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Gender Roles in Environmental Household Waste Management: A Case Study in Palmerston North, New Zealand

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ABSTRACT

This research examines the roles of gender in environmental household waste management in New Zealand. Gender activities play an important role in environmental household waste management as shown by the *Household Survey 2000*. The survey result confirmed that a clear understanding of the perceptions of both men and women is required in managing the sustainable environmental household waste management. Educational level, occupational status, and demographic characteristics are key factors in determining household waste management strategies in order to maintain a sustainable environment in New Zealand. This study was carried out in Palmerston North. The objectives were to:

Explore the relationship between gender; household waste management and environmental sustainability to identify whether there are gender differences in environmental management practices. In addition this study examines household waste management practices in Palmerston North and to investigate ways of improving household waste management practices in New Zealand.

Data analysis was based on 266 households by survey questionnaires. Results showed that household waste management practices are influenced by the demographic factors age, gender, education occupation and income level. The results also show that women, rather than men, handle household waste. Female participation was mostly involved in recycling, composting and landfill activities. The final research results show that: Women's participation was found to be higher than that of men in managing household waste. Demographic characteristics appear to have a direct relation to gender and household waste management. There is a positive relationship between socio-economic status (education, occupation and socio-economic class) and household waste management.

Based on the research results, different types of policy implications, suggestions and recommendations are addressed to improve environmental household waste management in Palmerston North, New Zealand.

DEDICATION

This thesis is dedicated to my grandmother, Khila Panta - aged 98 - who has always inspired and encouraged me to pursue higher education.

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TABLE Of CONTENTS

LIST OF TABLES

Table **Page**

List of Figures

Figure **Page**

Chapter 1: Introduction

1.1 Introduction

This research set out to examine roles of gender in environmental household waste management in New Zealand. This investigation examined the impacts of household waste on sustainable waste management development, waste management methods and problems with waste in the earth and air. Solid waste, hazardous waste, mixed waste, illegal dumping, landfills, also awareness of recycling, composting and dumping are a major category of this area of focus in waste management in New Zealand. Chapter one provides background information on this topic by introducing briefly the local issue of waste management in New Zealand, and research problems and objectives.

> *Humans have always been known for their garbage. Ancient garbage dumps provide us with a wealth of information on our ancestors and their lives. From the historical perspective, this human garbage trail has allowed archaeologists to study humans from their earliest days, discovering many fascinating facts about them. From the garbage record, for example, we've determined that at every stage, humans have lived with enormous amounts of garbage, underfoot and all around them. Still true in the poorest parts of developing countries, this habit poses significant hazards to human health and to the environment (Spellman & Whiting, 1999:373).*

Solid waste is the growing issue of concern about environmental pollution, especially in urban localities of the world. The term *solid waste* refers to low liquid content waste materials. It includes municipal garbage, industrial and commercial waste, sewage sludge, wastes from agricultural and animal husbandry, demolition wastes and mining residues (UN, 1997).

Unmanaged solid waste disposal is one of the main causes of environmental degradation. Increasing population density is the leading cause of the solid waste management problem in cities and there is a lack of sanitary landfill sites in which to dispose of generated wastes; most municipalities have been dumping their wastes in nearby rivers or in open fields (Kayastha & Mishra, 1998:307). Although some

municipalities do have practices of preparing compost from biodegradable waste collected, recycling activities involving waste (plastic, metal glass, etc.) are negligible. All developed countries and cities have problems of waste management and in maintaining landfill sustainability in the long run, New Zealand can't be far from these issues. Every households in every city is a primary source of waste generation, thus the waste management techniques of every householder directly affect the sustainability of the environment. It is a necessary to investigate the causes and consequences of the potential for the recycling and reuse of waste materials, and their impacts on landfill.

Human beings produce solid waste. Solid waste generation is directly related to population density. The levels of socio-economic development determine the quantity and composition of solid waste. The higher the level of socio-economic development, the greater will be the proportion of non-biodegradable materials in waste composition. The concentration of population in higher densities in urban areas as well as unmanaged growth of settlements are among the major causes leading to the problem of solid waste disposal that affects public health and the natural environmental system (OECD, 1996).

Generally, there are many sources of solid waste: in the New Zealand context these are domestic, industrial, agricultural, institutional and natural (OECD, 1996). Household wastes are somehow different from production of other waste products. Household dwellings are the producers of domestic solid waste, which contains kitchen wastes, paper and cartons, plastic, rubber, leather, bone, glass, ashes and metals. The main agents of commercial waste production are stores, coffee shops, business premises, restaurants, markets and fruit vendors, hotels and motor repair by product shops. These sources produce wastes such as paper and cartons, glass, waste from food preparation, hair, and ashes, spoiled and discarded goods etc. These are mostly organic wastes. Waste produced from industries is *inorganic* and includes such materials as waste from construction (demolition debris), food processing industries, slaughterhouses, manufacturing establishments and breweries, leather industries, carpet and garment factories, chemical plants and tourist facilities (Ministry for Environment/ New Zealand, 1997).

Many common household products used in the kitchen, bathroom, garage and basement have the potential to cause serious health and environmental problems during their use,

or after their disposal (Jorgensen, 1996). Householders or consumers use a host of specialised, powerful cleaners, paint and paint-related materials, pesticides and a wide variety of automotive products. When the householder disposes of these materials, they become wastes. Most of the wastes come from the 'products' or 'items' or 'goods' purchased over the counter by any person, in any age group, at a variety of locations such as grocery stores, hardware stores and automotive centres.

In western society, especially in urban areas, people purchase household items from the supermarket. The industrial goods used as packaging nowadays account for much of the increase in waste in the household. By choosing useful goods while taking into consideration the least possible waste produced, women are the group of people who need to be considered when eliminating unnecessary waste. It is not only in the west, but also in almost all societies, women have a role, which is different from that of men. As mothers and home – makers as well as educators, entrepreneurs and producers, women, more than men, have to play multiple roles. Definitely, women have the major role in sustaining the environment through proper practices in household waste management.

Gender refers to the social characteristics whereby women, and men exist in a dynamic structural relation to each other (Nicolson, 1996:9). Environmental management, and the extent of the involvement of each of the genders in this task or activity (Warren, 1992) focus on environmental waste management. Proper environmental household waste management requires attitudinal awareness from both men and women and an understanding of and sensitivity of the sustainable environment and the needs and concerns of each householder.

This research aims to address the problems of household waste management, and the roles played by each gender. Palmerston North, New Zealand, is the location for the case study of this research. It is expected that the findings of this research will help to meet the challenges of orienting waste management policies in New Zealand and elsewhere. The roles of women and men in waste management at the household level will be investigated by means of a household mail survey, literature review and net search. This study will highlight the different roles and requirements of women and men in relation to waste management at the household level. This research aims to identify

how women plays an active role in household waste management and in the management of a sustainable environment and to ascertain whether or not there is a disparity between the roles of women and men. At the same time, relevant literature will be consulted to support the research hypotheses.

The research will provide important information on the recent developments in waste management technology with a view to providing solutions or insight into the direction of waste management for New Zealand cities. Similar surveys consulted during the development of the protocol have proven valuable during the preparation of solid waste management strategies, and for future decision- making on issues such as composting, recycling, waste minimization and closing of disposal sites (Ministry for the Environment/ New Zealand 1997). The findings of this study will provide support for focused waste management strategies and planning for future decision-making, including those concerning on gender issues.

1.2 Significance of the Study

Participation and leadership by both men and women are essential to every aspect of the effective participation of both genders in the promotion of knowledge and environmental education in decision-making and management at all levels. Gender-strategic action integration through from waste management at the household level to sound environmental management is required for a holistic, multidisciplinary and intersectional approach. Sustainable development will be an elusive goal unless the contributions of both men and women to environmental management are recognized and supported.

Gender can often play leadership roles or take the lead in promoting an environmental ethic, reducing resource use, and reusing and recycling resources to minimize waste and excessive consumption. Men and women each have a particularly powerful role in influencing sustainable consumption decisions (UNDP, 2000). Moreover, women's contributions to environmental management, including those made through household campaigns to protect the environment, can often taken place in the sphere of household waste management.

Women, especially indigenous women, have particular knowledge of ecological linkages and fragile ecosystem management. Women in many communities provide the main labour force for subsistence production; hence, their role is crucial to the provision of food and nutrition, the enhancement of subsistence and informal sectors (Ministry of Women's Affairs/ New Zealand, 1998), and the preservation of the environment. In certain regions, women are generally the most stable members of the community, as men often pursue work in distant locations, leaving women behind who end up safeguarding the natural environment and ensuring adequate and sustainable resource allocation within the household and community (UN, 1995).

1.3 Women's Role in Environment Management

Women's role in environmental management is an important in sustaining the environment. Both women and environment analysts recognize (Warren, 1992) women as knowledgeable problem solvers with an important role to play in the formulation of national and international agendas for sustainable development. The role of women in different countries, either developed or developing, is different in context but similar in natural resources management. As an example, the Chipko, Appiko, and Jharkhand movement in India is interesting with respect to environment management in a developing country (Agrawal, 1991). These movements directly support how women are responsible for sustaining the environment, and how they love nature. Women have much greater potential than men in the management and development of natural resources (Shiva, 1993). Environmental movements such as Chipko need to be conceptualised in relation to women's role in environment management. Women should be involved also in waste management sectors and the role-played by women in sustaining of the environment needs to be researched and addressed.

Men and women's household actions and environmental issues are important in the management of an environmental sustainability. Women can have a particularly powerful role in protecting the environment by influencing sustainable consumption decisions in grass-root campaigns through the household and community level (Muller 1998). The United Nations Global Conference on Development and Regional Fourth

World Women Conference Beijing (1995) have already acknowledged that without sustainable development policies which involve women as well as men it is impossible to achieve environment sustainability. The effective participation of women in generating knowledge in environmental education and decision–making in environment management practices is essential for ensuring sustainable environment allocation within the household and community levels. Women's experiences and contributions to household waste management, and sound household environment and community environment practices should promote an active and visible policy of mainstreaming a gender perspective in all national policy and programmes. Sustainable environmental development will be an elusive goal unless women's contribution to environmental waste management is recognized and supported. This research review tries to extend the literatures based findings of women's involvement in waste management, and to provide supportive survey data about this.

1.3.1 Environmental Situation in New Zealand

The New Zealand system of environmental management is intended to be integrated, consistent and effects based (Ministry for the Environment/ New Zealand 1999). The central government agencies; the Ministry for the Environment, the Department of Conservation and the Parliamentary Commission have key responsibilities - though local government carries much of the responsibility for day- to- day environmental management. Waste management was long regarded as not especially pressing in New Zealand because of the country's predominantly rural nature, low population diversity and ready availability of landfill sites. There is still no comprehensive legislation to deal with especially with this issue (OECD, 1996). The Resource Management Act (RMA) is the only Act to handle waste management. The Ministry for the Environment (1997) produces voluntary environmental standards and guidelines on waste management in New Zealand. Furthermore, monitoring of waste has enabled New Zealand to develop effective waste management plans and strategies. Still there is a lack of realizable comprehensive information on composition and of waste streams.

Waste disposal is one of the important national issues in New Zealand. As people function in society it is inevitable that they will generate waste, which will impact on

the environment (Bhamidimarri, n.d) Waste has been measured at the weighbridge of the Awapuni landfill since 1995. The commercial sector contributes significantly to the waste stream. New Zealand recycles more than 25 tonnes of plastics each year (PNCC, 2000) which, based on total imported materials of around 127, 000 tonnes, is equivalent to 16% of the total plastics in the solid waste stream. Plastic Environment and Advisor Council (2000) addressed that New Zealand's contract has undergone massive changes in a short time and is under constant pressure from human activity (WMINZ, 2000) The OECED defines *waste as unavoidable materials for which there is currently or no near future economic demand or for which treatment and disposal are required.*

1.3.1.1 Sustainable Waste Management

*Wasteminz (*2000) pointed out that sustainable development asks the question of how wastes fit into the picture of resources efficiency. Holistically 'waste' includes an example of neglecting, or paying attention to the cross waste effect associated with waste management (Richard, 1992). Sustainable waste management requires an assessment of how waste fits into the closed loop system of resource efficiency, while ensuring identification of the consequences of the management action proposal (Official Project/ New Zealand, 1990). The Resource Management Act is only the Act that sets the fundamental plank of sustainable management of natural and physical resources in New Zealand.

Community perceptions on waste do not necessarily reflect either the knowledge of waste management practitioners, or the role by waste management has to play in sustainable development (Taranaki Regional Council, 1993). Waste is seen as being a material, which cannot be reused, that is dumped at the landfill and then degrades and pollutes the environment (Tararua District Council, 1994)). In recent years there have been growing concerns in the community about the amount of waste produced in New Zealand.

1.3.1.2 Landfill

There is little information available on the environmental effects of closed landfills in New Zealand- Also there is little understanding or analysis of the management of closed landfills (Wellington regional Council, 1998). Many closed landfills are not being either monitored or effectively managed (Canterbury Waste Services, 1999). Ministry for the Environment (MFE) objectives include monitoring closed landfills ensuring their effective managed. The government New Zealand commented in 1999 (Thron, 2000:1) that: waste managements is an environmental matter, which needs stronger action and it will be a requirement that by the year 2010 all waste management shall be on a full cost recovery basis and all existing landfills are ungartered or closed.

1.3.2 Legislation

Waste management in New Zealand is principally driven by two types of key Legislation namely Resource Management Act (RMA) and the Local Government Act (LGA). The Hazardous Substances and New Organism Act (HSNO) is also important when considering the management of hazardous waste. The Resource Management Act 1991 is the core piece of legislation intended to help achieve sustainability in New Zealand. By bringing together laws governing land, air and water resources, and concentrating on the environmental effects of human activities, the Resource Management Act introduced a new approach to environmental management (Ministry for the Environment/ New Zealand, 1994). The purpose of the Act is to promote the sustainable management of natural and physical resources. The Parliamentary Commission for the Environment provides independent advice to parliament on environmental matters, including an independent assessment of central and local government environmental agencies (Royal Societies/New Zealand, 1986). The Act covered the waste management and the use of economic instrument taxes and levies charges.

1.3.3 Local Government

While the central government provides guidance through laws, regulations national policies, standards, guidelines and information in sustaining environment management, local government carries much of the responsibility for day to day environmental management (Taranaki Regional Council, 1993). Regional Councils are elected local government bodies' infrandused to co-ordinate and set policies for resource management, including water and soil conservation, and transport. Local governments also have some residual responsibilities for civil defence, drainage and waste management and control (Alistair, 1986).

Local Territorial Authorities are elected district or city councils. For the most part, the functions of Territorial Authorities are complementary to those undertaken by Regional Councils, but are focused on local service requirements (OECD, 1996: 32). They cover water supply, and control of land development resources, local roading and transport activities, sewerage and storm water drainage, community development and other public works.

1.3.4 Environmental Education

The importance of environmental education in protecting and managing the environment was recognized in the *Environment 2010 Strategy* discussed and released in 1995 (Ministry for the Environment/New Zealand, 1997). 'Many government agencies, including Auckland Regional Council involved in public education on environmental topics (OECD, 1995: 107). The government has now adopted a national strategy on environmental education as the key to providing people with the knowledge, awareness, attitudes and values that will help them to play their roles in sustaining the household environment (Ministry for the Environment/ New Zealand n. d). The delivery of environmental education addressing subjects such as landfills, recycling, composting and the message about the necessity for waste management is at present being launched amongst the general population in various areas throughout New Zealand, including Palmerston North. The programme helps to market a campaign that employs local people to deliver the message, and that will assist with implementing systems to

promote environmental education awareness' in schools, business centres and other organizations (Kelk, 2000). However the education concerning environmental waste management at the household level mentioned above is not sufficient to ensure the success of the campaign.

1.3.5 The Situation of Rural and Recreational Areas

Waste management is the collection, control and safe disposal of material such as household refuse, sewage, solid and liquid effluent from factories, mineral leachate, toxic substances and accidental spillage (Richard, G., *et al.*, 1973). Many environmental organizations are able to deal with solid and liquid waste disposal, and are able also to produce innovative solutions for any organization with effluent problems. They have helped create many highly valued products using waste as raw material, thereby turning cost items into company profits (University of Canterbury, 1992).

There is no provision for refuse disposal in the rural areas in general. Some are remote from any recognized disposal facility, and farmers have historically made arrangements on their property for the disposal of waste. A number of bins and public toilets are provided at strategic places in parks, reserves, and picnic spots and on beaches within the communities and rural areas for the disposal of litter and wastes in New Zealand.

1.4 Research Questions

The questions raised in this research are

1. "Are there gender differences in environmental household waste management in New Zealand?" specifically:

a. Is there any difference between men and women in the management of waste at the household level?

b. How are men and women respectively involved in waste management in the cities and nation?

c. Does gender participation in household waste management help 'environmental sustainability?' and does household waste management have any impact on landfill management?

1.5 Statement of the Problem

Waste is a problem for the whole community. People generate waste, which can be managed only through the involvement, co-operation and efforts of people, businesses and groups in the community (North Shore City, 1998). Reducing and managing waste depends on the actions of every person in every household. Lack of waste management, lack of disposal sites, lack of dumping areas, insufficient recycling industries, water contamination and sewage disposal are general problems in New Zealand, particularly in the city of Palmerston North in New Zealand. Other important factors to be taken into consideration for Palmerston North are:

1. The current landfill will be closed down in the near future
2. There is insufficient finance to manage the containers separately; i.e. to separate materials such as papers, plastics, bottles and organic material for recycling and compost making from unusable rubbish.

1.6 Defining the Problem

Gender participation in environmental management is one of the challenges, which has been faced in the field of development (Warren, 1992). Everywhere, women are the main users and managers of natural resources (Agrawal, 1991). Women are the real pillars of society with regard to environmental management – not only in respect of natural resources but also, and in particular, they play a major role in the management of household waste. Despite this, their contribution has not been acknowledged yet. No research has been done so far in this area of gender participation in household waste management.

The development agencies and Third World governments are trying to formulate and implement new policies in women's development, and success with these policies depends on increased gender awareness amongst development personnel (Longwe, 1995). However, even in developed countries, women are often not equal with men in many cases with regard to their participation and roles. The lack of attention to women in developed countries also calls for the initiation of a process of gender awareness.

The generation and management of wastes have become some of the most pressing problems facing modern society (Wanganui District Council, 1997). Although often depicted as problems of a technical and environmental management nature, many aspects of these issues can be framed in sociological terms. This research focuses on gender involvement and the response of men and women to wastes in developed countries - along with the consequent demands for information and involvement in gender-based decision-making in household waste management in New Zealand.

1.7 Purpose of Research

Environmental protection and preservation are major aims of this study. The purpose of this research is to investigate gender participation in household waste management and the concept of environmental sustainability, using Palmerston North as a case study.

1.7.1 Research Hypotheses and Objectives

The research hypotheses investigated were:

There is a connection between gender, household waste management and environmental sustainability.
There are gender differences in environmental management practices.
There is a relationship between household participation in waste management, landfill usage and recycling.

The associated objectives of the research were to:

Explore the connections of the relationship between gender, household waste management and environmental sustainability.
Identify whether there are gender differences in environmental management practices.
Examine household waste management practices in Palmerston North.
Examine the impact on landfill of household waste management in Palmerston North.
Investigate ways of improving household waste management practices in New Zealand.

1.8 Outline of the Thesis

The *First Chapter* of this thesis consists of general introduction to the environmental situation on New Zealand, the waste management practices and the city, which formed the context of the research. *Chapter Two* reviews literature related to the subject of the research area.

In *Chapter Three*, the conceptual framework of the study is explained, the sites of the study are described and the procedures of data collections by mail survey, sampling methods and multivariate techniques are explained. In addition, the methods of analysing and computing household waste management data are outlined. The main reasons for choosing this research study area and time sampling frame also the definition of the variables, hypotheses introduction, null or alternative hypothesis, level of significance of the results and reasons for the choice of test are discussed in this chapter.

Details of the study area are presented in *Chapter Four* and the study area is highlighted on the basis of population and geographical descriptions of the wards. This chapter focuses on the background of the study area, the local area photographs and a map of which are included. The household survey results and analysis is presented as the sequence of socio-economic and demographic descriptions in relation to environmental household waste management. The results of the survey interviews including tables and graphs to summarize the findings and an analysis of the investigation are located in the *Chapter Five.*

Discussion of the findings and results are presented in *Chapter Six. Chapter Seven* concludes the thesis by focusing on the final comments contained in each of the preceding chapters. Policy recommendations are made and topics for further research are suggested in this chapter

Chapter 2: Literature Review

2.1 Introduction

While the literature review will focus on the relationship between gender and the management of waste, both the development of waste management by gender literature on women and sustainable development will be presented to provide background to the issues under consideration. There are gaps in the literature about the relationship between gender and waste management, as although there is literature on women and environment management development, even in the environment sector there is a dearth of literature on the waste management environment. As for integrating gender in environmental household waste management, in general the literature in this area seems problematic in producing materials relevant to the investigation.

In all societies, women have a role that is different from that of men. As mothers and homemakers as well as educators, entrepreneurs and producers- women, more than men, have to play multiple roles. In some countries the demands of these multiple roles place women, and particularly non-elite women, at a special disadvantage (Agrawal, 1991). In orienting and directing policies, therefore, it will be important to take into account the specific needs of women to ensure that they can have equitable and affordable access to facilities and services (OECD, 1999). The rate of change in different fields has different effects on women and men for a number of reasons. Traditionally, for socio –cultural traditional cultural value and reasons such as limited mobility, double workload, and lower educational levels, women will not be the first in accessing, using and experimenting with these new technologies nor in benefiting from their enormous potential for employment, learning and leisure (UNIFEM, 1997).

The integration of gender equality concerns into the formulation of all policies, programmes and projects is one aspects of mainstreaming gender aspects (Billing 1994). On the other side, initiative to enable women as well as men to formulate and express their views and participate in decision- making across all development issues is lacking (OECD, 1999). In all areas of development practice, waste management

practitioners, consultants and policy-makers frequently discus gender interests or implications that people can research (Porter *et al.*, 1998, WMINZ, 2000, Waste Management Progress Report, 2000). However, the roles of women in the waste management area have not been investigated to determine whether or not the question can be linked together to fulfil the research requirements including *gender* and *women.* Any response made could limit the scope of the inquiry to the practical gender needs, or conditions of life and work of the women who work in the waste, who scavenge dumpsites. In the light of the important cognitive skills necessary for sustainable development, a gender-based focus on recruitment, training, operational policies and practices of the households sectors are necessary for the development of household environmental waste management (OECD, 1999).

In the area of sustainable waste management 'women have played leadership roles or taken the lead in promoting an environmental ethic, reducing resource use, and reusing and recycling resources to minimize waste and excessive consumption' (UN 1995:118). A couple of examples of sustainable responsibility shown by women are presented here: Firstly Batangas, where the *Integrated Solid Waste Management Project* demonstrates the responsibility of women in the area of waste in the Philippines (UN, 2000). An example of an alternative approach to providing waste management for developing countries in Asia is the municipal solid waste policy of Batangas Bay in the Philippines, which has been facilitated by the United Nations Development Programmes (UNDP), Sustainable Project Management Programme (SPM) (World Bank, 2000). The International Maritime Organization (IMO) and Global Environment Facility (GEF) have undertaken a preliminary survey and a technical study (World Survey, 1999). The project is a Public and Private Partnership (PPP) between the Local Government Units (LGUS) of the provinces of Batangas and Waste Systems New Zealand Ltd. (WSNZ), which established a joint venture to implement an integrated Solid Waste Management Programme to service the province of Batangas in the Philippines (WMINZ, 2000). The contribution of New Zealand in this sector of the Official Development Assistance (NZODA) programme towards the project is acknowledged (Quinn, 1998), however the performance of the project is the responsibility of WSNZ. Waste management problems are not confined to New Zealand, and role-play by women in this sector is important in the world beyond New Zealand.

Medina (1993:1) addressed recycling waste management in Manila in the Philippines, which had been problematic for several years due to a lack of equipment, inadequate truck maintenance, and irregular collection routes. Women's efforts to showcase the problem were a positive means of changing this existing itinerant collection system while reducing some of its shortcomings. The *"Metro Manila Women's Balikatan Movement'* which commenced in 1983, funded by the World Bank, created an innovative program called *Linis Ganda* (Medina, 1993:2). Women were willing to work with the government to protect the city's environment, and a group of women began to organize junk shops and to designate households for the collection of recyclable materials. Moreover, a female independent collector reported that the supports herself and her two children by salvaging styrofoam cups and plates from a fast food restaurant which she then sells to a junk shop (Medina, 1993).

