoic C22:6n-3 (DHA)	JAOCS, 62 (1985)																

P Thomas

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Scientific Analyst Chemistry