Secondly, *Alameda County Waste Management Authority 1990,* in California USA, mandated the Alameda County Home Composting Education Program (ACHC) which educates residents where average middle-class, middle-aged women were participated in a survey (Doron, *et. al.*, 1992). The home composting program introduced as a result of the survey, which mandated the ACHC program to educate people where the women had more participation in a survey. Similarly women's participation in resource management in environmental sector is more than a man involved. 'An example introduced into water buffalo for milk production, agricultural production, fodder, and fuel and forest management of gender differences in men's and women's attitudes towards resource availability along with the changing responsibilities and labour allocation for women in Nepal (Rocheleau, D. *et al.*, 1995). The differences between men's and women's attitudes towards resource availability and the changing responsibilities and labour allocation can be seen in the example of women in Asian countries such as Nepal which have introduced agricultural production and forest management (Bajracharya, 1994, Karki, 1994, ICIMOD, 1994, Collect *et al.*, 1996). Also the complex land tenure and inheritance patterns involving both males and females, siblings which, under the same socio- economic circumstances, undermine sustainable management in the Philippine context (Jacobson, 1992:18) justified the women's involvement in different areas of sustainable management. United Nations data indicate that, on average, women work longer hours than men in every country except Australia, Canada and the United States (UN, 1997). Likewise, time allocation

studies (Doron, 1992) confirm that women throughout the world maintain almost exclusive responsibility for childcare and housework as well as higher participation in other area as an example of Almanda US, where women have attended in participating higher in composting workshop than man. An example found that Mexican women accounted for 40 percent or more of the total household income, although their wage rates were far lower than those of their husbands (Jacobson, 1992:16). Furthermore, gender disparities in total hours worked are greatest among the poor. Similarly, there is a need to find out about the urban environmental problem in developed countries and the involvement by each gender in waste and environmental management

Spring, (1999), mentioned the Rio Convention, which considered gender issues and as a result led to women in different social and academic sectors through out the country being concerned about gender considerations and the participation of both males and females in environment management. The discussion addressed irrigation river control, ecological order norms and waste and sludge composting of agricultural harvests, ecological education and social control of mechanisms of environmental impacts. To response to the questions of gender concerns in environmental indicators Spring, (1999), gave a Maxican example of social participation named SEMARNAP, which linked the participants in communication in order to improve women's participation in sustainable agricultural environmental projects.

This chapter focuses on the literature-based women and the environment, women and sustainable environment, women and household environment; household labour participation is focused on in this chapter. The literature investigated women and waste management to look at women's contributions to environmental management. The chapter has been broadly divided into twelve different parts. The parts comprised as gender development and analysis, women and development, women and environment development women and the sustainable environment, women and household environment, women and household responsibility extends community, household waste management, carrying capacity of waste, landfill and waste management, legislation, and environmental impact assessments.

2.1.1 Gender Definition of Waste

The word 'waste' refers to something that is 'no longer serving a purpose' something without value (Hornby, 1974) Certainly people in certain circumstances consider waste materials as a resource for their family, their livelihood, or their enterprises (Mansoor, 1999). So-called waste materials may serve as a crucial resource within households for example oily milk packages may be used for fuel, different kinds of bottles, may be used as containers, leftover food may be fed to domestic animals, discarded cardboard may serve as walls and roofs of houses. In this way, one can expect that men and women will value waste materials differently and see their usefulness for different purposes, such as domestic utility saving on household expenditures, earning money etc. (Schienberg & Muller (Web page, n.d: 11).

Gender based definitions of' waste' and of 'resources' must be reflected during any discussion of priorities regarding waste management in the community consultation process. An Urban Waste Expertise Programme Netherlands (1998) demonstrated that men and women participate (or not) in managing waste within the household, and that their relationship to discarded materials may depend on who they are as much as, or more than, on what they do. Thus in particular, the frequently subordinate status of women may affect their general access to, and control, of resources, so that the 'waste' materials or waste-related activities may be the only ones, which are available to them. Managing waste materials, which are, concerned with women's activities, may destroy fragile livelihoods. Such activities might concern buying and selling household garbage, the reuse and recycling of materials, the collecting and disposing of human and solid wastes in a safe manner, and keeping households clean. The nature of discarded materials may be influenced by the gender of the person making the judgement. What looks like junk to women may be motorcycle parts to men; what looks like dirt to men may be compost or fertilizer to women; the examples of different sexes 'seeing' things differently are legion.

2.1.2 Gender Division of Labour

The GAD approach stated that households are the basic unit of social organization, which recognizes the importance of an understanding of gender relations in terms of the sexual division of labour (Warren, 1992). Efforts to increase women's participation and status must consider both resistance and opportunity within the household. Warren (1992) further noted that gender is an organizing principle in society where the gender division of labour allocates to men and women different roles, responsibilities and activities based on societal ideas of capabilities and appropriateness. The gender division of labour also extends to household waste management roles.

2.1.3 Women and Household Labour Force

A *household* is defined as *a family where people live together cooking in one kitchen and sharing food together at one table* (Evan, 1992:12*)*. Fratkin (1989) noted that household members can influence the character of household allocation, and household labour force practices play an important role in allocating household labour participation activities. The knowledge and practices in waste organization and management labour participation by women and men generate waste environment activities. Women play the predominant roles in the household work labour force everywhere in the world. Maintaining the household, childcare, gathering food and horticulture are almost exclusively the women's responsibility (Nowak, 1979:49). Somehow, often it is only the activities of the men as "bread winners" which are recognised as being productive within the household.

Gender division of labour remains strong in industrial societies worldwide. Most women and men work in jobs that are done predominantly by one sex. The OECED (1999) reported that the women's labour forces in different sectors are higher than that of men. There are significant numbers of good gender practices in different areas i.e. water supply, sanitation agriculture extension, forestry and community- based natural resource management. However, these types of involvement linkages between gender division of labour in environmental waste management and project effectiveness have not been acknowledged yet.

A householder is an inmate of any house. Hornby (1974), notes the household roles allocation where the "household maximizes utility desired from the consumption of goods and services subject to their time and income constraints". According to Agrawal (1991) women in poor peasant and tribal households do much of the gathering and fetching from the forest, village commons, rivers and wells. Agrawal added that women of such households are burdened with the significant responsibility for family subsistence, and they are often the primary-and in many female-headed households the sole-economic providers. Nonetheless, the ability of women to fulfil the responsibility is more constrained than that of men because of gender inequality in access to productive and subsistence resources. Dankelman (1995:268) stated that women's daily domestic tasks still confine women more than men to the environment of the house. This means they often put much time into maintenance and repair of the home. In this way, women often take care of sanitation systems and solid waste disposal in human settlements (Muller, 1998).

As housewives, women all over the world are still primarily responsible for the purchase of consumer products, such as food items, cleaning materials, and other essentials for the household (Overholt, *et al.*, 1985). Often women who cure the sick contribute more to the household in maintaining the health of their families by the provision of clean water, food, energy sources, shelter, sanitation, and waste disposal. Women realize better than men do what an accelerated population rate continued childbirth and child rearing mean (Ministry of Women's Affairs/ New Zealand, 1998). Decisions about the family size and safe contraceptives are often beyond their reach. Women's educational and occupational opportunities are most important in these regards, and are still limited compared to those of men. With regard to child-care, the division of tasks between men and women is changing, women are still responsible for child-rearing to a large extent, which means women have an important influence on the development of the child's perception of the environment, making women the first environmental educators (Shiva, 1993). Environmental education concerns knowledge of plants and animal species and their direct environment, as well as practical skills in environmental use and management (Warren, 1992).

2.2 Gender Development

The term *gender,* as it is used here, refers to culturally and historically specific concepts of femininity and masculinity, and the power relations between men and women (Hombergh, 1993). Hombergh further discusses the fact that *gender* is not the same as *sex* that refers to the social construction of sex roles and relations between the sexes. Therefore, *sex* refers to biological attributes and *gender* to the actual equal activities. *Gender* is also fundamental in understanding human interaction with the environment. *Gender* and *development* (GAD) refers to the economic, socio-political and cultural process of change in human societies (Sobrevinas 1993, cited in Hombergh, 1993). The term *development in gender in environmental development* has different meanings and connections (Nicholson, 1996). The connections with the role of *gender* in household waste management deal with the waste organization role, as this is differentiated between men and women.

Gender involvement in the environment and its impact assessments are important tools for sustainable development. 'Sustainable Development Strategies are an important mechanism for enhancing and linking national capacity so as to bring together priorities in social, economic and environmental policies' (UN, 1997:42). The United Nations Conference on Environment and Development (UNCED) characterized a certain globalisation of interactions among countries in the areas of World trade, foreign direct investment and capital markets (UN, 1997). The real issue in the context of *environmental household waste management* which is how women been integrated into sustainable waste management development has not been identified. Whether development has had different effects on women in different classes and castes in this sector needs to be recognized in program and policies for the waste management development of women and in integrating gender concerns into the waste environment in New Zealand.

2.2.1 Sex and Gender

'The GAD approach recognizes the basic unit of social organization on the basis of gender relations, the sexual division of labour, and other major influences within the

household in planning change and development (Warren, 1992:12)'. Gender is socially constructed and changeable, while biological sex is natural and permanent under normal circumstances (ICIMOD, 1997). The idea that attempts to look at and understand the differences between men and women that are externally influenced, and conditions imposed on the naturally given biological sexes deals with both sexes in relation to each other (Roda, 1997). While social and economic structures disrupt homogeneity, women share and experience strength and obstacles that bind them together as a group. Race, ethnicity, class, caste, nationality, age, and civil standing are other factors that may be causes for significant differences between males and females, but gender is always present and cannot be ignored (ICIMOD, 1997). Moreover, gender is not a mass social movement that aims to divide men and women and cause conflicts that are not in existence. However, it brings together those issues relating to men and women that have brought about unequal relations, and draws the attention of development workers to these in order that they might address them with appropriate measures that will help change, rather than perpetuate, them.

2.2.2 Gender Analysis

Gender Analysis focuses on understanding and documenting the differences in gender roles, activities, needs and opportunities in a given context. Macdonald *et al.*, (1997) stated that G*ender Analysis* involves the desegregation of quantitative data by gender, highlighting the different roles and learned behaviour of men and women based on gender attributes'. These vary across cultures, class, ethnicity, income, education, and time (Roda, 1997). *Gender Analysis* should not treat women as a homogeneous group.

Gender analysis refers to a systematic way of looking at the different social and cultural values impact on women and men, and requires separating data by sex and understanding how labour is divided and valued (Schienberg, 1999). Gender feature was developed to investigate the labour division between men and women differently. The ideas below identify why gender differences are necessary for society (Birks, 1998). Gender Analysis in contrast can perhaps better be seen to be a tool, a lens through which a muddy issue can become clear. Participation in household waste management by gender can be designed by the use of gender household waste management, and the real gender implications of waste activities and ways in which

gender and waste truly relates can be ascertained. How are men's and women's role or tasks in household and community waste activities related and what opportunities do women and men have to be engaged in small waste enterprises? How do gender differences affect the effectiveness of waste management and environmental sustainability? What strategies and methods can be applied to enhance men and women's contribution (International Labour Organization, 1998).

If gender based policy, interests or implications are considered in the development of practices in waste management sector, then the questions may be raised concerning the role of women. Sometimes the questions are raised in order to fulfil a policy or funding requirement to consider gender without there being a clear statement of why, or in what way, gender is to be considered. The limited inquiry into the practical gender needs, or conditions of life and work, of the women who work in waste, or who scavenge dumpsites in any working area number of women are involving as waste pickers and as organizers of recycling materials in several places. For those of us working on gender issues, there is an irony in seeing gender as a problem or a burden. Gender analysis, in contrast, can perhaps better be seen to be a tool, a lens through which a project can take on new dimensions (Scheinberg, 1999).

2.2.3 Gender in Recycling

The Waste Management Institute New Zealand (1994) ascertained that the increasing waste is having a damaging effect on the environment. In their efforts to discover the theoretical base of gender views on recycling, different agencies have different experiences about the views of waste organization in the world. An Email Conference (1998) believes that certain aspects of waste management practice within families and households and their experiences of waste and recycling practices and enterprises, could lead to minimization of waste at the household level, and help to keep the city environment clean. Further, the conference produced insights that lead to improvement in waste management practice and the strategic gender interests of women and men and their practical needs in waste practices, which help to develop waste management sustainability.

Recycling refers to an extraction of materials to produce new products (PNCC, 1997). Waste recycling is often undertaken as a survival strategy when the urban poor are unable to obtain formal employment and when non-waste resources are scarce or unaffordable (University of Canterbury, 1992). Waste reuse also plays a role in improving the urban physical environment. By reducing the total amount of solid waste headed for the landfill, recycling and composting are land saving and pollution reducing strategies (Waste Management Institute /New Zealand, 1994). Waste reuse also plays a valuable resource-conserving role: by recycling materials, further exploitation of scarce natural resources is minimized, thus containing the spreading ecological footprint of the city (Wellington City Council/New Zealand, 1995). Despite these environmentally and socially beneficial aspects of waste recycling, it is not without its negative impacts which include exploitation by waste buyers, and poor health and living conditions for the urban poor which deal in waste pickings (*Guideline*, 1999).

Gender participation is important in the process of recycling at the household level. Recycling activities ensure a clean and sustainable environment at the household level. 'Reduce, reuse, recycle' is the major aspect of recycling where women and men both can handle the waste in their households (Muller, 1998). An experience of Recycling NSW (1993) with recycling seems largely centred in New South Wales for the motivation of waste reduction programs in Australia. The particular interest to New Zealand Waste Minimization (2000) mentioned that waste management strategy progressed to waste management goals, and first steps involved improving its kerbside-recycling program (Charlie, 1993). The gender disparity in environmental risk in the home and workplace may result in a disproportionate impact on women's health because of women's different susceptibilities to toxic effects. Damaging health by involving women in recycling programs in the Philippines context means that the women are working more in waste collections and waste dumping activity than men (UN, n.d). Another example of women in recycling is that women have to take care of their children no matter whether it is winter or summer. Nepalese women especially from lower caste, *Chyame* and *Pode* used to carry their children on their backs, and start to collect waste early in the morning in a developing urban city, Kathmandu. The collection of recyclable paper, plastics, bottles and tins is carried out by collection groups in Kathmandu city comprising Indian migrants who are involving more teenage girls in the groups.

2.2.4 Gender in Composting

Composting has managed to achieve environmental improvements in all urban or rural societies (Barth *et al.*, 1988). Maintaining a clean and healthy environment is the principal motivation for women who participate in composting and this goal has been met to a significant extent. But improved waste management solves only a few of the informal settlements' environmental problems and does very little to improve housing conditions or human waste disposal, both of which also have a significant impact on the health of informal settlement residents (Ministry For the Environment/New Zealand, 1997). The ability of composting to generate income will be assessed. In this regard, composting could have a significant gender role in improving other environmental problems by providing resident base composting. A woman has the greater role to manage all types of waste at household and outside households, which helps to mange the sustainable environment development.

Many relevant studies were discussed on the participation in composting behaviour. (Alister *et al.*, 1998: 42) stated empirical evidence that habit formation is important with respect to composting and recycling and that initiation and is initiated persistence in this depends on the psychological attitude. Attitude towards the environment, social pressure and knowledge are important positive determinants of composting, while personal inconvenience is a strong negative determinant. Aberg *et. al.*, (1987) also mentioned similar findings for composting behaviour in Gothenburg, which was determined by the strong social pressure of knowledge. Almenda Country Waste Management Authority (1990), Portland Metro Survey (1999) emphasized that the composting activity at household level is important by demonstrating as country home composting education program (UN, 2000).

2.3 Gender Participation in Sustainable Environment

The integration of gender into environmental household waste management by the global process is important for the development of gender relations in waste management. The Ministry for the Environment in New Zealand acknowledged that good information is needed to make good decisions about the sustainability of the environment. An environmental indicator is something measured regularly to show trends or sudden changes in the state of a system, population or individual (OECD, 1996). New Zealand's environment has undergone massive changes in a short time, and is under constant pressure from human activity (Ministry For the Environment/New Zealand, 1998). There are so many cases, which are affected by humans such as the atmosphere, rivers, soils and oceans, where the effects occur, or the best way to control them. The power of an indicator lies in its ability to suggest whether things are getting better or worse.

Human beings are at the centre of concern for sustainable environment development (UN n.d). The United Nations Conference on Environment and Development and the International Population and Development recognized that women have an essential role to play in the development of sustainable ecology, sound consumption and production patterns and approaches to natural resource management. The empowerment of women and the improvement of women's socio economic status are essential for the achievement of sustainable development in all areas of life. Scheinberg, (1999) mentioned that inequality between men and women in sharing of power, family responsibilities and decision–making influences the participation of gender in waste production at the household level. The equal division of labour and responsibilities within household- based development requires waste management skills for participation in household waste management for wider aspects of sustainable environment.

The culture and society define the rights, responsibility participation identifications of roles of men and women in relation to separation and organization of waste for a sustainable environment. Longwe (1995) summarizes that the gender is all about reconciling growth with the equitable distribution of benefits among men and women,

which greatly highlights the interdependence and partnership between men and women in any field of sustainable environment development.

2.3.1 Gender and Sustainable Waste Management

Many common household products used in the kitchen, bathroom, garage and basement have the potential to cause serious health and environmental problems during their use or after their disposal (Wolf, *et al.*, 1997). Scheinberg, (1999) presented a gender theme, which gives a clear vision of the role of gender in a sustainable waste environment. The practical connections between waste management and gender focus on the needs and strategic gender interests of women in the waste area, especially in conditions of work and Scheinberg presented power relationships within enterprises and negotiations between enterprises. The following discussion gives a clear view of the theme of gender in environmental waste management.

A gender theme for waste management

The gender nature of waste in specific cultures: Who defines if an object is 'waste'; who makes it; who owns it: who is responsible for it; who gets blamed for it; who is allowed to scavenge, reuse, or repair particular types of waste? Are different kinds of waste differently gendered? For example, has human bodily waste a different meaning for women and men; are both women and men socially permitted to touch it? And is human waste different in from this respect, for example, household garbage?

In the specific cases where women are economically, socially, educationally, and/or culturally disadvantaged, does this create a perceived affinity between women and waste, because of the low or marginal status of both? If women's access to all resources is limited or denied, does waste become the resource of last resort? Is waste work seen as the only area, which is open to women, because of their low status and limited education?

Gender and responsibility for household and community cleanliness: What are the gender characteristics of the task or project of community waste management, including human and animal waste management, street sweeping and the maintenance of public spaces, separation of waste at source, re-use of waste materials, collection, transport and disposal of solid waste from households and businesses?

Women are usually associated with responsibility for cleanliness of the home and for the health of the family. Does this translate to responsibility for or special interest in cleanliness of the community? Are there special aspects of women's role in community maintenance that relate to responsibility for waste management? At which point in the waste management trajectory (if any) does this special interest 'switch over' to men and what are the aspects of that shift? What measures can project staff take to respond to these gender characteristics?

How does the gender balance of power and access and control of financial resources within the household and the community affect the demand for waste removal services? And how does this affect willingness to pay? How does it affect willingness to invest in, manage and maintain household infrastructure such as compost bins, soak pits, or 'modern' toilets? How does this affect willingness to do volunteer work for the community? And, knowing that gender affects for example willingness to pay, how has this been translated into the practice of waste projects?

Gender and community-based waste enterprises: What are the gender characteristics of small waste enterprises, for example in terms of size and potential for development, waste materials managed or recycled, division of responsibilities and tasks, working conditions, access to technological innovations and income level?

How can project implementation focused on micro- and small enterprises and co-operatives, ensure that women's existing enterprises are not disproportionately ignored or disrupted and that women share appropriately and equitably in the benefits of new projects including being hired as workers, managers and the like? Are there examples of how this has happened?

Gender and waste management: policy and practice: What strategies can strengthen recognition for women's productive use of waste-derived resources? How can planners and development support organizations ensure that women's access to resources in the waste stream is not disturbed by modernisation or privatisation of waste systems?

What can gender analysis tell us about improving sustainable and environmentally sound waste management projects and practice? How can an understanding of the gender characteristics of households, communities and small enterprises improve the environmental and economic performance of micro- and small enterprises and co-operatives? How should gender be factored into cost recovery and fee administration schemes? Can the discussion group participants give examples of gender-sensitive methods in waste management?

Do women and men differ in their preferred policy and management approaches to waste, or in their selection of technology? How (if at all) does this play out at the community level, in local government, in NGOs and CBOs and in international agencies and development organisations? What does this suggest for the choice of waste, recycling and composting personnel and staff for government organisations, micro- and small enterprises, co-operatives, NGOs and the like?

Source: Schienberg, 1999:5, Gender and Waste, UWEP working paper Document 12,

Web page http://www.waste.nl/dochtm/wd12/wd12.htm

2.4 Women and Sustainable Development

Many Conferences related to women and development have been held for example: Unites Nations Conferences on Environment and Development (UNCED), Rio de Janeiro, (1992), World Conference on Human rights, Vienna (1993), International Conference on Population and Development (ICPD), Cairo, (1994), World Summit on Social Development WSSD, Copenhagen, (1995), Fourth World Conference on Women, Beijing (1995) and the world food summit Rome, (1996) In 1992 the United Nations Convention on Biological Diversity (CBD) focussed on indigenous knowledge mainly women's involvement in economic and social development and cultural and equal participation of women and men as agents and beneficiaries of people-centred sustainable development (WPWT, Web page 1999). These types of conventions on biological diversity in indigenous knowledge and the findings from these types can be applied in the sustainable waste management development

The Brundtland Report (WCED, 1987) defined the meaning of sustainable development as a vague area. "Sustainable development is a vague concept that at once, offers a comprehensive, consensual and conservative approach able to weld together quite disparate and conflicting interests in environment and development. But because it is vague and its implications poorly understood, in practice it offers few clear solutions. Anyone can signup for sustainable development so long as it requires no specific commitment to do anything that will threaten their material interests" (UN, 1987).

The industrial world recently signed up to a programme of radical change in the way global resources are managed and used, though the UN conference on environment and development and the final conference document require sustainable economic and social systems to present the prospect of natural resources (UNCED, 1992). Development should improve the quality of life of both men and women and increase equity among classes and sexes. Sustainable development must be determined and directed by both men and women based on different experiences, perspectives and needs (Warren, 1992). The issues have been a growing awareness of the specific role that women play in the process of promoting social and economic development and the differences between men and women in the use and management of natural resources. Information on environment development relationships and sustainable management

methods should be made available to women and their organization and empowerment should be promoted (UNDP, 2000). United Nations Development Programmes (2000), further stated that women's access to, and control over, natural resources should be increased by environment conservation and rehabilitation measures in which local women's needs and views are properly integrated. It is important to manage properly the waste environment at the household level, which helps to develop environment conservation, which is mostly handled by women and men equally.

In order for sustainable development to advance in practice it is important to figure out the holistic vision to make the explicit linkage among sustainable livelihoods, environmental survival, cultural trends, and gender structures in power relationship and women's institutions (OECD, 1999).

> *A gender sustainable development perspective should be infused with a commitment to change the cultural values and sexual division of labour, to attain, in the near future, a state where men and women share power and labour in the management and control of fragile ecosystem. A gender sustainable development framework should be shaped by an awareness of the impact of development on people and resources, emphasizing the design of integrated programs to improve the quality of life of its people. It should battle against relations of inequality between women and men between the nations and between humanity and natural resources (UNIFEM 1997cited OECD1997: 25)*

CIDA (1995) indicated that the issues must be brought together in a broader approach through promotion of training and sustainable development that integrates social, political, economic, environmental and cultural aspects of sustainability through its second-generation sustainable development course. Furthermore, CIDA maintains that a key challenge inherent in the development of training initiatives is to avoid the compartmentalization of environment and gender issues. Even in a course on a sustainable development that holds the potential, in theory, to bring these two themes together there is the danger that 'Gender" will be dealt with one day and 'environment' another without identifying how these issues co-exist in peoples lives and development co-operation initiatives. Similar investigation has been done by USAID (1999), which documented gender considerations in environment sectors and programming and improving participatory community-based natural resource planning and programming. New Zealand has been involved in the area of gender and environment supporting the

initiation of locally based research in specific projects-although, again, this has not focussed on waste related gender research.

Moreover, women and organizational development are considered in this age to be successful through educational campaigns on issues such as equality for women in decision-making from the household to the community to national and international levels (Macdonald M., *et al.*, 1997). There is a concern to prevent, through environmental clean up, the promotion of reproductive and sexual rights and sexual exploitation, poverty reduction through micro credit and a seeking to change the microeconomic policies of the world. 'Gender and Development' supports the various movements to build a strong, unified movement for social change in the next century by emphasizing demarcating values, pluralism and diversity by all public institutions and decision- makings (Subedi, 1999, Porter *et al.*, 1998). Gendered division of labour, and differential access to resources vary across and within countries; careful assessment and analysis are required to understand the specifics of how gender as social structure will affect waste management development in any particular context (Dankelman, 1995). Integrating women in environmental programmes explicitly supports the target of sound environmental management in the waste sector and the implementation of international agreements relating to waste management for environmentally sustainable development.

2.4.1 Women and Environment Development

The environment is incorporated in numerous ways in development programs. Women are acting as natural environmentalists to improve environment development. Environmental performance is assessed with regard to the degree of achievement of domestic objectives and international commitments (OECD, 1996: 3). Environment and Development insists that women's visibility, roles and leadership in household public policy making is seen through peace, gender, human rights and environment and economic justice campaigns (WPWT, 1999). According to an analytic, women and environment development approach presented by Warren (1992), women are the primary users of natural resources for human subsistence in the developing world. Not only in developing countries, - women in developed countries also are not all equals in powers and positions. In the area of environment development women in developed

countries may be the managers of natural resources. In the sector of household waste management this research has been demonstrated that women are more involved than men in New Zealand, as has been proved by the sample study of Palmerston North.

2.4.2 Women and Sustainable Environment Development

Sustainable Environment Development is responsible for pursuing agricultural, forestry, fishery, tourism and urban development policies, which do not exhaust or damage the country's landscapes and resources (OECED, 1996). The specific role of women in environmental management focuses on the natural environment and the implications of the relationship for sustainable environment development. Dankelman (1995), and Farrington J., *et al.*, (1999) showed that women play a predominant role in the management and use of natural resources at the local level. This is obvious all over the world, especially in non-industrialized countries where gender differences exist in the management of natural resources. Different studies demonstrated the close link between women and the environmental situation. In fact, women are important managers of biomes, which flow, in those agricultural systems in which sectors like forestry; crop production and animal husbandry are integrated (Dankelman, 1995; Overholt *et al.*, 1991). Within agricultural production and forest management there is a clear differentiation of responsibilities between men and women such as weeding, pronging, plugging and digging. Women primarily do harvesting and trenching, while men are involved in mechanized work (Agrawal, 1991). In the agricultural sector, women take care of food preparation and processing activities as well as fodder collection, tending animals, weeding, and transportation. The men's jobs in this sector seem to be to manage agricultural farming and handle crops. Nonetheless, class, caste and age differentiate the position of women in the household, community and society. There are differences between the tasks, responsibilities, and opportunities of male and female members of society, and there is an inequity in these differences (Dankelman, 1995; and Frrington J., *et al.*, 1999).

2.4 3 Women and Household Environment

The household environment is an important base on which to build a sustainable environment. Women's household maintenance and domestic responsibilities, i.e. daily needs to obtain water or fuel or dispose of waste may result in women adopting unsound environmental practices where resources are limited (Gender Waste Email Conference, 2000). Women and men tend to have different responsibilities for domestic purchases and different roles as consumers, which may result in consumption patterns that contribute to environmental changes (OECD, 1999). Warren (1992:8) stated that women's domestic and subsistence activities, as crucial as they were to social and economic order, were neither recognized nor valued in developing countries. It is relevant to investigate these issues in terms of women's development not only in the developing countries but also in the context of the developed countries.

2.4.4 Women and Waste Management Environment

Years of global rapid economic and population growth of the world have resulted in tremendous pressure on waste management and disposal. Sustainable waste management in New Zealand depends on the strategic waste management policy and planning, waste management technological improvement, modern waste management infrastructure and waste minimization, and recycling and clean technology (Waste Conference, 2000). Waste management continues a long standing tradition of leadership in recycling and the environmentally safe collection, handling and disposal of solid waste (WWW, 2000).

The literature has been discussed in a Waste Management Conference in Hong Kong (2000) in different area of waste management policies and legislation. Also the Conference enforcement was of waste management legislation, integrated waste management planning, financing waste management infrastructure, sustainable waste management practices, construction and demolition waste management contaminated sediment management waste minimization, recycling and clean technology waste collection and transportation (ISWA Conference, 2001). The area of waste environment technology, such as landfill management and aftercare technology, organic waste

management and treatment technology, and hazardous waste management was discussed. However, the women and waste management environment has not addressed in literature yet.

Trucker, (1999) stated that the household waste management hierarchy resolves many of the dilemmas relating to the individual's actions. Women face biases in the education system, which may mean that they lack access to technical training such as recycling, composting, landfill uses, environmental practices, that would enable them to support the development and implementation of environmentally sound practices. Still, women have been mobilized at the community level to work on environmental issues that directly affect their home and family, such as water and waste management. Gender stereotype about appropriate work may limit the potential for women's involvement in programmes, and even business opportunities, promoting environmentally sound practices such as recycling and composting (Gender and Waste Conference, 2000).

Given that women make up over half the total population of New Zealand their status is also inextricably linked with the divisive issues of access to opportunities, resources and decision -making process (Bowes, 1994). While some changes in the status of women are readily observable, obvious inequalities still exist, ensuring that these issues continue to be of importance to the public and policy makers alike (Ministry of Foreign Affairs, New Zealand, 1998). The trends and patterns, drawing mainly on the context of changing perceptions of the roles of women and men in the family and broader level of society affect the activity participation in waste management environment.

2.4.4.1 Women and Recycling

By purchasing long life and low package devices, consumers can effectively reduce waste in landfills. The Depression and the Second World War made recycling a way of life for a whole generation in western society (Jorgensen, 1996). However, the fact that waste is a possible environmental hazard was not the driving force for legislation until 1950 when increasing industrialization led to Clean Air and Water Pollution Acts being passed Solid waste legislation of the 1960s requiring sound disposal methods was

harder to understand as the potential damage, was not immediately visible (Jorgensen, 1997 cited in Powelson, 1992: Warmers, 1994,).

Arising from a deeper understanding of the interaction between man's activities and his environment, new legislation was written to cope with the potential environment problems (Barde, 1989). Household waste management is seen as one of the components of urban waste management, in which neighbourhood communities, households, community-based organizations and small, informal enterprises are engaged in the collection and disposal, re-use and recycling of waste materials.

2.4.4.2 Women and Composting

Composting is, in its broadest definition, the biological reduction of organic wastes to biomes by the action of micro-organisms. Composting requires people's participation in the process and can be classified as a form of waste stabilization which is applied to the solid and semi solid materials making composting unique among the biological stabilization processes used in sanitary and biological engineering (Haug, 1993). Composting activities are not entirely free from women related constraints. They are almost entirely carried out by women, though some women receive occasional help from husbands or sons (Gender and Waste Conference, 2000). While women are willing to engage in composting because it corresponds with their tribal roles, many complain of the hard physical labour that it entails. Some were not pleased that the composting project added that even more work to women's their already gruelling daily routines

A gender and waste conference (2000) addressed the fact that women are willing to engage in composting because it corresponds with their tribal roles although many complain of the hard physical labour that it entails. Some were not pleased that the composting project added even more work to women in their gruelling daily routines. Haug (1993) noted that composting requires people participation, and that composting activities are almost entirely carried out by women. An important advantage accounting for the sustained interest in composting activities is that composting integrates well with women's triple roles; household and family care income-generation, and community management (Anonymous, 2000). In some informal settlements the location of the

composting sites is important because they should be strategically located so as to ease the burden on women. The composting activities are almost entirely carried out by women, though some women receive occasional help from husband or sons. At the same time the women's group depends on a male chairman to represent its interests to the rest of the community. This may not be the best possible arrangement for addressing women's strategic needs, including political empowerment and the recognition of the importance of their work.

2.4.4.3 Women and Garbage

Women are responsible for removing the garbage from the home (kitchen) and putting it into public space. Especially women have a direct and daily relationship to garbage participation in Chicago. The women in Chicago have a full grasp of the technical, administrative, and fiscal issues in effective waste management and an integral of the construction of the refuse management efficiency sanitation and cost (McGurty, 1999). Mc Gurty's research on Garbage was addressed to the gendered areas of waste are by assuming the gender neutrality of other images, eliminates the home making image of waste management. Another examples is women waste pickers in Banglore India, who contribute to household income by facing different difficulties (Haysman, 1999) includes a detailed account of a day in the life of a woman waste picker. Despite the low returns and the health risk, for women in Banglore waste - picking offers one of the few ways in which women from lower castes can earn an income and also meet their household and child-rearing responsibilities.

Scheinberg (1999), focused on the fact that women and men, girls and boys engaged in different waste related activities because of cultural traditions and conventions. Because of practical interests, such as earning income and maintaining a healthy living environment and partly because of the wish to gain recognition as a worthy household environment, they have different activities (Agrawal, 1991). Such waste activities range from managing the resources within the household or family to the more formal municipal activities of collection. Mostly women's role in household waste management affects the ways in which cities and community organizations organized collection efforts. Many women used to go to the recycling to deposit to the recyclable

materials. Many women in households organize the dumping of household materials and put the household rubbish at the kerbside.

The practices of composting, recycling of plastic and paper and waste - picking at dumpsites etc., are concrete expressions of different views on so - called *waste*. The claims on the waste stream, in terms of the core gender analysis ideas of access and control of resources, are very relevant (Scheinberg, 1999) also in the area of community and household waste management. When there is competition about waste materials as a valuable resource, women often have limited access to these materials. On the other hand, there is a link to the strategic gender interests of women working in waste and recovery activities.

Using participatory technology development process a pilot project started in an area of Sharona and Nassareya, Egypt on garbage reducing in women in participatory decision process adopted innovative cleaner stables and living space concerning organic household waste, manure and urine in a pit in house stable. The women's experiments on the project led to the making of an improved compost, which later helped form different fertilizer combinations (Zakaria *et al.*, 1997). The recycling through garbage - improved stables has resulted in time saving for women, and improved health conditions as well as providing income -earning opportunities.

2.5 Women and Community Waste

A better understanding of the interrelations between gender and community organization will assist in strengthening the voice and the contribution of women in waste management. Social class and caste are also related factors. Scheinberg, (1999) addressed that 'community' denotes the distinctive space between the household and the public sector where waste management is neither the full responsibility of individual households or of the municipal waste department. "Community" denotes neighbourhood spaces like streets, public areas and locations for waste facilities such as disposal sites/containers. In the community, citizens are responsible for waste management. Their social responsibility is to be promoted and motivated by influential community members, who approach the residents through informal groups, committees,

community-based organizations and NGOs. In many neighbourhoods citizens take responsibility to complementing the official services.

Agrawal (1991) mentioned women in all areas of the world, in general are responsible for cleanliness and hygiene within the home, and that this responsibility extends to the areas around the home, compound and neighbourhood. This is the case is spite of the fact that social norms or permission of husband (or partner, father, son, etc.) may not normally allow women outside their homes which in turn-may make it difficult for them to carry out this responsibility adequately (Tiwari, 1998).

2.6 Household Waste Management

A number of studies analysing household waste generation were discussed. Sterner *et. al.*, (1999) addressed a large discussion about household waste generation and found that most of the studies available rely explicitly or implicitly on the utility theory of the consumer or household production. The theory used to derive a demand function for solid waste management services mostly used models of socio- economic and demographic factors (Sterner *et al.*, 1999, Gamba & Oskamp, 1994).

Waste management is a vital aspect of city life, and any waste management policy must satisfy the requirements of its residents (Ministry For the Environment/ New Zealand, 1998). According to the Oxford dictionary, the definition of waste is 'superfluous, no longer serving a purpose' (Hornby, 1974). Therefore, waste is a commodity that is superfluous to one person, which does not mean the product is no longer useful to anyone. Zurbrugg (2000) stated in an electronic article (p 13-14) that the refuse collection in the Pakistani context that giving a priority to promoting participation primarily means developing public awareness through information, education and technical support in effecting strategies for improvement. Zurbrugg (2000) added further, that taking socio - cultural aspects into consideration in differing cultural, religious and language backgrounds plays a prominent role in information, campaigns. The gender - specific information is very important in Islamic communities in Pakistan, where men are the heads of their families, especially in determination of outside affairs.

Women, however, play the decisive roles in the household in managing the waste, as for health issues. The process of waste management follows the hierarchy of reduce, reuse, recycle, recover, treatment and disposal of the residual waste (North Shore City, 1998). Effective and efficient household waste management creates a good sustainable environment within the household.

2.6.1 Household Hazardous Waste

Related to the issues of waste reduction and recycling is the question of identifying, and making special provision for, household wastes, which may be potentially hazardous (Tonga & Associates, 1989). There is cause for concern at the number and range of potentially hazardous materials coming from households, which enter the waste stream (Commission for the Environment,1984). An example, which is addressed, is the idea of putting out recyclable material in boxes, which was introduced by the Ministry for the Environment (1997). The Auckland Regional Council has recognised that Household Hazardous Waste collection plays an important role (Patricia, 2000), and has exercised responsibility in managing the waste at the household level by diverting hazardous material from the general waste stream destined for landfills (WMINZ, 2000).

However, the literature on gender involvement in the waste management area is still lacking The Asian waste management has been analysed in an the area of expected economic recovery based on providing opportunities for new business and market expansion (ISWA, 2001). Asia is strategically located for holding an international conference on waste management; however, the gender aspects in this area have not been included as a topic in the conference. In the Philippine context there is a complex land tenure system and inheritance patterns involve both male and female siblings, which, under some socio economic circumstances undermine sustainable management (UN, 2000)

The Waste Management (WM) association in the country of Nevada city in Western County area in Canada, has stated that they have established a household hazardous, waste collections and opportunities residents to participate in waste recovery programs (WMINZ, 2000). Which provide a cost effective and convenient way for business to

recycle and divert materials from unnecessary or improper disposal. Research has identified that household waste collections are effective and common (Waste Management Practices, 1992). Many European, American, Canadian and Australian cities have followed similar collection systems, with opportunities for waste education. In New Zealand this has already started in Auckland, and other cities in New Zealand, including Palmerston North need to follow this example (WMINZ, 2000:49).

2.6.2 Waste Management History

New Zealanders have disposed of the waste they have produced in years gone by in a similar manner to many other developed countries around the world (Jamieson, 1989). Historically the 'Waste Management Programmes' have managed waste on a site-by-site basis. Some examples given in low level, waste for treatment to one site; each site treated its own waste. Regarding City and Rural Household surveys there are very few detailed studies that have been done on the waste production. From the household in small cities towns and rural settlements, nor the systems the municipal authorities in these areas employing to manage their waste (Laurence, 1993, Worley, 1992, DDC, 1993, WCC, 1995)

Mostly the solid waste history comes from municipal waste organizations rather than from federal regulatory control. The sources of municipal solid wastes in a community are generally related to land use and zoning. Municipal Solid Waste (MSW) sources include residential, commercial, institutional construction and demolition, municipal services, and treatment plants. Single and multi family detached dwellings and apartment buildings generate residual sources of Municipal Solid Waste (Waste Management Institute/ New Zealand, 1994). The types of solid wastes generated include food wastes, textiles, and papers, cardboard, glass, wood, ashes, tin cans, aluminium, street trees leaves, and special bulky items including yard wastes collected separately and white goods (refrigerators washers, dryers, etc.)

Local governments controlled solid waste almost from the beginning of each settlement because of the inherent severe health consequences derived from street disposal. Furthermore, along with prohibiting the dumping of waste in the streets, municipal

regulation usually stipulated requirements for proper disposal in designated waste dumpsites and mandated that owners remove their waste piles from public property. 'There is no legal definition of waste in New Zealand' (Ministry For the Environment/New Zealand, 1997:5). Various organizations have used different terms and definitions to classify waste. Palmerston North's history of solid waste starts from the integrating model of the following waste generation, The waste is generated: solid, liquid or gaseous hazardous waste is treated as separate categories as it is generated in solid liquid and gas use form (PNCC, 1999). The source of waste is residential or industrial. The management methods are the disposal to land, public, private land filling, or littering.

2.7 Carrying Capacity of Waste

Different societies have different ways of producing and reducing waste. Western economic systems have increased the carrying capacity of their environments by depleting that of others (Haward, 1971: 291). The increase of population in the world naturally increased consumption and waste production. Franklin (1992) states that while the people enjoyed the convenience of prosperity of the 'throw-away' society, they also questioned the consequences of such a lifestyle. Agenda 21 from Earth Summit, Rio de Janeiro, June 1992, pertaining specially to waste management, observed that this was among the environmental issues of greatest concern to the global community. In addition, Warmer, (1994) added the idea to achieve waste minimization based on environmentally sound reuse and recycling, and promoting safe waste disposal and treatment is important to support the environment. Still the discussion is lacking about the gender participation in handling waste.

The Resource Management Act 1991 proposed that as a key reflector in order to have sustainable development, waste production and disposal must be reduced. There are many institutions reducing, reusing and recycling wastes for industry, business, and other organizations and for people, both individually and in the community (University of Canterbury, 1992). In order to achieve sustainable development, every person,

company and organization must be aware of ways to minimize waste. Households are one of the local places, which can be responsible for reducing waste in New Zealand.

2.7.1 Waste Control Technology

In most industrial countries, facing major problems of how to handle society's toxic chemical waste now ranks among the top environmental issues. New Zealand cannot be far from these problem issues. Without concerted efforts to reduce, recycle, and reuse more industrial waste, the quantities produced will overwhelm even the best treatment and disposal systems (Cocks, *et al.,* 1989). One of the most challenging and pressing current environmental concerns confronting environmental scientists and others is what should be done with all of the solid and hazardous wastes our throwaway society produces. In simple terms, it could be said that society must change its throwaway ethic to a recycling one, which would help restore again living standards. The roles of all members of the household are important in making a concerted effort to organize and eliminate waste by recycling.

2.7.4 Good Waste Operating Practices

Reducing wastage, preventing inadvertent releases of chemicals, and increasing the useful lifetime of process chemicals are all directly related to good operating practices. Ensuring management of the major sources of solid waste from residential, institutional, agricultural, and industrial locations has been of major concern to the public in terms of environmental degradation for only a relatively short period of time (Ministry For the Environment/New Zealand, 1997).

Wasteminz (2000) addressed that the waste minimization is accomplished in a variety of ways, including feedback or input substitution, process modification, and good operating practices. One of the first steps to be taken in the information gathering process is determining the exact nature of the waste produced The waste must initially be characterised and categorized by type, composition, and quantity a task

accomplished by performing a chemical process audit or survey of the chemical process (UN, 1997).

2.8 Landfill and Waste Management

Recycling and composting are given incentives to extend the capacity of acceptable existing landfills, which is the way to encourage the waste minimization process (Kennedy, 2000). The Ministry of Environment/New Zealand believes that effective environmental management can be achieved through partnership with local government. (WMINZ, 2000). Land filling is the most common method of solid waste disposal in New Zealand. According to a landfill Census/New Zealand (1995), there were 327 legal landfills operating in New Zealand (Waste Management Report, 1997). As it is in more densely populated countries, existing landfills in larger urban areas are approaching full capacity and the availability of new space, which is limited by opposition from local residents and by higher environmental standards (Ministry for the Environment/New Zealand, 1997:13). However, the proper uses of landfill in terms of gender prospective who uses the landfills more, men or women and who usually goes to dump the rubbish - men or women -have not yet been ascertained.

A modern landfill is an environmentally secure and well-engineered facility for the disposal of commercial and domestic waste. The term *sanitary landfill* implies a good standard of management, as opposed to *tip* or *dump*. The new sanitary landfill would have to be modern, environmentally secure and well engineered (Waste Management Report 1997). The development of sanitary landfill can by sharing information and resources, reduce overall cost and most importantly-reduce environmental impacts both EIA and SIA by reducing the number of landfills.

2.9 Legislation

Legislation relating to waste management is found in a number of Acts. The main acts relating to Local Authorities are the Health Act 1956, the Local Government Act 1974, the Resource Management Act 1991, and the Hazardous Substances and New

Organizations Act 1996. Other Acts include the Litter Act 1979, the Transport Act 1962, and Acts relating to Toxic Substances, Dangerous Goods, Explosives, Radiation Protection, Pesticides, Animal Remedies, etc (Ministry For the Environment/New Zealand, 1994). Some of these are discussed below

2.9.1 Resource Management Act 1991

The Resource Management Act 1991 covers waste management. Regional Council may develop regional waste management plans, which can include such aspects as charging for disposal and local recycling ventures. Many of these developments occurring at the local level in New Zealand will improve waste management practices, and through those, have an impact on the users and manufacturers of packaging. Ryan (1994) stated in one of the report in Regional Overview of Industry in the Manawatu-Wanganui Region and Related Environmental Issues that the resource management Act1991 is the principle statue for managing the land, soil, water, and waste control of pollution. Resource Management Act is an over searching purpose to promote the sustainable environment management of natural and physical resources.

The purpose of this act is to promote *sustainable management* of natural and physical resources. In this act, sustainable management means managing the use, development, and protection of natural and physical resources in a way, or at a rate, which enables communities to provide for their social, economic, and cultural well being and for their health and safety (Ministry For the Environment/New Zealand, 1994). The purpose is addressed as, Sustaining the potential of natural and physical resources (excluding minerals) to meet the reasonably foreseeable needs of future generations; and safeguarding the life supporting capacity of air, water, soil and ecosystems; and avoiding remedying or mitigating any adverse effects of activities on the environment.

2.9.2 Hazardous Substances and New Organisms Act 1996

The Hazardous Substances and New Organisms Act (HSNO Act) was passed in June 1996 but will not come into force until a date to be fixed by the Governor-General by

Order in Council. This delay is to allow regulations relating to the Act to be put into place to coincide with the act being brought into force. A new state agency called the Environmental Risk Management Authority will be set up under the HSNO Act to assist in the control of hazardous substances and new organisms. This organisation will replace the Hazards Control Commission, which was set up under the Resource Management Act. Gender knowledge in this sector is important to be aware of all types of legislation to maintain the environment sustainability (Commission For the Environment, 1984).

2.10 New Zealand Government's Waste Management Policy

According to the (Ministry for the Environment/New Zealand, 1997), the Government's Waste Management Policy is to ensure that New Zealand's waste generators should meet the costs of the waste as far as practicable. Where possible they should produce and encourage the implementation of the internationally recognised hierarchy of reduction, reuse, recycling, recovery and residual management by all involved in waste generation and management in New Zealand. A couple of Councils e.g. the Selwyn District Council (1996), Taranaki Regional Council (1993) Tararua District Council, (1994), North Shore City Council (1998), and Canterbury City Council (1999), have addressed the implementation of the policy in New Zealand. Which should be consistent with the purposes and principles of the Resource Management Act 1991, including the promotion of sustainable management of natural and physical resources. Massey University surveyed plastic board in the waste stream and the 'Zero Waste' management programme in Palmerston North (Shilton, *et al.*, 2000:127). This policy is designed to maximise net benefits to New Zealand firstly by promoting economic efficiency gains from reduced resource use through waste reduction, resource recovery, reuse and recycling, and secondly, by avoiding environmental and health risks created by increasing volumes of waste requiring disposal, and securing the economic advantage of New Zealand's "clean green image"(WMINZ, 2000)

2.11 Environmental Impact Assessment (EIA)

The Environmental Impact Assessment (EIA) has been adopted to analyse and mitigate the effects of the environmental development process (Erickson, 1994). Further, the impact assessment as conventionally practiced, pays relatively little attention to the environmental and social effects, which actually occur, from development, or to the effectiveness of the mitigation and management measures (Wathem, 1988). Environmental protection followed by legislative and institutional set-up is a relatively new issue for most countries. The EIA is a new instrument for all countries. Public and household involvement in decision-making roles and activities is necessary to maintain the environment, particularly the waste management process in the household. Gender participation in household management practices makes an initial impact assessment in the process of household waste to landfill. An environmental impact analysis is a study of the probable changes in the various socio-economic and biophysical characteristics of the environment, which may result from the proposed action (Lawrence D, 1993). Canterbury Regional Council, (Clancey, 1999), analysed the environment health impact assessments of different districts, regional and City Councils which had carried out production recovery and environmental impacts studies. However, the Environmental Impact Assessment (EIA), with the involvement of a Social Impact Assessment (SIA), evaluating the gender involvement in waste management sectors needs to be discussed to find out the extent to which the sustainable environmental impact assessments are supported by form the household sectors.

2.12 Environmental Education Practices

Traditional environmental education programmes, which focus only on collection of waste, have the potential to greatly increase both the amount of household waste collection and the facilities provided, and also the money spent on disposal (Wolf *et. al.*, 1997). 'The three most frequently mentioned reasons expressed by people for behaving in an environmentally damaging way were lack of knowledge on how to treat the

environment better, lack of motivation and ignorance of the effect of their behaviour on the environment' (Waikato 1998:3). Education is an important factor to organize waste management to know about the knowledge and techniques. Educational programs in waste management i.e. recycling, composting and dumping sites policy plan and facilities, which directly affects to the country's environment in New Zealand (WMINZ, 2000). Peoples in Palmerston City are being facilitated with educational programme launched by the city council through a campaign on business centre, media, booklets newspapers, and junk mail delivered officially and personally since 1993 (PNCC, 2000)

There have been a couple of surveys in Palmerston North, The Waste Audit Survey (2000), Rubbish Collection Survey (PNCC, 2000) also a Household Survey in Kuwait, a Household Waste Survey in the Philippines, and a Household Pilot Project tested over a period of time (WMINZ, 2000). However, the gender participation in household waste management through educational program and practices in this area has not been acknowledged yet.

Chapter 3: Methodology

3.1 Introduction

This research is an exploratory and descriptive analysis involving quantitative and qualitative approaches. To conduct this research, a comprehensive literature review was completed, using both national and international material. The literature was reviewed to ascertain whether or not and if so, then to what extent base household waste determines the sustainability of the environment in New Zealand. Writing letters to the related waste management institutions, internet searches; library database searches and email communication have all been carried out as part of the search for relevant literature.

This chapter focuses on the methodology used in the research. A conceptual framework and an empirical model of the study are specified. Comments are also made on how the mail survey been conducted and progressed. It has been explained how the study area was selected, and a detailed account is provided of the data collection methods chosen in the household survey.

3.2 Conceptual Framework

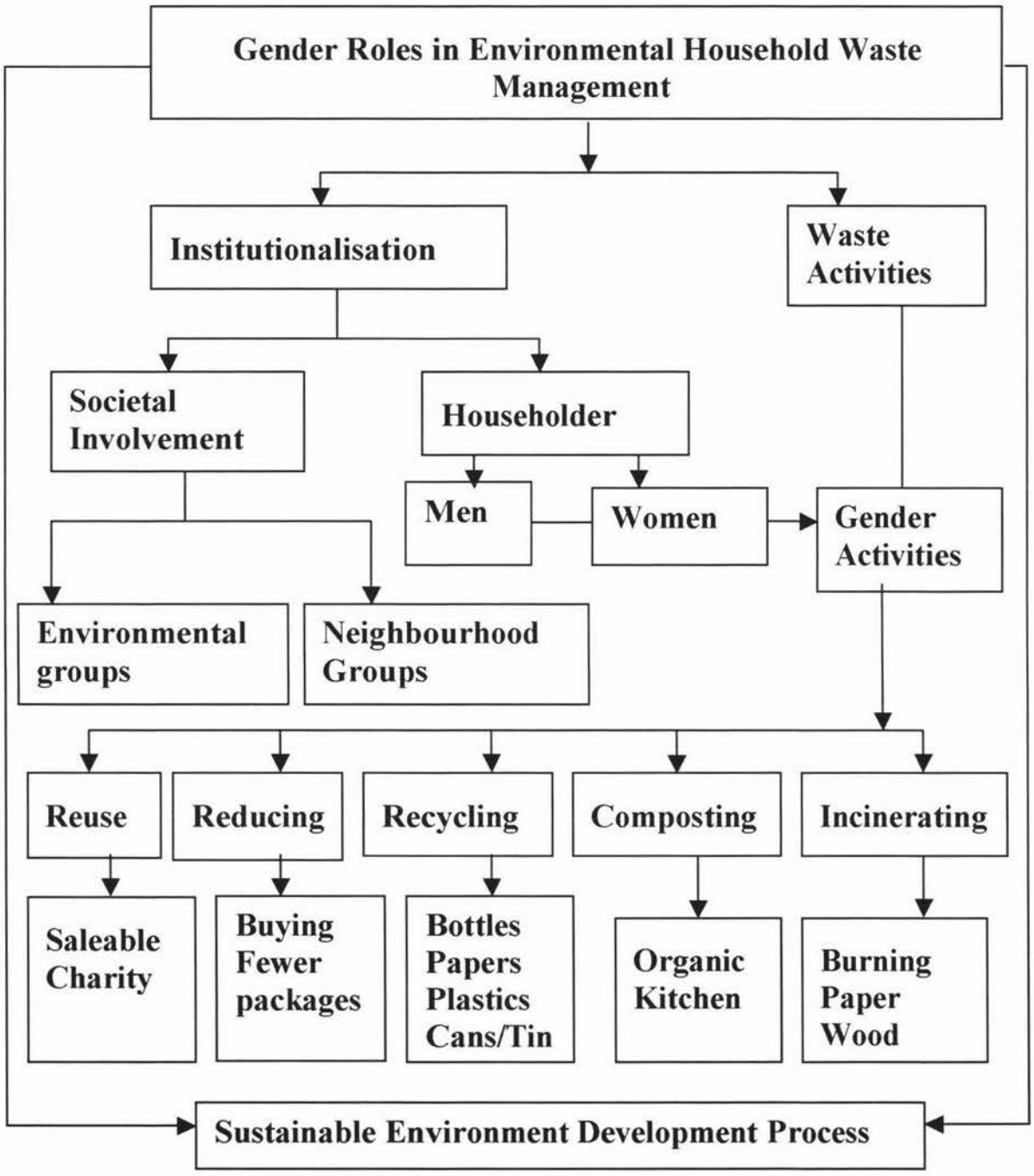
A conceptual framework for gender and household waste management based on the review of the literature and the researcher's personal experience and knowledge is presented in Figure (3.1). The framework illustrates the household generation of waste materials, in which the proper handling of waste by both males and females will help to sustain the environment in the future. The explorative framework of this research has provided the ability to generate descriptive data on the current situation of environmental household reporting of waste management in Palmerston North. A conventional approach was used for collecting quantitative data during the household survey. Multivariate analysis (the statistical tools of correlation, regression analysis,

principal component analysis) was applied to support the relationship of independent and dependent variables. Factor analysis was used, and the results are interpreted to support the objectives for *Likert Scale* questions. Further, a descriptive analysis of the data of household waste management was carried out and the results interpreted.

A conceptual framework was designed for this research. Waste activities in the household, and role-play by both men and women were conceptualised. The conceptual framework is set out below in diagrammatical models. The role of gender and its relationship with –and activities in relation to waste management are institutionalised to household and societal involvement. The aspects of gender participation and societal involvement such as environmental groups and neighbourhood groups were addressed extensively. Gender activities in waste management, particularly waste reduction, reuse, recycling, composting, incinerating and dumping were set up to look at the waste management area of the research. In considering the importance of a good sustainable environment development process in a civilised society and in nature, households are the basic institutions with which to start in the process of the waste management environment, which was conceptualised for the purpose of this research. A simple diagrammatical framework is illustrated below in Figure 3.2

Gender Roles in Environmental Household Waste Management

Conceptual Framework



Source: Ministry for the Environment, 1998

This study was based on primary data collected through a mail survey mailed to selectively random households in 6 wards of the city of Palmerston North. Ten days after the first mailing, a follow up letter was sent as a reminder to each respondent to prompt the return of the completed copy of the questionnaire. The sampling frame was designed by the proportion of the total number of households present in the selected wards.

3.3 Rationale of Survey Method

To conduct effective research, the survey method considered in this research was exploratory and descriptive. The role of gender is exploratory, and sustainable environment management in New Zealand is descriptive as it sought to describe household waste management and individual characteristics associated with gender activities. The research was exploratory as it sought to explain the nature of waste activities undertaken by different households.

Babbie, (1998) argued that the survey method provided a quick way to collect data from the target population, which is difficult to, observe directly. Moreover, the time and resource limitations for data collection, and the location of the research indicated that the survey method was appropriate for this research. The method is appropriate for collecting data on the characteristics, behaviour and attitudes of individuals (Creswell, 1994; Neuman, 1997, Babbie 1998). Survey research has been described as the *method of collecting information by asking a set of pre-formulated questions in a predetermined sequence.*

3.4 Sample Survey

The need for a sample survey in this research was due simply to the facts that it was less expensive, and the nature of the study. Statistics New Zealand (1998) stated that sample surveys are generally cheaper and faster. It is almost impossible to conduct a survey of the whole population within a limited period of time due to either a lack of resources or

the difficulties of contacting the whole population. Sample surveys are easier to control. The small number of measurements from a sample may well be more accurate than the large number of measurements from a census (Statistics New Zealand, 1995).

3.4.1 Cluster Sampling

Palmerston North in New Zealand was taken as the study area. Ward-wise clustered sampling was used to obtain information in this research. A small population followed by sample unit selection from the ward cluster was sought for the mail survey. The clusters are selected randomly as a stratified sample from each of the six wards selected. Stratified sampling procedures were used in each selected ward and the household numbers were taken from lists of ratepayers to the City Council.

3.4.2 Stratified Sampling

Stratified Random Sampling (SRS) of the systematic sampling process (Vaus de, 1991: 65) was used in this research to produce more representatives and thus be more accurate. Different age groups, ethnic groups, and different educational, occupational and economic status groups of the people were found using SRS in six different wards. Nachmias (1996) stated that stratified sampling ensures that the different groups of population are adequately represented in the sample so as to increase their level of accuracy when estimating parameters.

3.4.3 Sample Design (Sampling Frame)

The Systematic Random Sampling method was applied for sample design by using the following Sampling Frame (SM) to select the Households (Hh) in the study area. The household numbers are taken in terms of the rate demand issued to individual households. Table 3.1 describes the household size and selected households' samples in the study area.

Table 3.1 Number of households in each wards for Palmerston North.

Wards name	Household No.	Sample size	Selected sample households
1 Papaioeo	6671	0.265	160
2 Takaro	5912	0.234	141
3 Awapuni	5031	0.199	120
4 Fitzherbert	628	0.020	15
5 Hokowhitu	5660	0.224	136
6 Ashhurst	1257	0.049	28
	25,159	0.991	600

Source: City Council, Palmerston North, 2000

Table 3.1 shows that Fitzherbert ward has a low household number as the Linton Army camp has been excluded from the list because it is not rated as an individual household. Farms can have more than one household, but for rating purposes only the ratepayer or household is recorded, which is the case for this household extraction in this research.

The ratio of the population size to the size of sample is given by

$$K = n/N$$

Where,

K= Sampling interval

n= Number of units selected into sample

N= Number of units in population

A set of data that comes from all members of an entire group is called a *population* (Statistics New Zealand, 1995) and a set of data that comes from a small part of the group of population is called a *sample* (Wagner, 1992). In this study a sample of a population was chosen, and the sample was tested to see what it says about the population from which it came. A systematic random sampling method was obtained in this research by selecting every Kth unit of population, where K is an integer greater than 1. The first member of the sample must be selected randomly from within the first K unit. A systematic sampling fraction was obtained by dividing the population of each ward in this research.

The household occupants were selected to receive the mailed survey questionnaire. The required 600 household addresses in proportion to the number of household properties per ward were determined to select the household numbers. In this way, each and every

ward of Palmerston North has been given a sample size based on using the number of occupied dwellings. An example of the sampling frame is given in appendix for the Papaioea ward. Similar examples were used for other rest of the five wards Takaro, Awapuni, Fitzherbert, Hokowhitu and Ashhurst. An example of the sampling is addressed in the sampling frame (See table 3.2 in Appendix 1).

3.5 Household Survey

3.5.1 Questionnaire Design

The questionnaire was designed to fulfil the data requirements of this research. Searching published statistics, Statistics New Zealand, the publications from government agencies and professional associations, local sources, subjective information, administrative forms and records, and seeking expert knowledge and opinions developed the questionnaire. A careful planning of the survey stage is necessary to ensure a satisfactory result (Statistics New Zealand, 1995). According to Preece, (1994) a survey is a research-structured questionnaire administered to a sample of individuals representative of a defined population. Further, Vaus de (1995:100) states that it seeks an understanding of what causes a phenomenon by looking at variation in a variable across cases, and looking for other characteristics, which are systematically linked with it

The first part of questionnaire was designed to collect data on the basis of demographic information, general information about waste organization at home, and future looking ahead in the matter of environmental waste management. The problems of household waste collections; gender activities in terms of their roles, shopping awareness activity and *Likert Scales* agreement statements or questions were addressed in the second part of the questionnaire. The questionnaire comprised four sections. The first section consisted of demographic questions. In the second section, environmental waste-related questions were asked. Activity profiles questions 'shopping awareness activity' and 'gender activity' were addressed in the third section, and argument types of questions were addressed in the fourth section.

The types of questions used in the survey included open and closed format questions, rating scales and the 'Likert Style' questionnaires.

The questionnaires were delivered including returned pre-paid envelopes. All the returned mail which started to come back after the third day from when the questionnaire had been delivered - was collected from the Department of Natural Resources Management, at Massey University.

3.5.2 Limitations of the Questionnaire

Vaus de (1995) stated that there are some limitations associated with mail surveys. Mostly these are related to the fact that there is no interviewer present to stimulate interest in the survey or to compensate for any of its inadequacies. The absence of the interviewer leaves questions open to be misread and misinterpreted by respondents. Complex questions are not advisable for mail surveys, as respondents may simply give up if they find the questionnaire too difficult. According to Vaus de (1995) the respondents of mail questionnaires may also have difficulty coping with boring questions.

Household respondents may be forced into what to them seems an unnatural reply, as they have no opportunity to qualify their answers to explain their opinions more precisely. The respondent may desire the personal contact with the interviewer that is lacking in a mail survey. Vaus de (1991) mentioned further that mail questionnaires provide no control over the order in which people answer, thus obscuring the extent to which answers may be affected by later questions.

3.5.3 Demographic Information

The information about sex, educational qualification, age group, ethnic group, occupational status, household structure, number of people of each gender in the household, and annual income was included in this section. The area of dwellings and details of environmental groups to which people belong were also included.

3.5.4 Household Environmental Waste Information

Questions in this section addressed general information concerning environmental household waste organization in the home. Information relating to gender participation in household waste separation and management, and rubbish estimation, at home was included. Information was sought also about composting, recycling and dumping activities carried out by householders to find out about management systems in households. Questions on the use of landfill and transfer stations by householders also included finding out relevant information about the amount of rubbish produced by in the households. Questions were included to ascertain householders' attitudes towards the future management of household waste with a view to proper sustaining of the environments. Further questions were added to find out about problems in household waste management.

3.5.5 Shopping Awareness Activity

A shopping awareness activity profile was drawn including awareness about taking shopping bags to the supermarket, refusing plastic bags for purchased goods, buying goods from organic shops, and preferring to buy goods to reduce waste, or in recyclable containers even if they are more expensive.

3.5.6 Gender Activity Profile

A gender activity profile in terms of who does what in the households was included in the survey. Who does what questions were asked to determine the roles of women and men within the households. The questions asked were about reducing the amount of household waste, recycling, composting and dumping, cooking, cleaning, laundry, and dishes. In order to examine the household rubbish situation, the questions involved who (men or women) tries to purchase items with less packaging, manages the wastebaskets, takes rubbish out and also educates children in environment management.

3.5.7 Environmental Waste Likert Scale

Likert scale questions involve providing people with statements and asking them to indicate how strongly they agree or disagree (Vaus de, 1995). Likert scales were used throughout all of the questionnaires. This was to simplify the analysis, and to provide a more appealing visual layout for the respondents. It is possible to combine the three *agree*, *neither agree nor disagree* and *disagree* positions on the Likert scale (See questionnaire in Appendix iv) when wanting to look at subgroups of smaller size form questions addressed in questionnaire

3.5.8 Open VS. Closed Questions

The majority of the survey used the closed question format. A major problem of closed or forced-choice questions is that on some issues, they can create false opinions either by giving an insufficient range of alternatives from which to choose, or by prompting people with 'acceptable' answers. Further, the forced choice approach is not very good at taking into account peoples qualifiers to the answers they tick (Vaus de, 1996). Nevertheless, there are a number of advantages to a well-developed forced choice questionnaire. Where the questionnaire is long or people's motivation to answer is not high, forced choice questionnaires are useful since they can be completed quickly. Furthermore, coding is made much simpler.

Open-ended questions can elicit a great deal of repetitious, irrelevant material. Respondents will sometimes miss the point of the question, and more time is taken up in coding (Oppenheim, 1992). Open-ended questions were, therefore, avoided wherever possible in order to make the analysis simpler. However, this may have predisposed respondents to answer in particular ways (Jemieson, 1989). According to (Moser and Kalton 1971: 341) the main advantage of open-ended questions is that they allow respondents to answer in their own frames of reference, entirely uninfluenced by any specific alternatives suggested by the interviewer (Mosoer, & Kalter 1971:341, Oppenheim, 1992). They reveal what is most salient to respondents, what issues are foremost in their minds. 'Some respondents might give one answer on an open question but a different one on the closed, because the list of question reminded them of

something they had not thought of when they answered the questions' (Nachmias.1996: 253).

According to Foddy (1993:127) the danger with closed questions is that it is very easy to invent a set of categories on a priori basis, which appears to be self evidently adequate. However, on further reflection, perhaps after the questionnaire has been administered, it may become apparent that the categories had not been appropriate and respondents were forced into answering differently from the way in which they would have answered than if the categories had been better designed (Nachmias, 1996:254).

'Don't know' was omitted from the range of options asserts that when there is not a "don't know" option, uninformed or uninterested respondents are forced into stating an opinion that they had not thought of before, and may never think of again (Foddy, 1992: 120). However, it was felt that if a respondent really did not know how they felt about a statement, they would indicate level 4 "neither agree nor disagree". A Likert scale can reduce the amount of space required per question significantly, and allow for strength of opinion as well as simply opinion. The intention was to make the questions as simple as possible for the respondents to fill out, thereby encouraging them to complete and return the questionnaire (Vaus de, 1992).

3.5.9 Questionnaire Pre-testing

The questionnaire was designed using the researcher's prior knowledge of the area together with a literature review and guidance from supervisors, and was pre-tested prior to implementation in the field. The survey methodology followed the programme to pre-test the survey. The pre-testing was conducted on those people to whom the final survey was sent out (Vaus de, 1991). Relevant environmental indicators normally matched in the time of pre-test followed the particular characteristics of the survey. The questionnaire was tested with ten randomly selected households in Palmerston North and two households in Ashhurst. The following changes were made to the questionnaire after the pre-test.

The final draft of the questionnaire designed after a pre-test, which was conducted in the selected ward, 'Ashhurst'. Pre-testing was done to improve the quality and relevance of the questionnaire, and to check whether or not people reacted favourably towards it. In the pre-test, both closed and open-ended questions were broadly used to ascertain whether or not the questions were standardised. And the kinds of questions which people were motivated to answer illustrated instructions were easy to follow all relevant questions were being answered, and the answers, which were received, could be interpreted properly.

The respondents' answers to the proposed questionnaire, length of time taken to answer the questions and the feedback received from them were important parts of the pre-test. Further, the variability among respondents in answering the questions their interest in them, and the time taken to receive completed questionnaires from respondents through the mail were of interest.

Respondent's educational level was expanded to include *Home Schooling* in New Zealand.

In the first part of the questionnaire, Household Structure in New Zealand and Income Level were re-organized, and the religious question - which was controversial in New Zealand context, was eliminated.

In the environmental part of the questionnaire the cleaning agents, composting materials and fees for landfill were discussed with a view to fixing possible entry prices to the landfill and recycling centres in future.

3.6 Mail Survey

The advantages of mail surveys include lower costs, the ability to collect data from populations that would otherwise be difficult to survey (Krathwohl, 1997). In addition, to this, the accuracy of answers is generally greater as the response to sensitive or controversial questions are more likely to be affected by social desirability considerations in a face to face interview giving acceptable rather than true options

(Vaus de 1995). Furthermore, the distortion caused by interviewer characteristics and options is avoided. Moreover, mail surveys are not demanding in terms of staffing requirements (Babbie, 1973).

3.7 Data Processing and Analysis

The results from the survey were entered into the computer in the statistical programme, SPSS. Frequencies and Bar graphs were computed from the SPSS, later the edited data from SPSS were converted to SAS V6.12, particularly for the purpose of correspondence analysis by gender and computation for the Likert Scale question. They were entered as separate files, and analysed separately. Frequency distributions of all the variables were initially created in order to give an overall picture of the data. Variables of interest were cross -tabulated to find any significant relationships. Other relationships were also explored through the use of correlations, regression and principal components analysis. The results are presented in chapter 4 and discussed in detail in the discussion chapter.

By using SPSS / PC in Microsoft Word 2000, descriptive and logistic regression analyses were used to find the relationship of gender to the household environment through waste management. To find the attitudinal dimension, Factor Analysis, Simple Canonical Correlation Analysis and Corresponding Analysis was applied to obtain the appropriate result of 'Likert Scale" statements. Altogether, four hypotheses were tested to determine the relationship between gender and waste management.

Besides the survey information a couple of interviews were taken by visiting the people in recycling centres, landfills and transfer stations in Palmerston North and Fielding. The interviews were concerned with the programs policy, methods and activities about the recycling composting and dumping processes in the households Both official and personal views were also collected by interviewing the Environmental Education Officer and Waste Engineer in City Council Palmerston North. Further information was collected from the people who were working in the recycling centres in both Palmerston North and Fielding in New Zealand.

3.8 Procedures for Recruiting Participants

Primary data were obtained by sending letters out to 600 households inviting the participation of all females and males over the age of 18. Gathering information from a wide variety of participants provided the necessary information for this study. Letters to invite participation in the study were attached to the front page of the questionnaire.

The research used a field survey for primary data collection. The survey was conducted in the second week of June 2000. Subject to approval by the Ethics Committee of Palmerston North City Council. A sample survey of 300 households was selected in different Wards of Palmerston North City. Households were selected by a systematic random sampling technique. Pre tests were conducted in Ashhurst, one of the selected wards of the city.

3.9 Variables

The variables were selected and categorized by independent and dependent variables. Gender based independent variables followed by environmental dependent variables are basic methods for making cross-tabulation and correspondence tables for analysis. The demographic variables used as controlled variables are used as intervention types of variables. A variable that can have only two values is called a *dichotomous variable.* Researchers have also found it important to make an analytic distinction among *dependent*, *independent* and control variables and between *continuous* and *discrete variables*. A box table below is presenting relevant variables in this research.

Dependent Variable: The waste management variables are trying to explain.
Independent Variable: The variable gender that causes a change in the dependent variable.
Control variable: Demographic variables used to test the possibility that the relation between the dependent and independent variables as a counterfeit, which can be explained only by the presence of another variable.
Continuous Variable: A variable that does not have a minimum sized unit, such as length, the argument statements used as a continuous variable in this study.
Discrete Variable: Variable that does have a minimum sized unit, such as the number of children in a family at households is used.

Source: Nachmias, 1996:59

3.9.1 Dependent and Independent Variables

The variable *gender* was selected in this research for the independent variable and variables from the household waste management (recycling composting and dumping) were selected as the dependent variables. A demographic variable was used as a control variable in analyzing data in this research. According to (Nachmias, 1996) the variable that the researcher wishes to explain is the *dependent variable*. The variable, which the researcher expects, will explain change in the dependent variable is referred as the *independent variable.* The independent variable is also called the *explanatory variable*: it is the presumed cause of changes in the values of the dependent variable: the dependent variable is expected to because or influenced by the independent variable. Dependent variables are also called *criterion variables*: independent variables are also called *predictor variables* (Vaus de, 1991). Nachmias (1996) addressed the kinds of variables, which are adjusted in this research, and which are shown in the table below taken as the data interpretation as waste management variables are dependent variable and gender are independent variables. Other variables such as demographic income occupations are the control variables. Continuous variables are also used as the income levels and discrete variables are used as wards and households

3.9.2 Intervention and Control Variables

The control variables in analysis used in this research are age, education, occupation, and income, household structures, household area and environmental groups where the respondent belongs. Scientists use control variables in empirical research to reduce the risk of attributing explanatory power to independent variables that are not in fact responsible for the variation found in the dependent variable (Vaus de, 1991). Control variables are used to test the possibility that an empirically observed relation between an independent and dependent variable is spurious Nachmias, 1996:57. A spurious relation is a relation that can be explained by variables other than those stated in the hypothesis.

Gender and age, *sex,* are variables characteristic, which have more than one category (or value) *male* and *female*. *Age* is a variable with many different categories (one year

old, two years old, etc.). Any person, however, will only be in only category. A variable, then, is a characteristic on which people can differ from one another analysed in this research. In cause and effect terms distinctions has been made between *dependent* and *independent* and intervening variables (Howell, 1995). The effect is called a *dependent variable* (symbolised Y): It is the variable, which is dependent on something else. The assumed cause is called an *independent variable* (symbolised X). In order to determine whether the level of education affects *income*, then income would be the dependent variable and *education* would be the independent variable. An *intervening variable* (symbolised Z) is the means by which the independent variable affects the dependent variable. In this research intervening variable education affected the type of job people get which, in turn, affects income level.

3.10 Limitations of the Study

The limitations in the area and household addresses were bounded by the statistical systematic random sampling methods where each and every person in Palmerston North was not able to fill in the questionnaire even if they were interested.

1. This study was limited to a small sample of households
2. The case study was limited to one area, namely, the city of Palmerston North.
3. The unit for environmental examination was limited to within the households.
4. The methodology of this study was limited to an examination of 'a survey' of households.
5. The analysis was limited to regression models. Multivariate Analysis was performed to examine the correlation between gender involvement and waste materials, and gender involvement and environmental management issues.
6. Only selected variables related to the environmental management of household waste, which contribute to the sustainable environmental management was included in this research.

Chapter 4: Background of Study Area

4.1 Introduction

New Zealand is located in the Southern Hemisphere, and measures approximately 1600 km from north to south. The official languages are English and Maori. The country has a rich natural environment with a population of approximately 3.8 million people, is one of the least populated countries in the world. Palmerston North is a typical example of a New Zealand provincial small city. It has a population of approximately 78,000 by 2001 with 1,404 households (PNCC, 2000). The city services a large rural sector but has a heavy concentration of educational research and conference facilities as well and reputed having an above national average of bars and restaurants per head of population (PNCC, 2000). Palmerston North (40^0 23'S; 175^0 37) is a city is located in North Island, New Zealand.

Palmerston North city has relatively young age profile which reflects among other things the City's important tertiary education, training and military sectors. The most noticeable variations to the Palmerston North's central and Fitzherbert ward, which have younger populations because of Army personal dominates Linton and central Palmerston North and Fitzherbert ward has high proportion of students. There has been little change in age distribution since the 1991 census. However, like elsewhere in New Zealand, the city's population is gradually aging as the proportion of people in the older age groups increases. In the 1996 census the average household occupancy rate was 2.9, the same as in the census. 1991.

The New Zealand community has become more and more concerned about environmental issues and on an individual basis considerable effort are being made by citizens to contribute to remedying believe for the acceptable national environment (PNCC, 2000:). Territorial authorities such as Palmerston North City Council have a wide range of functions including the power to grant land use consents under the *Resource Management Act 1991*. Solid waste management includes normal household rubbish, hazardous substances and contaminated sites management. The main focus of this study is household waste, the management of which is carried out in terms of above

Act by the Manawatu Regional Councils and City Council, Palmerston North. Palmerston north is located in North Island, New Zealand where a geographical map is presenting below.

Figure 4.1 A geographical map of New Zealand

Source: Geographical Map of New Zealand:
http://www.channel18.net/newzealand/nzmap.htm

The administrative area of the Palmerston North City is 32,594 km^2, (refer to map of Palmerston North in Appendix) which also includes the communities of Ashhurst, Aokautere, Whakarongo and Linton. The rateable and non-rateable area of the city is 27,600 $km^2$and 100 km^2 respectively. The net capital value of the city is $4,779,565, 700 and the net land value is $1,718,608,600 (PNCC, 1999). The area is predominantly urban, which has a district entity and a major centre of activity within its parent region (Census/New Zealand, 1996).

4.2 Population

Statistics New Zealand has indicated that the population growth trend in New Zealand has fluctuated, sometimes very high and sometimes very low levels between 1936-1996 (Statistics/New Zealand, 1998). Which is most likely caused by immigration and emigration policy of New Zealand. Population growth is the major factor to increasing household waste in cities. The population of New Zealand in 1996 was 3,618,302. This is an increase of 6.7% percent from the 1991 census. Population density is 13.37 per square kilometres. Women residents increased by 7.6% more in 1996 than in 1991. From 1986 to 1996, the female proportion of the population increased by 0.4 percent, up from 50.5 percent to 50.9 percent, while half the resident population was under the age of 33 years. Of the total population of 1996, 14.5% were identified as Maori, which is up from 12.9% in 1991 (Census/New Zealand, 1991).

4.3 History of the Study Area

Palmerston North was established in an isolated clearing, set in the midst of a native forest that covered inland Manawatu until 1877. At that time the population of the town was approximately 800 and sawmilling was the main industry of the district (PNCC, 1999). By 1885, forest had been cleared and a water supply and sewage disposal system developed which later improved to street and storm water drainage in 1890. Because of population growth, different development projects were started together with growing agricultural development. Many developments such as the opening of the library, the

building of the Opera House, and the establishment of a series of parks took place in Palmerston North after the end of the World War II However, by the 1980's many challenges for example urban growth, multiculturalism, and a new economic climate were experienced at the local level.

4.4 Waste Management in Palmerston North Past and Present

The purpose of waste management is to dispose of waste materials in a manner that causes the least damage to the environment (Mobbs, 1998). The brief history of waste collection and in levels of services started from 1994 in Palmerston North. According to a file record, (Waste Management Unit PNCC, 2000), the council began household rubbish collection from residents in 1879. Two electric trucks were purchased in 1924 and replaced all but one of the horse drawn collection vehicles in use up until then. Petrol powered trucks replaced the electric trucks in 1934. The amount of refuse collection increased by11-12 tons from 1938. Refuse collection ceased temporarily in 1943 because of staff shortages caused by the war. Residents were asked to take rubbish to the destructor themselves. No other major change was made to refuse collection until 1965, when paper bags were introduced to replace the metal or other refuse material which had been used since 1910 (PNCC, 2000).

The history of recycling in Palmerston North started in 1991. Initially, two recycling canters were built at Ferguson Street on the City Council depot site. A second recycling centre was built at the Awapuni Landfill in 1992 for the convenience of the public. In October, 1995, *Kerbside* collection of paper and card commenced, which was expanded to include plastic bottles, steel cans and aluminium cans in 1997 (File reading PNCC, 2000).

At present, PNCC supplies 52 official bags per year to each *household* in the Palmerston North residential area, including Ashhurst. The bags have also been supplied to residential properties in rural areas. PNCC does not supply refuse containers or bags to business properties in the central business area either business must purchase bags for collection by Council staff, or make private arrangements for refuse disposal.

Figure 4.2 An organised kerbside household waste pickup collecting material for dumping in the landfill.

Each household in the Palmerston North residential area, Ashhurst and those households in rural areas where the refuse collection service operates, are charged a Uniform Annual Charge (UAC) of their rate demand for refuse collection. The Charge covers the cost to supply and collect 52 official refuse bags, and the cost of collecting and disposing of those bags.

Figure.4.3 Retrieval of material suitable for recycling from the landfill

4.4.2 Major Waste Management Problem in Palmerston North

Reducing waste in the household is a major problem in Palmerston North. This could be attributed to increasing consumption of industrial products. Managing the city waste needs the co-operation of different groups and at all levels. Furthermore, waste is a problem for the whole community. All generate waste and it can be managed only through the involvement, co-operation and efforts of people, businesses and groups in the community (*North Shore City*, 1998). Reducing and managing waste at the household level depends on the actions of all householders, both men and women.

Figure 4.4 Household waste management organised for kerbside pickup

4.5 Introduction of Study Sample

There are six ward divisions in Palmerston North, namely, Awapuni, Takaro Fitzherbert, Hokowhitu, Papaioea and Ashhurst. A brief introduction of each ward, followed by population and area boundaries is given below:

4.5.1 Papaioea Ward

Papaioea ward is the area bounded by Rangitikei Street, Main Street, Napier Road to James Line and Flygers Line. It includes the former statistical suburban areas of Papaioea, Terrace End, Kelvin Grove and Milson. The population of this ward is 19,024 and the total household number is 6671 (Census/New Zealand, 1996).

4.5.2 Takaro Ward

Rangitikei Line, Meadowbrook/ Benmore Avenue, No.1 Line, Longburn-Rongotea Road, Pioneer Highway and Main Street bound Takaro Ward. This ward includes the former statistical suburban areas of Takaro, Cloverlea, Highbury and Westbrook. The population of this Ward is 15,955 and the total number of households is 5,912 (PNCC, 2000).

4.5.3 Awapuni Ward

Fitzherbert Avenue, Pioneer Highway, Shirriffs Road and the Manawatu River bound Awapuni Ward. It includes the former statistical suburban areas of Awapuni, West End and Riverdale. The population of this Ward is 13,524 (Census/New Zealand, 1996) and the total number of households is 5,031.

4.5.4 Fitzherbert Ward

Fitzherbert Ward is the area bounded by the Manawatu River and the Tararua Ranges, and includes the communities of Aokautere (To Forest Hill Road) and Linton. The population of this ward is 5, 575 (Census/New Zealand, 1996) and the total households number is 528.

4.5.5 Hokowhitu Ward

Fitzherbert Avenue, Main Street and the Manawatu River bound Hokowhitu Ward. It includes the former statistical suburban areas of Hokowhitu, Brightwater and Te Awe Awe. The population of this ward is 15,412 and the total number of household is 5660 (Census/New Zealand, 1996).

4.5.6 Ashhurst Ward

Napier Road, Forest Hill Road, the Manawatu River and the township of the Ashhurst bound the ward of Ashhurst, and to the North Range Road is the boundary point of this ward. The population is 3, 605 (Census/New Zealand, 1996) and the total number of household number is 860.

The vision for the city for the next 20 years, sets out the type of city, which the community wants Palmerston North to be. The vision for the future of city is to make environmentally clear Palmerston North an exciting city in which to live, learn, work and play (PNCC, 2000). The latest newspaper *Chaff (March, 2000)* published that 'Palmerston North is a sophisticated town with a great hinterland around it, but this is still intact, neither town nor country are isolated or out-of touch with each other'.

Two recycling centres have been established in Palmerston North. One is the Awapuni Landfill area located in Maxwells Line the other located in the city depot on the corner of Albert and Ferguson Streets. Palmerston North City Council has also managed the refuse bag collection on the basis of information collected by telephone or other media.

Figure 4.5 Disposing of bottles for recycling at the recycling centre

4.6 Landfill

The Palmerston North City Council has one landfill in Awapuni and two transfer stations one in Malden Street and the other in Tremaine Avenue (PNCC, 2000). The landfill and transfer stations were established on the basis of the results of household survey collections in 1997 (Ministry for Environment/New Zealand, 1997). According to the survey, the landfill data exclude transfer station refuse, special, operational, recycled, and composted waste, unless otherwise stated. Cars, and Trucks are the main types of vehicles visiting the landfill and the transfer stations. Refuse was identified as comprising garden waste, kitchen waste, soil, paper, construction material, demolition material, plastic, metal, textiles, glass, and potentially hazardous waste (PNCC, 1999).

Figure 4.6 Waste being dumped in the Awapuni landfill at Palmerston North

Figure 4.7 Garden waste being dumped in the Awapuni landfill at Palmerston North

4.6.1 Landfill Survey

According to *Waste Survey NZ* (1997), the composition figures of the Palmerston North City reveal various and different minimum and maximum various components. The Awapuni landfill was relatively high in terms of paper, plastic and textile components, and relatively low in terms of garden green and soil components (Ministry for the Environment/ New Zealand, 1997). Furthermore, the Malden Street Transfer station was relatively high in terms of garden green, plastic, metal and textile components and relatively low in terms of kitchen and soil components. The main types of waste entering the Awapuni Landfill are paper and garden waste from the households in the area.

Chapter 5: Results and Analysis

5. 1 Introduction

The household survey data described in this chapter provide quantitative information and have been supplemented by qualitative information obtained from the mail questionnaires and substantial literature. The research results presented in this chapter covered the results of questionnaires, which were asked in the survey. The results are summarized in six major sections. The analysis is based on the conceptual framework, addressed variables and empirical model outlined in chapter three. The overall findings discussions are summarised in chapter six

Proper household environmental management requires attitudinal awareness from both men and women and an understanding of, and sensitivity to the needs and concerns of each member of the householder. A simple introduction to environmental household waste management is contained in the first section. In the second section, demographic; socio-economic and environmental characteristics by ward of the sample respondents are discussed, also the relevant information such as percentage distribution of sample respondents by gender, age, educational level, occupation, economic status and level of environmental awareness are addressed. Details of the attitudinal background, household size and gender disparity of household members aged above fifteen years are also included in this section.

The relationships between gender and the waste management characteristics of the sample respondents at the household level are discussed in the second section. This section contains an examination of household waste management practices, including composting, recycling, also landfill uses and transfer stations on the basis of topics section addressed in the survey. The primary and secondary sources, such as the land area of the households, the burning of materials, visiting the recycling depot, children's participation in the environmental household waste management and other details of the attitudinal awareness of the householders are investigated to explore the role of gender in environmental management. Using the statistical tools of logistic linear regression, and correlation analyses in the fifth section sets out the gender differences in waste

management by demographic characteristics. The results are interpreted and discussed in order to test the hypotheses and arguments.

The household waste management practices by wards examined in terms of recycling composting and dumping materials in the third section. The results of investigations into socio-economic characteristics and household waste management in relation to the gender activities are described in detail in the fourth section. *Gender* and *waste management* compositions by socio-economic status are also discussed extensively. In the fourth section, a model of the gender relationship between waste management and educational behaviour is addressed in fifth section, attitudinal issues are examined and discussed -such as household gender activities related to waste behaviour in terms of 'who does what' activities. Landfill data and gender participation in this aspect are presented and analysis Likert Scales agreement statements by gender are presented in sixth section.

5.2 Environmental Household Waste Management

Results show that various factors such as education, occupation, socio-economic, and other demographic conditions can influence gender activities in New Zealand. Societal values have helped advancement in the management, organization and arrangement of household waste materials. The results are analysed in detailed below.

5.2.1 Socio -economic and Demographic Characteristics of the Sample Respondents by ward

The socio-economic and demographic characteristics of the respondents considered in this study included age, sex, ethnic group, educational qualifications, occupational status, and economic status. Household structure, number of persons of each gender in the household, area of dwelling of the respondent, area of the property (land) and environmental groups to which respondents belong were also discussed briefly. These demographic variables interacted with the gender and waste management variables and demonstrate the relationship between gender and waste management activities.

5.2.1.1 Sample Respondents by wards

The Figure 5.1 shows the ward-wise percentage of the total respondents in this study. The proportion of respondent taken in the Fitzherbert (2%), and Ashhurst wards (6%) was lower compared with other wards, which is simply because of the presence of the army camp in the Fitzherbert ward and the lower number of households in Ashhurst ward.

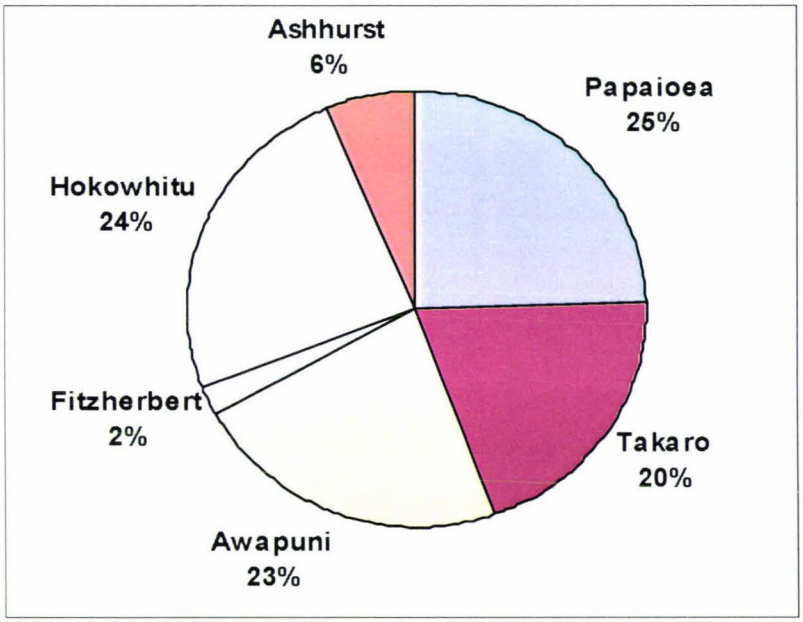


Figure 5.1 Percentage of sample respondents in each ward

5.2.1.2 Ethnicity

The Figure 5.2 presented show how the sample population was divided, according to the main ethnic groups with which the respondents identified. Some explanation of the terms is useful here. 86 percent said that they were European/Pakeha, the most commonly used terms. Five percent specified their background as African, three percent said that they are Asian, three percent identified themselves as Maori, and two percent specified Pacific Islander and only one percent responded that they are American.

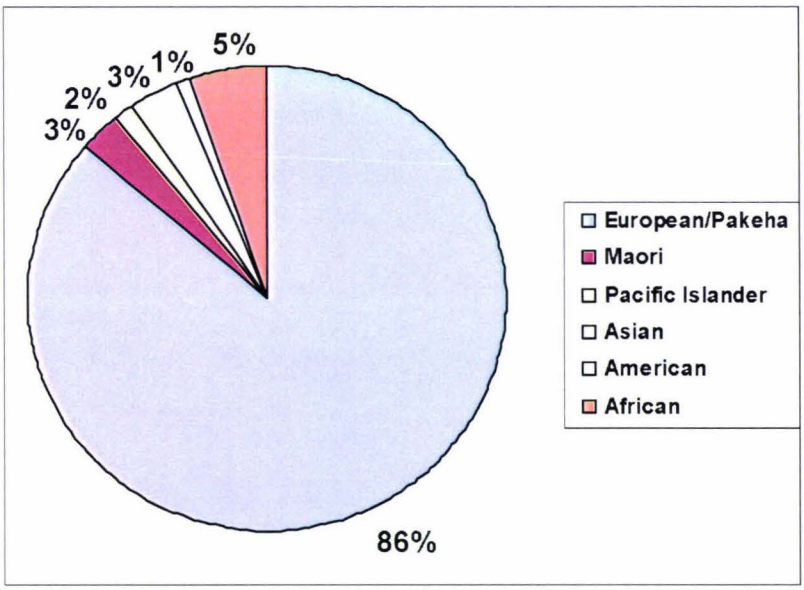


Figure 5.2 Percentage of sample respondents in ethnic group at Palmerston North

5.2.1.3 Education

Figure 5.3 shows the educational levels of the respondents. The highest number of the sample respondents 40 percent, had received secondary education. The second highest number 26 percent of the total sample respondents has tertiary Certificate or Diploma level education. 15 percent of the sample population were Bachelors degree holders and 12 percent were postgraduates. There were nominal (1%) home schooled, three percent primary educated and one percent of the population were found to have no educational attainment, while two percent of the population have other degrees such as technical, vocational, or practical training.

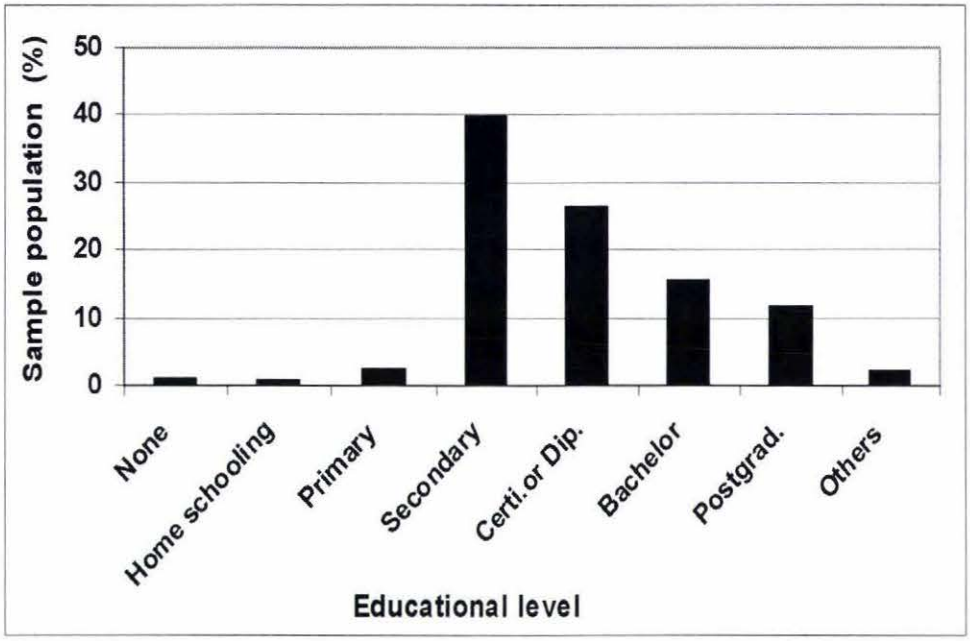


Figure 5.3 Percentage of educational level of sample respondents

5.2.1.4 Age and Sex

Figure 5.4 showed the male proportion of the sampled population of the study area was 31 percent, whereas the majority of the sampled population, 69 percent were female. As for age group, 11 percent were belonged to the15–25, age group, 20 percent to the 26-35 age group and 22 percent to the 36-45, age group. Likewise, 20 percent of the sampled population were in the 46-55 age group, and 12 percent in 56-65, age groups and 16 percent of the population sample are in the above 65 age group. Middle-aged 36-45, age group people accounted for the highest proportion among the sampled population. The difference in the percentages among the young and old generation in the study area was very small. Among the total sampled population, the higher proportion of the respondent's age group was quite well distributed between 26-55 and the smallest proportion in the 15-25, age group. By looking the age and sex wise population, there is high number of single women aged over 65 in the city.

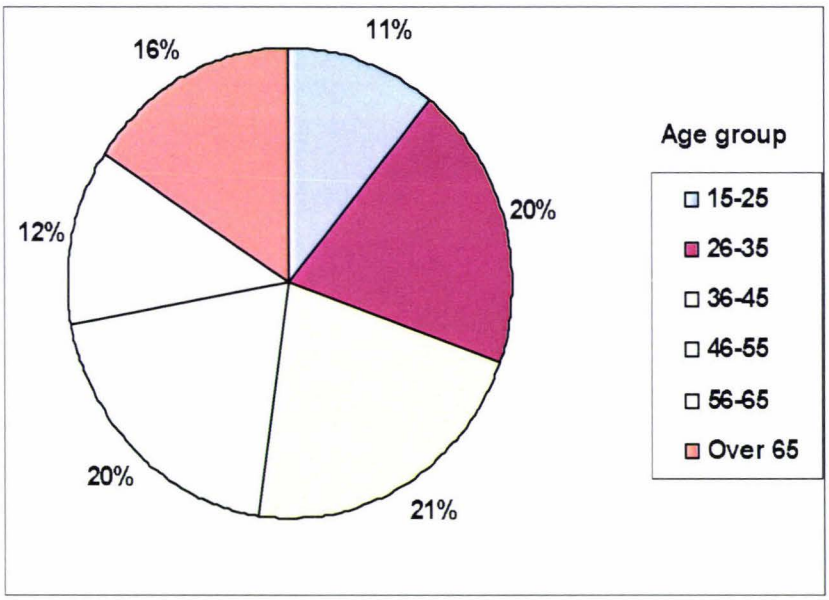


Figure 5.4 Percentage of respondents in each age group in the sample population

5.2.1.5 Occupation

Figure 5.5 shows that 29 percent are professionals, 18 percent retired, 17 percent homemakers, 10 percent service and sales, eight percent students, 10 percent other stated, five percent technician or associates, three percent not working, two percent trade worker, one percent agriculture and fisheries and none of plant or machine operator are represented as occupational status. Among the sample population, seven percent were involved in other occupational categories for example administrative or secretarial, childcare work and, teacher aiding. Others describe themselves as being in fashion, industry workers, accountants, loss presenters, community workers, nurses, office workers, librarians, military, work place support, gardeners, daily help, child waiter, on parental leave, storemen, caretakers, and hairdressers.

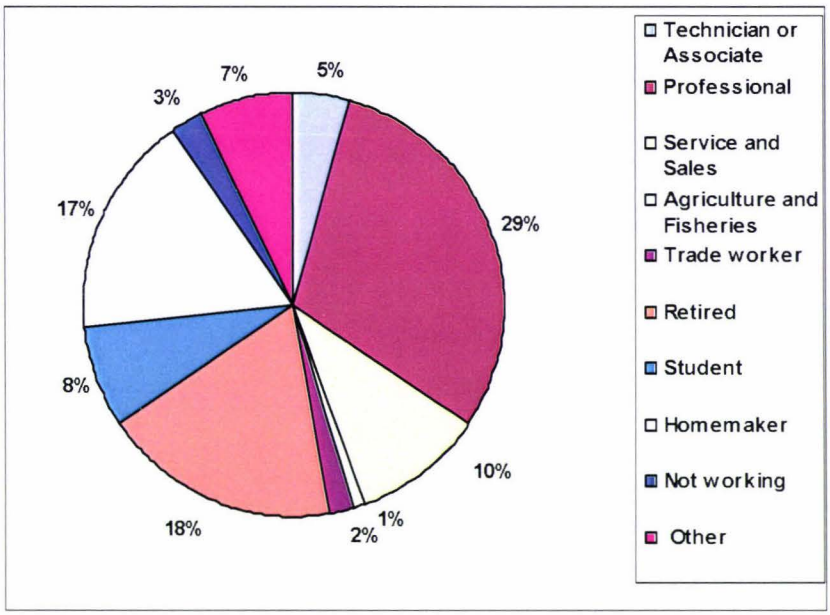


Figure 5.5 Percentages of sample respondents in each occupational status

5.2.1.6 Household Structure

For household structure, the data showed that highest percentage (36%) of the total householders were couples with children or a boarder, 26 percent were couples, 16 percent were a single people, five percent were single people with a boarder, seven percent were living with flat-mates, and four percent were single person with children. The smallest proportion of the householders, one percent, were living as two couples with children and a boarder, and one percent formed an organized group. The rest, four percent, were living in other categories such as children visit twice a week, divorced person with one child, and a single person with children and a flat mate.

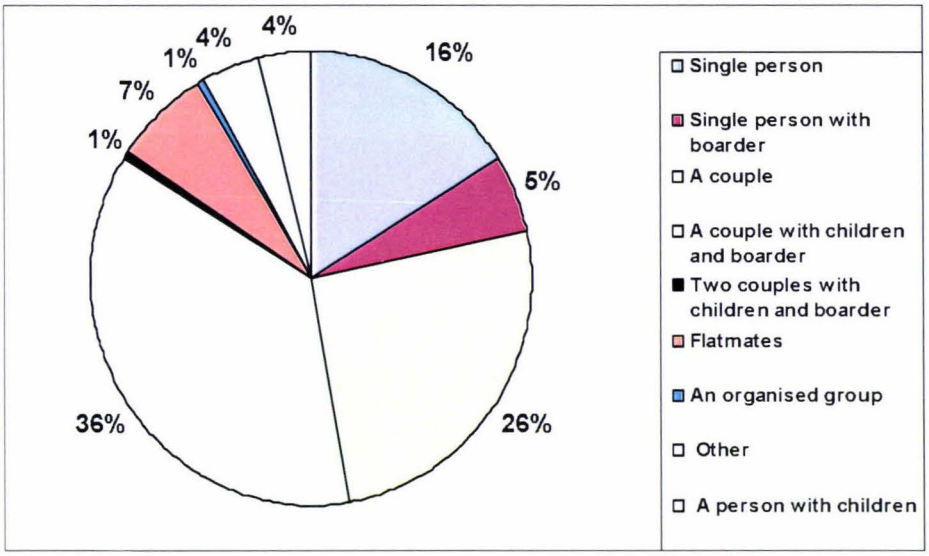


Figure 5.6 Percentages of sample respondents in each household structure.

5.2.1 7 Annual Income

Out of the total surveyed population, 14 percent respondents have highest an annual income of $30,000-40,000. The respondents with nil income were four percent. Similarly, the respondents with highest income (>$100,001) were comprised two percent. Figure 5.7 shows the percentages of the population and their annual income range in NZ dollars before tax.

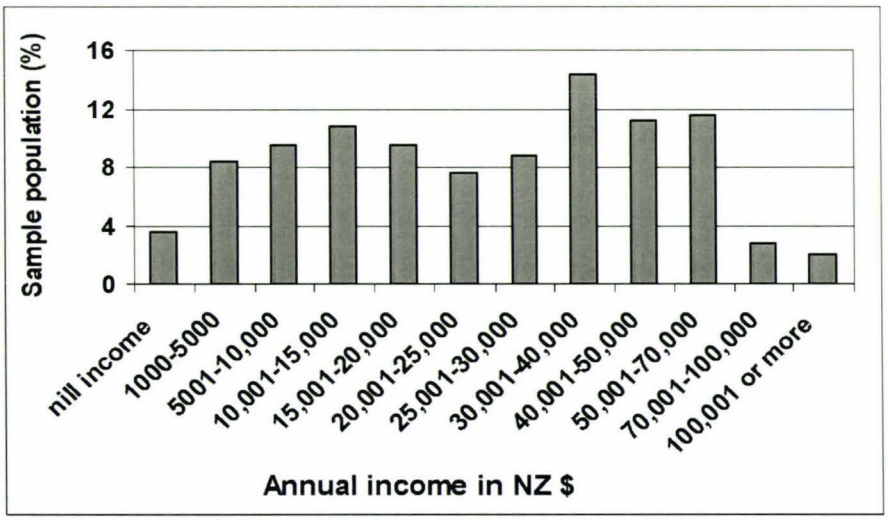


Figure 5.7 Percentages of sample respondents at each income level

5.2.1.8 Status of Land Area of the Households

Figure 5.8, shows that, the percentage of the respondent's household land area. Out of the total population surveyed, 83 percent have owner occupied dwellings and the remainder, 17 percent, were renting. It seems that the highest percentage have owner occupied dwellings simply because the research sample has been taken from the ratepayer's address. Among 83 percent house owner respondents 44 percent of the householders had land area of 400-800 m^2, and 25% have 800-1200 m^2 eight percent of the householders had less than 400 m^2 and seven percent had more than 1200 m^2 land area. About 16 percent of the householders did not mention their household occupied land area.

5.2.1.9 The Environmental Groups

Table: 5.1 Sample respondents who belong to environmental groups in Palmerston North

Name of the Environmental Group	Numbers	Percentages
Green Peace	3	1.13
New Zealand Historic Places Trust	4	1.50
Forest and Bird Society	14	5.26
Friends Tini Tini Mata	1	0.38
Entomology Society of New Zealand	2	0.75
Massey University Environmental Group	1	0.38
New Zealand Soil Science Society	1	0.38
Ecological Foundation	2	0.75
Other Group	5	1.88
Not a Member of any Group	233	87.59
Total	266	100

Source: Household Mail Survey, May 2000

Table 5.1 shows that only about 12 percent of the respondents are involved to environmental groups, while about 88 percent of them do not belong to any environmental groups. About half of respondents involved to environmental groups are members of the Forest and Bird society in Palmerston North. The table tells that there is not the environmental groups affiliate many respondents however, the results above presented that the environmental household waste management was good as they responded 84 percent did the well management of household waste.

5.2.1.10 Environmental Awareness

According to the sample population, 90 percent responded that they were environmentally aware of the recycling programme. Which means that only a small proportion of the population either is not aware, or they do not care about it. Fifty-five percent of respondents make a conscious effort to purchase environmentally friendly goods such as chemical -free cleaning agents, recycled paper, etc. Seventy five percent of the householders they say regularly recycle their household waste.

5.2.1.11 Waste Management in the Household

Among the total sampled population, 84 percent responded that the waste is well managed in their household, 14 percent were not managing waste well, while only few (2%) of respondents do not know how to manage the waste in their household. In other words only few percent of the respondents don't know that they doing waste management properly or not in their households. The overall results presented that the situation of environmental household waste management in Palmerston North are good

5.2.1.12 Household Waste Separation

From the total sampled population, 84 percent responded that they carry out waste separation in their household, 15 percent do not do so and only about one percent does not know what the separation of the waste in their household. Two separate questions were asked about well-managed waste and waste separation, and the responses produced very similar results. This means waste separation and management of waste at the household level in Palmerston North is being carried out very well. This result clearly shows that the people in Palmerston North are very much conscious about organizing their household waste

5.2.1.13 Waste Materials

The survey results show that of the sampled population, 62 percent are using compostable materials and producing an average of one bag per week. Eighty three percent are using recyclable materials and producing on average one full rubbish bag per week and about 92 percent handle the rubbish for dumping and produce waste to a volume of one full rubbish bag per week.

5.2.1.14 Waste Separation by Gender

Figure 5.8 shows that 20 percent of the household waste is separated by men, 46 percent of the household waste is separated by women, and 34 percent of the households waste is separated by both men and women. Data shows that women are more actively involved in separating waste than men.

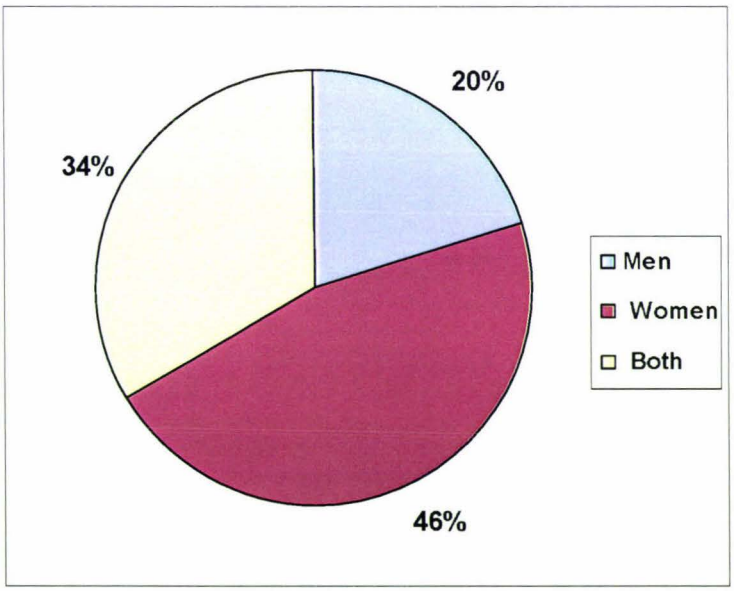


Figure 5.8. Percentages of sample respondents by gender in separating household waste

5.2.1.15 Awareness of Recycling Program in the City

As previously mentioned 90 percent of the sample responded that they are aware of the recycling program in the city. Among them, the percentages of respondents who recycle different kinds of material are as follows: glass at 73 percent, cans at 62 percent, aluminium at 46 percent, plastic bottles at eight percent, cardboard 39 percent, papers 85 percent magazines at 70 percent, batteries at 17 percent, plastic bags 46 percent and other materials 11 percent.

The questions was asked 'on average, do you visit the recycling depot?' Of the total sampled population, in answer 21 percent responded that they visit the recycling depot yearly, 35 percent visit monthly, 15 percent visit fortnightly, eight percent visit weekly, whereas 15 percent do not know about the depot and five percent never recycle household materials. Among the total sampled population, 76 percent responded that they do recycle household waste and 24 percent do not recycle. For the questions 'what was the main reason for not recycling household waste, in an answer the respondents indicated that the main reason for not recycling waste is the cost of transportation to the city's recycling centre. Other reasons are either that they do not like to separate waste or they do not have time to separate waste. 27 percent responded that they are unable to do so because they have no transport, 14 percent respondents do not like to separate waste, 22 percent do not have time for separation, 20 percent have not thought about it and 17 percent do not recycle for other reasons because of time constraints and unavailable of transportation facilities to take materials to recycling centre.

5.2.1.16 Purchase of Environmentally Friendly Goods and Choice for buying, Products with Reduced Packaging

The survey results shows that of the sampled population, 45 percent responded that they consciously try to purchase environmentally friendly goods e.g. chemical free cleaning agents, recycled paper etc, and 55 percent do not follow this philosophy in purchasing goods. Among those respondents who consciously try to purchase environmentally friendly goods, figure 5.9 shows that 20 percent always buy articles and products that

have as little packaging as possible. 40 percent buy articles or goods 'occasionally', 12 percent do 'rarely', and 28 percent don't think about it.

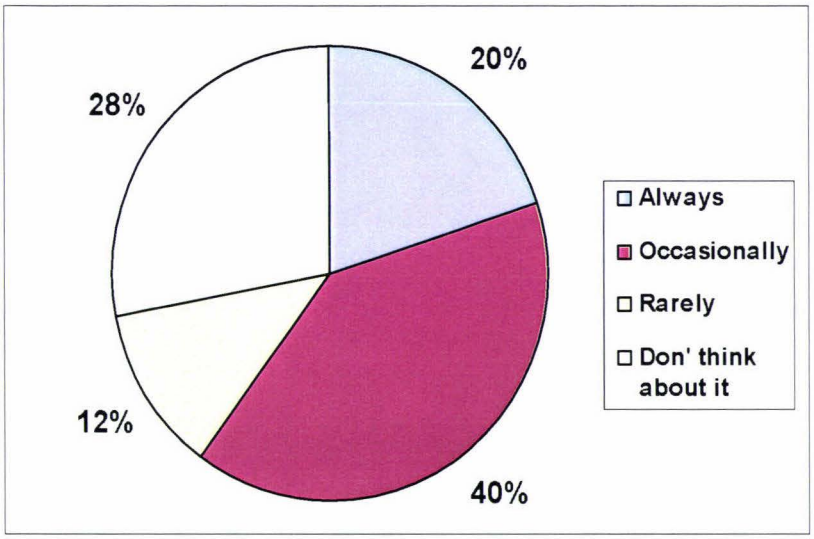


Figure 5.9 Percentage of sample population to buying articles with as small packaging as possible

5.2.1.17 Rubbish Taken to the Landfill or Transfer Station

The sampled population indicated that use of the different types of transportation to take rubbish to the transfer station in a year was, included car trips, 30 percent, trailers, 25 percent, small truck trips, 27 percent and large truck trips 25 percent. A small proportion of the people, nine percent responded that they do not know about the landfill and transfer station in Palmerston North. Another small proportion of the people 11 percent responded that they use all types of vehicles to take rubbish to the landfill. For the types of rubbish materials taken to the landfill or transfer station, 67 percent of the sampled population responded that they usually take garden cuttings to the landfill, 24 percent taken building rubble, 14 percent have take metallic waste, and 19 percent take other household waste.

5.2.1.18 Disposable and Non Disposable Nappies

Twelve percent responded to the survey questionnaire that they usually use disposable children's nappies rather than linen, 11 percent do not use these while 77 percent responded that this question was not applicable to them.

5.2.1.19 Separation of Organic Waste

Among the total sampled population, 62 percent responded that they separate organic and inorganic waste in their households, and 38 percent respondents that they do not separate these. Among 62 percent who separated organic and inorganic waste in their households, 50 percent do home composting, Six percent do landfill composting, Six percent do rubbish separation into organic and non organic waste, 18 percent have incinerators and five percent do other separation.

5.2.1.20 Burning Rubbish in the Garden

The survey results show that, 13 percent burn rubbish in the garden whereas 87 percent do not burn rubbish in the garden. Those who do burn rubbish in their gardens burn more paper waste than other types of rubbish, for example, plastic and other refuse.

5.2.1.21 Participation of Household Members in Waste Management

Replies concerning the participation among household members shows that only 29 percent of children participate in waste management in households, whereas 16 percent do not participate and 53 percent of the sampled population responded that questions concerning children did not apply to them.

5.2.1.22 Use of Wheeler Bins or Rubbish Bags

Survey results indicate that 31 percent of the respondents use wheeler bins and 69 percent do not. Among the 31 percent who are using wheeler bins, 21percent responded that they are using the wheeler bins for green waste, 11 percent are using them for other household waste, and a very small proportion one percent are using for recyclable waste.

5.2.1.23 Interest in the use of Compost Bins and Separation of Organic Waste

Twenty-six percent responded that they are interested in learning more about worm composting, 23 percent are interested to learning about the traditional composting bin, and 31 percent are interested in learning about using a composting pit in the garden. Among the sample respondents, 18 percent responded that they would be prepared to pay to establish composting schemes at home, 53 percent are not prepared to pay to establish this sort of composting scheme at home, and 29 percent responded that they are unsure about the scheme.

Among the total respondents, 52 percent indicated that they prefer to separate organic waste in bags collected by the City Council, 46 percent do not to prefer and three do not know the answer to the question. Among the respondents, 11 percent indicated that they are prepared to pay the City Council to separate rubbish for recycling, 72 percent are not, and 17 percent are unsure about this. Regarding the cost of a disposal fee for cars, etc., 21 percent would like to include the disposal fee in the cost of cars, 44 percent would not, and 35 percent are unsure. Most of the respondents suggested that household waste could be managed better in New Zealand.

5.2.1.24 Gender Activity in Household Waste Management

Table 5.2 shows that a significantly higher percentage of women are involved in household work compared to men in Palmerston North. Furthermore, the percentage of households where both men and women are working in paid employment is higher than

the percentage in which the men only have paid employment. As recognition of active management of household waste, as a major work within the household this study can be said that women play an important role in terms of environmental waste management in households in New Zealand.

Table 5.2 Household waste management of activities by gender in Palmerston North

Activities	Men %	Women %	Both %
a Who usually organizes the following waste in your household?			
1. Garden	6.9	23.8	69.2
2. Kitchen	35.2	35.6	29.2
3. Paper	16.5	51.0	32.5
4. Plastic	21.6	49.8	28.6
b. Who usually encourages the reduction of household waste?	23.2	49.8	27.0
c. Who does most of the recycling	17.6	52.4	30.0
d. Who does most of the composting?	32.0	49.3	18.7
e. Who does most of the housecleaning?	9.9	67.5	22.6
f. Who does most of the cooking?	8.4	69.7	20.
g. Who usually does the laundry?	10.8	69.2	20.0
h. Who usually washes the dishes?	19.4	47.7	33.3
i. Who tries to purchase items with less packaging?	16.6	58.3	25.1
j. Who mostly manages the wastebaskets?	25.1	47.0	27.9
k. Who mostly takes rubbish out?	38.7	43.0	18.4
l. Who actively educates children in environment management?	16.9	46.1	37.0

Source: Household Mail Survey, May 2000

Table 5.2 shows that the participation of men and women together (both) accounts for 69 percent, women alone for 24 percent and men alone seven percent. These results show that participation of both men and women together in garden work is higher than the participation of either men or women alone. For kitchen work the participation of men and women together accounts for 29 percent, women alone accounts 35 percent and men alone for 35 percent for similar work activities. Apart from these first two garden and kitchen activities, -and the last two activities, above percentages for the participation of women remained more than double compared to both, and to men alone. In the other activities 'who mostly takes rubbish out' and 'who actively educates children in environment management', women lead also. For the rest of the activities, numbers 3 to 13, there was not much difference between the percentage of the participation of both, and of men alone. For the number fourteen activities, the percent

participation of women and men alone was closer and higher than that of both. But for the number fifteen activity, the percentage participation of women alone and of both were closer and higher than for men alone. These results confirm that women alone are more actively participating in paper and plastic management, reducing household waste, recycling, composting, housecleaning, cooking, doing laundry work and dishes, supporting to purchase of items with less packaging, and managing waste baskets compared to men alone, and to both women and men together.

These results show the influence of the percentage participation of female respondents in this research, as there were more female respondents than male. Table 5.2 illustrates that the level of woman's participation, except for gardening in every household work is higher than that of men. Garden work is the only activity done by both men and women. The figure shows that women's participation in reducing household waste such as cleaning, recycling, and composting waste is higher compared to that of men. Women are doing plastic separation in all other activities, such as kitchen, cleaning, laundry, and paper together with other environmental waste activities. It seems that men and women participate equally in taking rubbish out in the households. The involvement of women in household work such as cooking, laundry, washing dishes and managing wastebaskets is also higher than that of men. Also, women's involvement is higher in purchasing items with less packaging. The percentage of respondents' responses on children's education about environment management was less, simply because respondents believe that this should be done through the education system in school rather than by coaching children at home.

5.2.1.25 Shopping Awareness Activity in terms of Waste Management

Table 5.3 Shopping awareness activity profile

Shopping Activities	Yes (%)	No (%)	Sometimes (%)
a. Do you usually take your own shopping bags to the supermarket?	26	57	17
b. Do you usually refuse a plastic bag for purchased goods?	17	62	21
c. Do you buy goods in organic shops?	8	71	21
d To reduce waste, would you prefer to buy, even if they were more expensive-goods in recyclable containers (e.g. glass)	28	42	30

Source: Household Mail Survey, May 2000

Table 5.3 shows that most of the respondents in the city are not environmentally aware regarding the re-use of shopping bags and that they could refuse plastic bags for purchasing goods. Only eight percent of the total respondents replied that they like to buy goods in organic shops and 28 percent responded positively that they are preferred to buy environmentally aware goods even if they are more expensive. Only 26 percent of the respondents usually take their shopping bags with them when they go shopping, 57 percent do not, and 17 percent do that sometimes when they do shopping. Also result shows that 17 percent do not refuse plastic bags for the purchased goods, 62 percent refuse and 21 percent sometimes refuse plastic bags for the purchased goods. Further, the table shows that eight buy organic goods, 71 percent never buy them and 21 percent do that sometimes.

5.2.1.26 Indications of Problems in Organizing Household Waste

Table 5.4 Percentage of the sampled population showing problem indication in managing household waste

Problems Indication	Occasional Problem (%)	Major Problem (%)	No Problem (%)
a. Bags bursting or tearing	76	21	3
b. Animals damaging bags	68	28	4
c. Spillage of rubbish during collection	73	21	6
d. Bag size too small	53	36	11
e. Rubbish collection being missed	75	20	5
f. Not enough bags provided	45	43	12

Source: Household Mail Survey, May 2000

Besides the major problems, which have already been mentioned, the respondents have indicated that there are several other problems in household waste management in Palamerston North. These are presented in Table 5.4 has been set out the problems and percentages of those who experience them.

Among the sampled population, 21 percent responded that they have major problems with bags bursting or tearing, 28 percent responded that they have major problems with animals damaging bags, and 21 percent have major problems with spillage of rubbish during collection. As regards to the bag size, 36 percent responded that they have a major problem with the bag size being too small, 20 percent reported that their rubbish collection has been missed out, while 43 percent responded that their major problem is that not enough bags are provided by the City Council.

Results shows that 76 percent of the respondents reported that they have an occasional problem with 'bags bursting and tearing', whereas 21 percent responded that this is a have major problem for them. Sixty-eight percent of the respondents said that they had occasional problems with 'animals damaging bags'. This was a major problem for 28 percent of the respondents. Seventy-three percent of the respondents replied that they had occasional problems with 'Spillage of rubbish during collection', which was the major problem for 21 percent of the respondents. Fifty-three percent indicated the fact

that the bags are too small is an occasional problem whereas 36 percent replied that, for them, this is a major problem. Seventy-five percent replied that their rubbish collection being missed is an occasional problem, 20 percent of the respondents experienced this as a major problem. Forty-five percent of the respondents replied that their occasional problem was 'not enough bags provided' which was a major problem for 43 percent of the respondents.

5.2.1.27 Respondents' Views on Waste Problem Indications

Table 5.5 Problems with waste management in Palmerston North.

Problems with Plastic Bags	Problems with Recycling	Problems in Managing Waste
1. Prefer paper bags than plastic 2. No wheelie bin provided 3. We do not receive rubbish bags though we are in the City Council area 4. We don't like plastic bags 5. I often reinforce bags with cardboard 6 If organic waste were to be collected separately I would prefer a bin rather than a bag. 7. No problems seen but we still use the paper bags. Not sure about new plastic ones. 8. The old paper rubbish bags were far superior to the new plastic bags. 9.Hazardous waste needs strong bags, wheeler bins needed for garden waste. 10. Useless rubbish bags provided	1. Sometimes stuff for recycling is too picky (and leave stuff lying around). This creates a danger to motorists because it blows onto the road. 2. Plastic containers blow onto our property on windy days. This is a problem. 3 Recycling collections being missed. 4. Recyclables are being missed. Because they are light, they are blown down the street. 5. More bags provided by City Council, less recycling at home. 6. Some people just throw away drink bottles and plastics onto the road and walkways. 7. Everybody in society needs to encourage and fully aware for recycling and better or improved waste behavior.	1. No collection yet in some area. 2. Landlord doesn't give me the coupon / bags 3. Other people's animals use our house as a latrine. 4 Rubbish collected too early. 5. Bags leaching contents 6. Litter, particularly bottles. 7. Articles left out for curbside recycling becoming scattered and blowing around street properties. 8. Depending on size of average family, bags not enough for a year. 9. Rubbish being blown about by winds, especially cartons and plastic bottles 10. People need more education and training about the waste management 11. Used to be a problem so we got a wheelie bin to use for household and garden rubbish.

Source Household Mail Survey, May 2000

Although the household waste management in Palmesrton North seems good in results however the respondents facing a problem in terms of waste management. They feel that there are some crucial problems too that need to be addressed for better sustainable environmental household waste management in Palmerston North. The Survey asked an open-ended question, to get the suggestions back for household waste management in Palmerston North the respondent responded that the problems with waste management at Palmerstion North are crucial. The table 5.5 presented the sample respondent indicated that they are facing problems on waste management. The table shows that the problems with waste area are about collection of waste, coupon bags, and animal damage household waste rubbish blown rubbish collection times. Furthermore, the number of bags is not great enough for the year so that people needs wheelie bins instead of plastic bags.

Some people complained to the City Council that the respondents are not getting enough bags and also in time. Organic waste was not being collected properly. Moreover, no containers or bags had been provided for hazardous waste and green waste by city. Regarding recycling materials, respondents have problems with the plastic blown up in the road because of missing waste pickup. Respondents in Palmerston north feel they are not guided by City Council in providing enough environmental educational training on recycling and waste management.

5.2.1.28 Statements about Household Waste Management

Table 5.6, presented the argument on household waste management in Palmerston North on a scale of 1-7 = *strongly agree* to *strongly disagree* that the weekly collection of household waste is frequent enough. The scale of '*neither agree* nor *disagree*' to the statement is as follows:

Table 5.6 Attitudinal scale performance values expressed by respondents on the environmental household waste management variables

Scale of 1 to 7 where: 1 – strongly agree, 4 – neither agree nor disagree, 7 – strongly disagree		
	Mean	**Std. Deviation**
Waste is well managed in my household	2.7	1.5
I do not regularly recycle goods in my household	5.4	2.0
I would like to regularly recycle goods in my household	2.2	1.5
I do not regularly compost in my household	4.3	2.4
I would like regular rubbish collection in my city	2.7	1.7
Gender plays an important role in the management of waste in my household	4.1	2.1
In my household men play the major role in protecting the environment	4.4	2.0
In my household women play the major role in protecting the environment	3.3	2.0
Entrance costs to landfill and transfer station in PN are excessive	3.1	1.87
A weekly collection of household waste is frequent enough	2.0	1.5
Provision for recycling at the landfill or transfer station in PN is inadequate	3.9	1.8
The government should initiate ideas for efficient household waste management	2.0	1.8
I think about the waste created by a product before buying it	4.1	1.6

Source Household Mail Survey, May 2000

The statements in the tables above with which the respondents agreed most strongly are as follows: Waste is well managed in my household with aggregate mean 2.7. I would like to regularly recycle goods in my household with the aggregate mean 2.2. I would like to regularly rubbish collection system in my city 2.7, A weekly collection of household waste is frequent enough 2.0 and the government should initiate ideas for efficient household waste management shows the aggregate mean of 2.0.

5.3 Examination of Household Waste Management Practices in Palmerston North

This section explores general household waste management practices in Palmerston North. The section later focuses on the gender practices of household waste management. When asked about issues surrounding waste management in the household environment, the majority of people in the survey replied that they manage household waste well in their households. To examine household waste management practices in Palmerston North the following discussion of recycling, composting, and dumping materials on practices was applied.

Table: 5.7 Responses concerning household waste separation by wards

Ward's name	Waste is well managed in my household		
	Yes (%)	No (%)	Total (%)
Papaioea	48(74)	17(26)	65(24)
Takaro	49(92)	4(8)	53(20)
Awapuni	49(82)	11(18)	60(23)
Fitzherbert	6(100)	0(0)	6(2)
Hokowhitu	58(89)	7(11)	65(24)
Ashhurst	14(82)	3(18)	17(6)
Total	224(84)	42(16)	266

Source: Household Mail Survey, May 2000

A consideration of how well the city manages waste and the people's perceptions of how well they manage household waste by ward-shows that there is a higher proportion of households where waste is well-managed in the Hokowhitu ward than in the other wards. The representation by household structure in this ward shows *a couple with children and boarder* as the highest percentage. Nonetheless, the 'waste is well managed' answer was also higher in these wards. The result shows that waste management is not affected by household structure. The Takaro and Papaioea wards were second highest among the others. As for the household environmental issues, the majority of people in the city 72 percent said that the environmental issues discussed in the survey showed that "waste is well managed at the household level". Furthermore, people commented about their current household environmental behaviour in their lifestyle, and showed their willingness to change by agreeing to use waste organization methods such as composting, recycling, and rubbish dumping. There was a significant

difference ($p \leq 0.05$) between the 'Yes' and 'No' answer to the statements that "waste is well managed in my household". So, the number of respondents who are managing household waste was significantly higher compared to waste-unmanaged households. People's perception of the Palmerston North City, they have proper management of waste environment at the household level.

The waste separation in the household in considering, recyclable, compostable and dumping materials, also analysed. The figure 5.10 shows the "Yes" and "No" answer of the household waste separations in the households at Palmerston North.

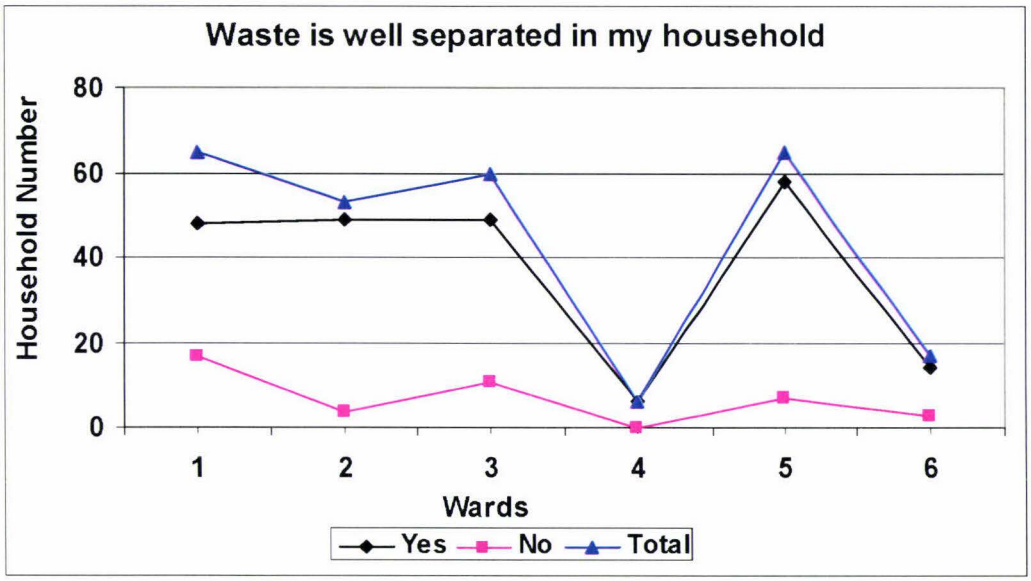


Figure 5.10 Waste is well separated in the household with 'Yes' or 'No' answer

Figure 5.10 shows that over fifty percent of householders are involved in separating the household waste in each ward. The proportion of householders who separate waste well was higher than those who do not separate. The graph lines show that the ward-wise waste separation of the study area in Palmerston North is well managed and has a good separation of recyclable materials, compostable materials and dumping materials. Both 'yes' and 'no' answers are in small numbers at wards 4 and 6 because of the low numbers of respondents in those wards.

The household waste separation by gender in Palmerston North discussed below in terms of 'Yes' or 'No' option.

Table 5.8 Gender-wise waste separation at the household level in Palmerston North

Gender	Yes (%)	No (%)	Total (%)
Men	12 (22.22)	42 (77.78)	54 (20)
Women	113 (91.87)	10 (8.13)	123 (46)
Both	58 (65.17)	31 (34.83)	89 (34)
Total	183 (68.78)	83 (31.20)	266

Figures in parentheses are percentages of gender and waste separation

Source: Household Mail Survey, May 2000

Table 5.8 shows the households who handled waste with "Yes" answer, and those who do not handle the waste with "No" answer. For gender-wise waste separations in handling waste at the household level, the number of women was 46 percent, and the number of men handling waste was 20 percent. The number of households with both handling wastes was 34 percent. The proportion of men not handling waste was a 78 percent of the households, and of women not handling waste was eight percent of the total number of households. As shown in the table, the proportion of households where in males handle waste was 22 percent and the proportion for women were 92 percent. The difference in the proportion of men and women handling waste was affected by different socio-economic, educational, occupational variables, and other environmental awareness and attitudinal behaviors towards waste environment of the respondents.

5.3.1 Recyclable Material

The recyclable waste materials considered in this research include; glass, cans, aluminium, plastic bottles, cardboard milk and cream cartons, papers, magazines batteries, plastic bags and other materials such as egg cartons and clothing, heavy cardboard packaging, plastic lids, ice-cream containers, cardboard boxes, burnt garden refuse, metal, junk mail and the like. Waste management in terms of recyclable materials in relation to waste, questions asked as 'well managed in the household' by gender are organized significantly in the city by ward The respondents who replied with 'Yes' and 'No' answers to the question as to whether or not as waste is well managed in their households by male and female percentages are given in table 5.23 (in Appendix1)

The result shows the responses of the respondents to the question 'waste is well managed at the household level' with 'Yes' or 'No' answer. For each waste variable e.g. cans, plastic bottles, papers, magazines, the model shows that the respondents who replied with a 'Yes' answer were significantly ($p \leq 0.001$) higher than those with a 'No' answer. Similarly, for the variables glass, aluminium, cardboard milk cartons, the respondents who replied with a 'Yes' answer were significantly ($p \leq 0.01$) higher than those with a 'No' answer. There was no difference between the respondents with a 'Yes' or 'No' answer for the variables batteries and plastic bags in terms of waste management. However the other recyclable variables are significantly recycled in each and every ward in Palmerston North

The amount of waste produced and number of respondents who participated in organising the recyclable materials in household waste in each ward are shown in the box plot chart (Figure 5.2) below.

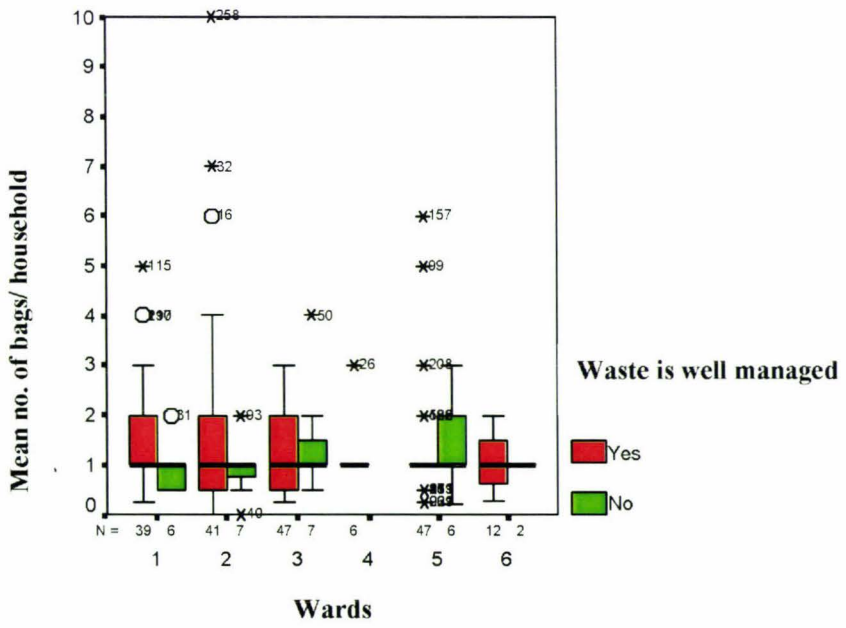


Figure 5.11 Averaged amount of recyclable materials per ward and household

Figure 5.11 (Box plot 1) above describes the inter quartile range of the recyclable materials produced in all 6 wards in Palmerston North. On average, one bag of recyclable materials is being produced in each ward. The vertical line shows the bags of recyclable materials produced and the horizontal line represents the number of respondents who participated in recycling in each ward. The whiskers Points (*) shown in the inner fences of the plot represent the maximum production of recyclable materials in each household. The number in whiskers Points (*) shows that the different households in different wards produced different highest numbers of bags of recyclable materials in each household. The Figure shows the maximum 10 bags of recyclable materials produced in one house per week in ward 1, (Papaioea). Similarly, 2 bags of maximum recyclable materials produced in one household per week was the maximum in ward 6 (Ashhurst). The data in the box plot show that well - managed recycling materials was at an average rate of one bag per week. The numbers described below in percentage distributions format indicate 'Yes' or 'No' response. The results show that in ward five 18 percent said they have well -managed waste at their household and only three percent said they have not. Regarding men and women, 25 percent men and 75 percent women did the same job in ward 5.

The median line in all wards shows that on average, 1 bag of recyclable materials is produced in each ward per week. The data show that in ward 2, 19 percent householders replied that with 'Yes' answer and three percent replied that they do not recycle waste in their households. Sixteen percent of the respondent's were men and 11 percent were women. In ward 3, 21 percent of the respondents replied with a 'Yes' answer saying that they do management of waste well and only few (3%) they do not. A few men (4 %) and women 96 percent take an active role in organizing waste in ward 3. In ward 4, only two percent of respondents replied that they have good management of waste in their households and all of these are women. In ward 5, 21 percent replied with a 'Yes' answer. Among them, 86 percent were women and 15 percent men, whereas only few (2%) replied that they do not organize waste well. In ward 6, 80 percent women and 20 % men respondents replied with a "Yes" answer for the good management of waste in their households, and very few householders (1%) don't recycle waste in their households.

5.3.2 Compostable Material

The management of organic waste and compost-able material at the household level is discussed below. The practices of home composting landfill composting, use of rubbish bags and incinerators has been considered in the composting of waste materials. Garden cuttings, building rubble, metallic waste, household waste and other waste are categorized as landfill waste in this research. In terms of burning rubbish-mainly garden waste, paper waste, plastic waste-all household waste is categorized. The table below presents the male and female percentages with 'Yes' or 'No' answer for the statement *waste is well managed in the household.* The box plot presented below (Figure 5.12) that an average of one bag of compost-able materials is being produced in each household each week.

Results presents that 54 percent woman and 46 percent men participate in composting waste management activities in ward 1. Similarly, 63 percent women and 37 percent men participate in composting in ward two-whereas 55 percent women and 45 percent men participate in ward 3. The results presented for ward 6 show that the total number of women who participate in composting is 73 percent and men only 27 percent (Table 5.24 in Appendix 1).

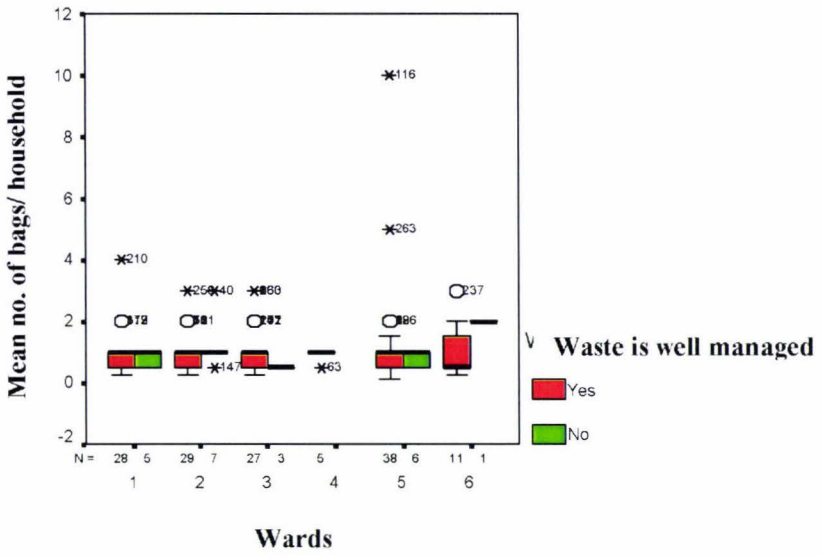


Figure 5.12 Averaged amount of compostable materials per ward and household

Figure 5.12 (Box Plot 2) above describes the inter quartile range of compostable materials produced in all 6 wards in Palmerston North. In a week, on average, one bag of compostable materials is being produced in each ward. The vertical line shows the bags of compost-able materials produced and the horizontal line represents the number of respondents who participated in composting and produced bags of compost materials in each ward. The whiskers Points (*) shown in the inner fences of the plot represent the maximum production of compostable materials in each household. The number in whiskers Points (*) shows that different households in different wards produced different maximum numbers of bags of compost-able materials. The Figure shows the maximum 4 bags of compostable materials produced in one house per week in ward 1, (Papaioea). Similarly, 2 bags maximum of compostable materials produced in one household per week in ward 5 (Hokowhitu). The data in the box plot show that well managing recyclable materials well produces, on average, one bag per week. The numbers described below in percentage distributions format show 'Yes' or 'No' response

The results presented for ward 5 is women 69 percent and men 31 percent. There is equal participation in composting by men and women in ward 6 (Table 5.24 in Appendix). The result of producing compost-able materials and respondents participated in ward 1, (Papaioea). 18 percent of the respondents do the composting in

their households, - 46 percent of males and 54 percent of females and only few (3%) replied that they do not do composting. In ward 2, 18 percent responded that they do composting, where 37 percent of men and 63 percent of women do the composting in their households, and four percent do not.. In ward 4, three percent replied that they organize the composting materials in their households the participation of men was 17 percent and of women was 83 percent. In ward 5, 24 percent of the respondents replied that they do the composting well, where 31 percent were men and 69 percent women. In ward six there were seven percent who responded that they organize composting well, of whom 27 percent were men and 73 percent were women.

5.3.3 Dumping Material

'Dumping Materials' are defined in this research as the materials, which are separated to send to the landfill. The recyclable and compost-able materials, together with the number of rubbish bags, are presented in (table 5.25 in Appendix 1). In the box plot 3, both the materials produced for composting and those for dumping (PCDUMP) are presented on the vertical axis, and the respondents' answers on the horizontal axis. More than 50 percent of the dumping materials produced by households goes to landfill. The table below presents the gender-wise percentage participation in dumping materials in Palmerston North.

The horizontal black line in the box plot (Figure.5.13) shows the average quantity of dumping materials being produced by the households. (Table 5.26 in Appendix 1) shows the ward-wise averaged percent of dumping material (garbage rubbish) being produced in Palmerston North. The quantity of dumping materials being produced was significantly higher in ward 3 (Awapuni) compared to other wards.

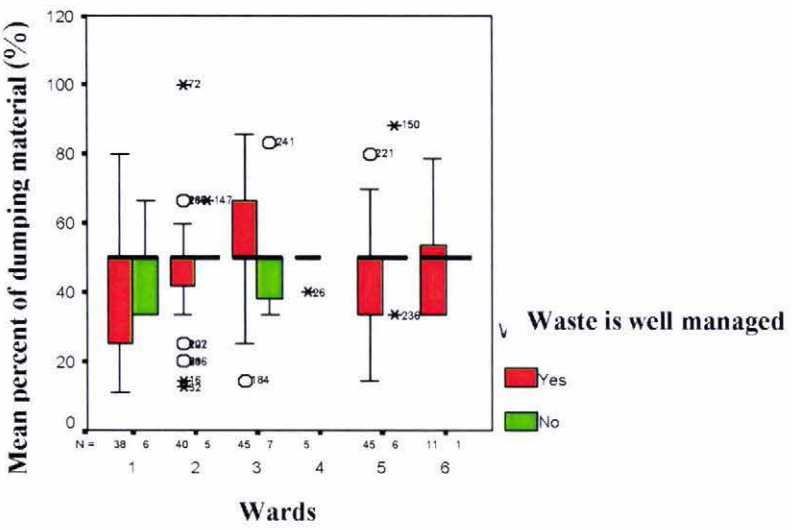


Figure 5.13 Averaged amount dumping material per ward and household

The Figure 5.13 (Box Plot 3) shows the 'Yes' or 'No' answer concerning waste management in Palmerston North in terms of better management of waste. The results show that 18 percent say they have well management of waste in their households and only few (3%) say they do not in ward 1. Regarding men and women, six percent of men and 94 percent of women did the same job in ward 1. The median line in all wards shows that there is on average, around 50 percent of dumping materials produced in each ward per week. The plot shows that there are 19 percent respondents who replies 'Yes' they do the better management of dumping and composting garbage in ward 2 and only few (2%) who replied that they do not produce dumping waste in their households. Fifteen percent of the male respondent's and 85 percent of the women participated in ward 2. In ward no 3 there are 21 percent say 'Yes' they managed waste well and only few (3%) said no they do not. Men 29 percent and women 71 percent participated in waste management in ward 3. Very few (2%) of respondents replied that they had good management of waste in their households in ward 4, of who or whom 17 percent were men and 83 percent were women. 22 percent are gave positive and three percent gave negative answers in ward 5. Among them 96 percent were women and four percent men. Similarly in ward 6, five percent replied they do the separation of waste well in their households, where 80 percent of the women and 20 percent of the men respondents responded with positive answers for managing dumping in connection with well waste management in their households. Only few householders replied that they do not organize waste in their households.

5.3.4 Landfill

The research results for rubbish taken to the landfill or transfer station by car are as follows. As mentioned earlier the highest percentage 30 percent of car trips has been to take rubbish to the transfer station. Trailer trips have been used the highest 25 percent within a year, whereas small truck trips have taken 28.percent, and higher large truck trips have been used 25 percent. The remaining nine percent of the sampled population did not know about the landfill and transfer station in Palmerston North, whereas 11 percent are using all types of vehicles to take rubbish to the landfill. The car and trailer trip interaction is shown in table 5.19

Table 5.9 Car and trailer trip interaction to take rubbish to the landfill

		TRAILER		Total (%)
		No (%)	Yes (%)	
CAR	Yes	80 (30)	58 (21)	138 (52)
	No	99 (37)(	29 (10)	128 (48)
Total		179 (67)	87 (33)	266 (100)

Figures shown in parenthesis are percentages

Source: Household Mail Survey, May 2000

The table 5.9 shows numbers of using both cars and trailers. There are 80 persons who use a car but not a trailer, and 58 persons who use a trailer and a car as well. Twenty-nine do not use car to visit the transfer station, but they use a trailer. Ninety-nine people use neither car nor trailer, 87 persons used only a trailer but not a car. There is an interaction between car and trailer use to take rubbish to the landfill by gender roles
The interaction between gender participation by men and women using car and trailer trips will be further discussed.

5.4 Analysis by Socio -economic Characteristics and Household Waste Management of the Sample Respondents by Wards and Gender.

The results show that people living in Palmerston North are generally satisfied with their household waste management. The residents in Palmerston North are familiar with

the composting and recycling programme. The result results show that ninety percent of the people are aware of the recycling programme in the city. Furthermore, results confirm that 84 percent of the sampled population agreed with the 'yes' answer for the question 'is waste well -managed in your household? This means that the majority of the people in the city think that they are managing waste well in their households. Based on this information, the socio-economic and demographic characteristics of the sample respondents are discussed below. The sample distribution analysis as between gender, sex, wards, education, occupation, income, household structure, and ethnic group are discussed in cross-tabulation percentage distribution tables below.

Table 5.10 Percentage distribution of sample respondents by ward, gender and age in Palmerston North

Wards	Gender	Age						Total	All Total
		15-25	26-35	36-45	46-55	56-65	Over 65		
.Papaioea	Male	0 (0)	3 (5)	3 (5)	4 (6)	3 (5)	5 (8)	18 (28	65 (24)
	Female	6 (9)	12 (18)	16 (25)	1 (2	4 (6)	8 (12)	47 (72)	
Takaro	Male	0 (0)	1 (2)	5 (9)	4 (8)	4 (8)	2 (4)	16 (30)	53 (20)
	Female	8 (15)	12 (23)	7 (13)	4 (8)	3 (6)	3 (6)	37 (70)	
Awapuni	Male	2 (3)	4 (7)	2 (3)	10 (17)	2 (3)	5 (8)	25 (42)	60 (23)
	Female	3 (5)	4 (7)	9 (15)	7 (12)	6 (10)	6 (10)	35 (58)	
Fitzherbert	Male	0 (0	0 (0)	0 (0)	1 (17)	0 (0)	0 (0)	1 (17)	6 (2)
	Female	2 (33)	1 (17)	1 (17)	1 (17)	0 (0)	0 (0)	5 (83)	
Hokowhitu	Male	1 (2)	2 (3)	1 (2	7 (11)	0(0)	7 (11)	18 (28)	65 (24)
	Female	6 (9)	8 (12)	10 (15)	11 (17)	7 (11)	5 (8)	47 (72	
Ashhurst	Male	0 (0	1 (6)	1 (6)	1 (6)	1 (6)	1 (6)	5 (29)	17(6)
	Female	1 (6	4 (24)	3 (18)	2 (12)	2 (12)	0 (0)	12 (71)	
Male Total		3 (1)	11 (4)	12 (5)	27 (10)	10 (4)	20 (8)	83 (31)	266
Female Total		26 (10))	41 (15)	46 (17)	26 (10)	22 (8)	22 (8)	183 (69)	
All Totals		29 (11)	52 (20)	58 (22)	53 (20)	32 (12)	42 (16)	266	

Figures in parentheses are percentages of gender and age

Source Household Mail Survey, May 2000

The age group with the highest representation was in the range of 36-45, in which there was higher number of percentage of female respondents who participated in the survey. In addition, most of the respondents were single women householders. The number of female respondents appeared higher in each and every ward in the study area: the highest number of female respondents was 183, and the total number of male

respondents' was only 83. Looking at the bivariate correlation model, the relationship between gender, age and sex in the six different wards was significant (P≥ 0.01) in the two-tailed test at the 95 % confidence level.

Table 5.11 Percentage distribution of the sample respondent by ward, gender and household structure in Palmerston North

Ward	Gender	Single %	SWB %	Couple %	CWCB %	SWC %	FM %	Other %	Total %	All Total
Papaioea	Male	3 (5)	1(2)	7(11)	5(8)	0(0)	1(2)	1(2)	18(28)	65
	Female	9 (14)	2(3)	8 (12)	21(32)	2(3)	1(2)	4(6)	47(72)	(24)
Takaro	Male	1(2)	2(4)	4(8)	6(11)	0(0)	1(2)	2(4)	16(30)	53
	Female	7(13)	2(4)	5(9)	12(23)	2(4)	4(8)	5(9)	37(70)	(21)
Awapuni	Male	4(7)	2(3)	10(17)	6(10)	0(0)	3(5)	0(0)	25(42)	60
	Female	7(12)	1(2)	8(13)	12(20)	2(3)	3(5)	2(3)	35(58)	(23)
Fitzherbert	Male	0(0)	0(0)	1(17)	0(0)	0(0)	0(0)	0(0)	1(17)	6(2)
	Female	0(0)	0(0)	2(33)	3(50)	0(0)	0(0)	0(0)	5(83)	
Hokowhitu	Male	4(6)	1(2)	7(11)	5(8)	0(0)	1(2)	0(0)	18(28)	65
	Female	8(12)	3(5)	10(15)	19(29)	3(5)	4(6)	0(0)	47(72)	(24)
Ashhurst	Male	1(6)	0(0)	2(12)	2(12)	0(0)	0(0)	0(0)	5(29)	17
	Female	0(0)	0(0)	4(24)	6(35)	1(6)	0(0)	1(6)	12(71)	(6)
Male Total		13(5)	6(2)	31(12)	24(9)	0(0)	6(2)	3(1)	83(31)	
Female Total		31(12)	8(3)	37(14)	73(27)	10 (4)	12 (5)	12 (5)	183 (69)	
All Total		44(17)	14 (5)	68(26)	97(36)	10(4)	18 (7)	15 (6)	266	266

Note: SWB= Single with boarder, CWCB= Couple with children and boarder, SWC=Single with Children, FM= Flatmates. The numbers in parentheses are percentage.

Source: Household Mail Survey, May 2000

There were only two households, which consisted of *two couple with children and boarders*, and only two households, which consisted of *organizational groups*. These latter cases were transformed in this table to the "other" column. The highest total (24%) representation of the householders was from Takaro and Hokowhitu and the lowest representation was from Ashhurst (6%) and Fitzherbort (2%). The reasons for this were, mentioned earlier, because of the lower total population in Ashhurst and the army camp in Fitzherbert. The representation of households consisting *of single with boarder* among the wards was only 5%, and these were located in the Hokowhitu ward. The highest (32%) representation was the category *couple with children and boarder*

from the Papaioea ward. The female representation was higher in each ward. The highest female (12%) representation from the *single person* households was in the Hokowhitu ward. The highest (32%) representation of the *couple with children and boarders* was in Papaioea ward. The low level of representation of the *couple with children and boarders* in the wards is shown in the table. The other householders including those widowed, separated, living with parents, or who spend the daytime at home and return to a nursing home at night are included in the '*Others*' category. The lowest numbers of householders and responses are represented (9%) in the Takaro ward. The argument regarding household waste management and environmental sustainability in the ward is low because of the low number of householders represented in this ward population.

Result also shows that the predominant household structure in Palmerston North comprises of couples who have children plus a boarder. A very small number of households owe comprised two couples and children with boarders. A couple living together is in second position in the city, and single persons living alone form the next largest group after couples.

Table 5.12 Percentage distributions of the sample respondents by ward, gender and ethnic group

Ward	Gender	European/Pakeha	African	Other	Total	All Total
Papaioea	Male	14 (22)	2 (3)	2 (35)	18 (28)	65
	Female	43 (66)	0 (0)	4 (65)	47 (72)	(24)
Takaro	Male	12 (23	0 (0	4 (8)	16 (30)	53
	Female	33 (62)	0 (0)	4 (8)	37 (70)	(20)
Awapuni	Male	19 (32	5 (8)	1 (2)	25 (42)	60
	Female	31 (52)	3 (5)	1 (2)	35 (58)	(23)
Fitzherbert	Male	1 (2)	0 (0)	0 (0)	1 (2)	6
	Female	4 (67)	0 (0)	1 (2)	5 (83)	(2)
Hokowhitu	Male	13 (20)	2 (3)	3 (5)	18 (28)	65
	Female	45 (69)	2 (3)	0 (0)	47 (72	(24)
Ashhurst	Male	4 (24)	0 (0)	1 (6)	5 (29)	17
	Female	11 (65)	0 (0)	1 (6)	12 (71)	(6)
Male Totals		63 (24)	9 (3)	11 (4)	83 (31)	266
Female Totals		167 (63)	5 (2	11 (4)	183 (69)	
All Totals		230 (87)	14 (5)	22 (8)	266	

Source: Household Mail Survey, May 2000

Table 5.12 shows the main ethnic groups, which are Europeans and Pakeha. Because of the very nominal representation of Maori (3%) and Pacific Islanders (2 %) Americans (1%) and Asians (3%), all of these are included in the group of European and Pakeha.

The reasons for the low representations of Maori and people from other ethnic groups may be that the sample population was selected from among ratepayers-and the majority of these are likely to be European/ Pakeha who are permanently longer residing with their property in Palmerston North

5.4.1 Gender Waste Separation and Waste Well-managed in Household by Educational Attainment

The gender involvement in waste separation and managing waste well in household by educational level were categorized as primary-secondary, certificate or diploma, Postgraduate and others. The Bachelor's degree was included in the certificate or diploma group. "Postgraduate" included Postgraduate University degree and other categories were involved with no qualifications, home schooling and other qualifications including short-term training.

Table 5.13 Percentage distribution of the sample respondents by ward, gender and educational level

Wards	Gender	Primary-Secondary	Certificate or Diploma	Post Graduate	Others	Total	All Total
.Papaioea	Male	6 (9)	10 (15)	1 (2)	1(2)	18	65
	Female	20 (31)	21 (32)	1 (2)	5(8)	47	(24)
Takaro	Male	10 (19)	2 (4)	3 (6)	1(2)	16	53
	Female	12 (23)	19 (36)	5 (9)	1(2)	37	(20)
Awapuni	Male	7 (12)	11(18)	5 (8)	2 (35)	25	60
	Female	19(32)	12(20)	1 (2)	3 (5)	35	(23)
Fitzherbert	Male	0 (0)	0 (0)	1 (17)	0 (0)	1	6
	Female	1 (17)	1 (17)	1 (17)	2 (33)	5	(2)
Hokowhitu	Male	7 (11)	5 (8)	5 (8)	1 (2)	18	65
	Female	18 (28)	23 (35)	5 (8)	1 (2)	47	(24)
Ashhurst	Male	2 (12)	0 (0)	2 (12)	1 (6)	5	17
	Female	4 (24)	7 (41)	1 (6)	0 (0)	12	((6)
Male Totals		32 (12)	28 (11)	17 (6)	6 (2)	83	100
Female Totals		74 (28)	83 (31)	14 (5)	12 (5)	183	
All Total		106 (40)	111 (42)	31 (12)	18 (7)	266	266

Figures in parentheses are percentages of gender and educational level

Source: Household Mail Survey, May 2000

Table 5.13 shows the significantly higher number of female respondents participating in a well waste management in each and every ward. For educational attainment, the number of the respondents was significantly higher in the primary-secondary level than in any other. The 'other educational attainment' category such as training and informal home schooling and number with informal school education was low compared to the others. The numbers of respondents with postgraduate study were low compared to the

numbers who had achieved certificates or diplomas, or education at only primary/secondary levels. In this case also, the bivariate correlation model shows that the relationship between gender and age in the gender different wards was significant ($p \geq 0.01$) in the two-tailed test at the 95 % confidence level (See Figure 15 in Appendix)

Table 5.14 Gender related waste is well managed in household by educational attainment

Waste is well managed in household				
Educational Attainment	**Gender**	**Yes (%)**	**No (%)**	**Total (%)**
Primary-Secondary	Men	19(83)	4(17)	23(9)
	Women	40(80)	10(20)	50(19)
	Both	29(88)	4(12)	33(12)
	Total	**88(83)**	**18(170**	**106(40)**
Certificate or Diploma	Men	15(88)	2(12)	17(6)
	Women	45(79)	12(21)	57(21)
	Both	31(84)	6(16)	37(14)
	Total	**91(82**	**20(18)**	**111(41)**
Post Graduate	Men	6(86)	1(14)	7(3)
	Women	8(80)	2(20)	10(4)
	Both	12(86)	2(14)	14(5)
	Total	**26(84**	**5(16)**	**31(12)**
Others	Men	7(100)	0(0)	7(3)
	Women	6(100)	0(0)	6(2)
	Both	5(100)	0(0)	5(2)
	Total	**18(100)**	**0(0)**	**18(7)**
All Total		**223(84)**	**43(16)**	**266**

Figures in parentheses are percentages of gender and educational

Source: Household Mail Survey, May 2000

Among 40 percent with primary and secondary level qualification responded that their household environment was good. They responded that they do separate waste well and mange waste well in their households. Of the 40 percent respondents who are involved in waste separation, 83 percent were men and 80 percent were women, and, 88 percent were both men and women working together in managing the household waste in their household. Among 40 percent respondents with a certificate or diploma degree qualification involved in separating waste and managing waste well in their households, 88 percent were men and 79 percent were women. Out of the 12 percent respondents

with postgraduate degree qualifications involved in separating waste and managing waste well in their household, men totaled 86 percent and women totaled 80 percent. Similarly, among the other category of seven percent respondents, both men and women have equally participated in organizing waste in their households. The higher proportion of the respondents had primary-secondary and certificate or diploma qualifications. The lowest proportion had other group and Postgraduate degrees

5.4.2 Gender Differences by Educational Influence in Household Waste Management

Using a logistic regression model shows that educational attainment influences the management of household waste. The respondents with a higher educational level are managing waste better, which may be because that group applies an educated attitude to environmental awareness. Respondents who have certificates and postgraduate levels of education are managing waste better than are the other educational category. Respondents with primary and secondary level qualification show that they have higher roles in waste management than the other qualifications mentioned. Therefore 'the higher qualification does not make any differences in managing the waste separation capability of waste management'. Looking at the educational level, also there are gender differences in managing the household waste for environmental sustainability.

The interaction between the educational attainment and age factors has been analysed in order to look at the household waste management and gender relationship in this research. The several ways of interaction between gender and waste management have been analysed. Similarly, different interactions have been shown between the separation of waste in the household and age factors. The logistic regression model shows clearly that there is a significance relationship between gender and household waste separation as indicated previously.

Table shows (5.28 in Appendix 1,) household waste separation in relation to educational attainment and age group. Age group, 36-45, have higher representation than the other age groups. Secondary education, certificate, and diploma level mostly lead the educational attainments in these groups. Actually, the results show that educational

qualifications have not affected household waste management. However, the age groups have an effect in organizing waste. This result confirms that adults are more concerned in environmental household waste management than is the younger generation.

5.4.3 Gender Waste Separation, or Waste is Well -managed in Households in Relation to Occupational Status

There were significant differences between different occupational statuses in the management of household waste. Non-working respondents are managing the waste better, which might be because this group has enough time to do so. But professional people show a higher level of waste management than do technicians.

Table 5.15 Percentage distribution of the sample respondents by ward, gender and occupation

Wards	Gender	Technician	Professional	Not working	Total	All Total
Papaioea	Male	5 (8)	6 (9)	7(11)	18 (28)	65
	Female	2(3)	17(26)	28(43)	47(72)	(24)
Takaro	Male	2(4)	8(15)	6(11)	16(30)	53
	Female	1(2)	14(26)	22(42)	37(70)	(20
Awapuni	Male	4(7)	9(15)	12(20)	25(42)	60
	Female	3(5)	9(15)	23(38)	35(58)	(23)
Fitzherbert	Male	0(0)	1(17	0 (0)	1(17)	6
	Female	0(0)	3(50)	2(33)	5(83)	(2
Hokowhitu	Male	1(2)	8(12)	9(14)	18(28)	65
	Female	0 (0)	26(40)	21(32)	47(72)	(24)
Ashhurst	Male	1(6)	2(12)	2(12	5(29)	17
	Female	1(6)	3(18)	8(47)	12(71)	((6)
Male Totals		13(5)	34(13)	36(14)	83(31)	100
Female Totals		7(3	72(27	104(39)	183(69)	
All Totals		20(8)	106(44)	140(53)	266	266

Figures in parentheses are percentages of gender and occupation

Source: Household Mail Survey, May 2000.

Table 5.15 presented to show the distribution of the sample respondents by gender and occupation in this study. For occupation, 'Not working' respondents were significantly higher compared to technicians and professionals, and female percentages were significantly higher than male percentages. Similarly the results show that the people who were not working had a higher level of participation in organizing the household waste management than working people. An examination of the results obtained from both people who are working and those who are not shows that there is a significant relationship between the time factor and waste management. The statistical mean for males is 4.81, and for females, 5.88.

5.4.4 Gender Differences by Occupational Influence in Household Waste Management

The table below confirms that more similar percentages of men and women both participate from the not working group than from other occupational status categories. The highest proportion of the respondents involved in separating waste was from the 'not working' group, and the lowest proportion was from the "Technician" group. This result clearly indicates that those who have time and do not work are involved more in separation of waste, and those who are busy in other work such as technicians do not bother to separate waste.

Table 5.16 Gender differences in relation to waste separation and management in household by Occupation

Waste is well managed in household				
Occupational Status	**Gender**	**Yes (%)**	**No (%)**	**Total (%)**
Technician	Men	8(89)	1(11)	9(3)
	Women	4(67)	2(33)	6(2)
	Both	4(80)	1(20)	5(2)
	Total	16(80)	4(25)	20(8)
Professional	Men	13(87)	2(13)	15(6)
	Women	35(79)	13(21)	48(18)
	Both	35(81)	8(19)	43(16)
	Total	83(78)	23(22)	106(40)
Not working	Men	26(87)	4(13)	30(11)
	Women	60(87)	9(13)	69(26)
	Both	38(93)	3(7)	41(15)
	Total	124(89)	16(11)	140(52)
All Total		223(84)	43(16)	266

Figures in parentheses are percentages of gender and occupational status

Source: Household Mail Survey, May 2000.

Gender differences in relation to waste separation and household waste management shown in the table illustrate that the positive answer "Yes" they do the waste separation total 84 percent of whom eight percent are technicians 40 percent professionals and 52 percent are not working respondents categorised by occupational status. Thirty percent of respondents lie in the 'Technicians' occupational status category, where 89 percent of men and 11 percent of women responded that they do the waste separation well, and

manage waste properly in their households. Among the respondent 40 percent are categorised by their occupational level in the "Professional" group where 13 percent of men did the waste separation, 35 percent, of women. In the same group 78 percent did this together, with men and women both working at the separation and good management of waste in their households. The table shows that 52 percent of respondents were from the "not working" category where 87 percent of men and 87 percent of women did the waste separation and managed waste well in their households, whereas 93 percent separated waste and managed waste well together both men and women in the same category.

Looking at the occupational levels, there are gender differences in managing household waste. Testing the hypothesis by using the logistic regression model, there are no gender differences at the 95 percent confidence level in all occupational classes-technicians, professionals and those not working in this particular case. Nonetheless, the logistic regression model shows that there are significant differences in gender and household waste separation control by occupational level (Figure 16 in Appendix 1). This may be the major influence among the socio -economic and other cultural characteristics.

5.4.5 Gender Waste separation or Waste Well managed in Households in Relation to Economic Status

A descriptive analysis by the gender waste separation and management of household waste in relation to the economic status cross tabulated are discussed.

Table 5.17 Percentage distribution of the sample respondents by ward, gender and income level

Ward	Gender	Annual income					
		0 to $15,000	$15001 to $30,000	$30,001 to $ 70, 000	$70,001 to $100.001 or more	Total	All Total
Papaioea	Male	4 (7)	5 (9)	7(12)	0 (0)	16 (28)	58
	Female	16 (28)	6 (10)	19 (33)	1 (2)	42 (72)	(22)
Takaro	Male	1 (2)	7 (14)	7 (14)	0 (0)	15 (30)	50
	Female	13 (26)	9 (18)	12 (24)	1 (2)	35 (70)	(20)
Awapuni	Male	8 (14)	6 (10)	8 (14)	2 (3)	24 (41)	58
	Female	13 (22)	13 (22)	7 (12)	1 (2)	34 (59)	(23)
Fitzherbert	Male	0 (0)	0 (0)	1 (17)	0 (0)	1 (17)	6
	Female	1 (17)	1 (17)	3 (50)	0 (0)	5 (83)	(2)
Hokowhitu	Male	6 (23)	1 (4)	7 (27)	4 (15)	18 (29)	62
	Female	12 (19)	14 (23)	15 (24)	3 (5)	44 (71)	(25)
Ashhurst	Male	2 (12)	1 (6)	2 (12)	0 (0)	5 (29)	17
	Female	5 (29)	2 (12)	5 (29)	0 (0)	12 (71)	(8)
Male Totals		21 (8)	20 (8)	32 (13)	6 (2)	79 (31)	100
Female Totals		60 (24)	45 (18)	61 (24)	6 (2)	172 (69)	
All Total		81 (32)	65 (26)	93 (37)	12 (5)	251	251

Figures in parentheses are percentages of gender and income level

Source: Household Mail Survey, May 2000

Table 5.17 shows the relationship between sex and income level distributions among the total sampled respondents. Fifteen respondents did not report their income. The reason might be that people do not like disclose detailed of their wealth for reasons of privacy. In this case too, the female representation was higher than the male. As for the income levels of the respondents, there are significantly higher numbers in the $0-15 (000) income level bracket than in the $15 –30 (000) bracket. The bivariate correlation result shows there is no significant relation between environmental management and income level in this case (Figure 17 in Appendix1).

5.4.6 Gender Differences by Occupational Influence in Household Waste Management

In total, 251 responses to the survey were received. Out of the total respondents, 83 percent replied that they have well-managed household waste. at their household. The highest number of respondents who replied that their household waste management is well organized lie in the medium annual income $30,000-$70,000, and the second - highest number of respondents are in the $15,000-$30,000 annual income bracket. The least 58 percent responded that they were managing the waste well in their household. The lowest number who replied that they were managing waste well also the lowest paid.

Table 5. 18 Gender differences in relation to waste separation and management in household by economic status

Waste is well managed in household				
Economic Status	**Gender**	**Yes (%)**	**No (%)**	**Total ()**
0 to $15,000 Annual income	Men	17 (94)	1(6)	18(7)
	Women	29(83)	6(17)	35(13)
	Both	27(96)	1(4)	28(11)
	Total	73(88)	8(12)	81(32)
$15001-$30,000	Men	10(83)	2(17)	12(4)
	Women	25(83)	5(17)	30(11)
	Both	19(83)	4(17)	23(9)
	Total	54(83)	11(17)	65(26)
$30,001-$70, 000	Men	17(85)	3(15)	20(8)
	Women	35(76)	11(24)	46(18)
	Both	22(85)	5(15)	27(11)
	Total	74(80)	19(20)	93(37)
$70,001-$100,001 or more	Men	1(50)	1(50)	2(1)
	Women	3(60)	2(40)	5(2)
	Both	3(60)	2(40)	5(2)
	Total	7(58)	5(42)	12(5)
All Total		208(83)	43(17)	251

Figures in parentheses are percentages of gender and economic status

Source: Household Mail Survey, May 2000

Table5.18 shows 94 percent of male respondents who have a low annual income ($ 0-$15,000) responded that they have well managed household waste. In the same economic bracket 86 percent of women responded that they separate waste well in their households. In the same economic bracket, 96 percent of responses they did good waste

separation in their household men and women equally participated at the rate of 83 percent. Eighty-three percent men and 83 percent women said they waste separation in their households and within the same economic bracket 83 percent both women and men together did the waste separation job in the annual income level of ($ 15,000-$30,000). In the annual income level ($30,000- $70,000), men did 85 percent and women did 76 percent and both did 85 percent in these economic brackets. The higher economic status ($70,001-$100,001 or more) responded that men did 50 percent and women did 50 percent and three percent did both.

Using a logistic regression model shows that there is no influence exerted by socio-economic status in managing the household waste. A low or high level of earning does not show any difference in household waste management. On the other hand, it is clearly shown that there are no differences in attitude in managing the household waste or in levels of environmental awareness between higher-level income and lower -level income respondents in the study area, but there were gender differences in managing the household waste (Figure in Appendix 1)

5. 5 Gender Relationship and Differences in Participation in Household Waste Management

To explore the relationship between gender and household waste management the variables, *gender-based household waste separation* and *gender activities* have been selected for studying male/ female participation in household waste management. The shopping activity profile illustrates the relationship between gender and differences in household waste management in Palmerston North. Gender –based activities within the household and shopping activities outside the household are analysed to find the differences and relationships between men and women -who does what, and how they participate Gender participation also in participating to take rubbish in trips to the Landfill analysed by cross tabulation of car and tailor trip to landfill.

5.5.1 Gender Participation Shopping Activities.

Gender participation in terms of consciously purchase environmentally friendly goods, in choice deliberately buy articles that has little packaging as possible or that can recycled, in taking shopping bags to supermarket, in buying goods in organic shops, in refuse a plastic bags for purchase goods, in reduce waste prefer to buy goods even if expensive discussed below in the gender activity participation table. 5.19.

Table 5.19 Gender activity in participation on shopping activities

1. Gender participation for consciously try to purchase environmentally friendly goods				
Gender	**Yes (%)**	**No (%)**	**Total (%)**	
Men	38(14)	45(86)	83(31)	
Women	81(30)	102(70)	183(69)	
Total	119(47)	147(55)	266	
2.Gender participation in choice deliberately buy articles that has as little packaging as possible or that can recycle				
Gender	**Always (%)**	**Occasionally (%)**	**Rarely (%)**	**Total (%)**
Men	11 (6)	46 (55)	26 (31)	83 (31)
Women	43 (23)	91 (50)	49 (27)	183 (68)
Total	54 (20)	137 (52)	75 (28)	266
3.Gender participation in taking shopping bag to supermarket				
Gender	**Yes (%)**	**No (%)**	**Sometime (%)**	**Total (%)**
Men	20(24)	49(60)	13(16)	82(32)
Women	48(27)	97(38)	30(12)	175(68)
Total	68(26)	146(57)	43(17)	257
4.Gender participation in buying goods in organic shops				
Gender	**Yes (%)**	**No (%)**	**Sometime (%)**	**Total (%)**
Men	7(9)	48(60)	27(34)	80 (33)
Women	13(8)	127(77)	26(16)	166(67)
Total	20(8)	175(71)	51(21)	246
5.Gender participation in refuse a plastic bags for purchase goods				
Gender	**Yes (%)**	**No (%)**	**Sometime (%)**	**Total (%)**
Men	16(20)	50(63)	14(17)	80(32)
Women	26(15)	104(62)	39(23)	169(68)
Total	42(17)	154(62)	53(21)	249
6.Gender participation in reduce waste, prefer to buy goods even if expensive				
Sex	**Yes (%)**	**No (%)**	**Sometime (%)**	**Total (%)**
Men	23(29)	33(41)	24(30)	80(33)
Women	46(28)	68(41)	50(30)	164(67)
Total	69(28)	101(41)	74(30)	244

Figures in parentheses are percentages of gender and participation of shopping activity

Source: Household Mail Survey, May 2000

Table 5.19 presents the results about gender activity in shopping in relation to waste production and reduction in households. The table presents men's and women's participation percentages involvement in shopping activities. Sixty-nine percent of women participated in consciously trying to purchase environmentally friendly goods, where only 31 percent of men involved. The gender participation in deliberately choosing to by articles that have packaging as possible, or that can be recycled also led - women 68 percent. Among women, participation was 23 percent and among men participation was only six percent. The percentage of customers who take shopping bags to the supermarket also is higher among women 27 percent than among men 24 percent. Further, buying goods in organic shops is higher eight percent among women then among men. In terms of refusing plastic bags for goods purchased, participation by women was 68 percent whereas among it is only 32 percent. As for participation in reducing waste by preferring to buy goods even if they are more expensive, participation by women was 28 percent and 29 percent were men

5.5.2 Gender Participation in Trips to the Landfill

Table 5.20 shows the gender participation in trips to the landfill or transfer station using Car & Trailer trip by gender.

Table 5.20 Cross tabulation of the car to landfill and trailer to landfill by gender

			Trailer to Landfill		
Gender			**No (%)**	**Yes (%)**	**Total (%)**
Men	Car to Landfill	No	25 (9)	17 (64)	42 (16)
		Yes	29 (11)	12 (5.)	41(15)
Women	Car to Landfill	No	55 (21)	41 (15)	96(36)
		Yes	70 (26)	17 (6)	87(33)
	Total		179 (67)	87 (33)	266

Figures shown in parentheses are percentages

Source: Household Mail Survey, May 2000

The proportion of the respondents who use a car was higher than who use a trailer. The number of women was higher 33 percent than men 15 percent to use car trips to the landfill. A smaller (5%) proportion of the respondents, men and women six percent were using trailer trips to the landfill. This result confirms that the people of Palmerston

North prefer car to trailer trips to take rubbish into the landfill and transfer station. The choice of car may be because it is of easier to in handle and smaller amounts of recyclable and compostable rubbish are being collected in the household.

5.6 Agreement Statements: Analysis of Environmental Household Waste Management by Gender

A multivariate analysis was applied to analyse Likert scale questions for attitude agreement on *Strongly agree, Neither agree, Nor disagree and Strongly disagree* about environmental household waste management. A principal component analysis was carried out on the Likert scale question of environmental household waste management to see whether the dimensionality (Attitudinal agreement) of the data could be reduced. The Principal Component (PC) is described by listing the correlation between each of the original variables and the more for each PC. The size and sign of the correlation coefficients is used as a basis for interpreting each PC. The eigenvalues (weight value) of the first five components (Components 1-5) of the new PCs account for a reasonable amount of variation (about 61%) (See appendix.1). The values show that at least five components are required to explain a good deal of variation. PCA was carried out to reduce the dimensionality of the data and to see if the first few components were accountable for most of the variation of 13 (Y) variables of waste data. The waste statement variables 1-13 are designated as Y1 to Y13 variables (table 5.21) for analysis purpose. The response score and the questions asked of the respondents are shown in Table 5.21

Table 5.21 The response score used by the respondents to answer the questions associated with the environmental waste management variables

For the response score number, the statement used: 1= Strongly Agree, 2= Lightly agree, 3= Very lightly agree, 4=Neither agree nor disagree 5=Very lightly disagree, 6 = Lightly disagree.7= Strongly disagree			
	Response score mean	**Std. Deviation**	**Response score**
Y1='Waste is well managed in my household (Hh)'	2.73	1.52	2
Y2='I do not recycle goods'	5.34	2.00	5
Y3= 'I like recycle goods' y4='I do not regularly compost'	2.22	1.46	2
Y4='I do not regularly compost'	4.26	2.34	4
Y5='I like regular rubbish collection'	2.56	1.64	3
Y6='Gender plays an important role in the management of waste in my Hh '	4.15	2.14	4
Y7=' In my household, men play a major role to protect the environment'	4.34	2.02	4
Y8='In my household women play a major role to protect the environment'	3.30	1.99	3
Y9='Entrance cost to land fills in Palmerston North (PN) are excessive'	2.79	1.86	3
Y10='A weekly collection of Hh waste is frequent enough'	2.00	1.51	2
Y11='Provision for recycling at the landfill or transfer station in PN is inadequate'	3.87	1.75	4
Y12='The Government should initiate ideas for efficient Hh waste management'	2.94	1.77	3
Y13='I think about the waste created by a product before buying it'	4.06	1.63	4

Source: Household Mail Survey, May 2000

The total number of respondent who participated and replied to each asked question asked in the survey: were 238. The results shows that for the statement y1 *(Waste is well managed in my household)*, the people have somehow lightly agreed to the statement and indicated that householders in Palmerston North are managing waste in their households but not very well. For the y2 statement *(I do not recycle goods)*, light disagreement indicates that people of Palmerston North city do recycle goods but again not very well. For the y3 statement *(I like the recycle goods)*, the response mean agrees strongly and indicates that people like to recycle goods. For y4 the statement *(I do not regularly compost)*, the response mean is very close to the '*neither agree nor disagree* score 4' and hence indicates that people might like composting but they do not do composting regularly. This response on composting shows that regular composting could be possible in future. For y5 statement *(I like regularly rubbish collection)*, the

response mean very lightly agrees on the statement and indicates that people like regularly rubbish collection system.

Similarly for variables Y6 (Gender plays an important role in the management of waste in my Hh), and Y7 (In my household, men play major role to protect environment), the response score mean are closed to the 'neither agree' nor 'disagree'. These responses on gender role in waste management and major role of men or women to protect environment may or may not important. For variable Y8 (In my household women play a major role to protect environment), the response score mean very lightly agrees. Gender participation in household waste management may be of important issue and there may difference on men or women's role to protect environment. For y9 statement (Entrance cost to land fills in Palmerson North are excessive), the response score mean very lightly agrees and indicates that entrance cost to land fills need to be reviewed and lowered down from the current rate.

For y10 statement *(A weekly collection of household waste is frequent enough)*, the responses mean score agree and suggests that respondents have agreed the current system of weekly collection of household waste. For y11 statement *(Provision for recycling at the landfill or transfer station in PN is inadequate)*, the response mean score is close to *neither agrees nor disagrees*, suggesting respondents are okay with the prevailing system. For y12 statement *(The Government should initiate ideas for efficient household waste management)*, the response mean score *lightly agree* and indicate that the government need to plan programs for efficient household waste management. For the y13 statement *(I think about the waste created by a product before buying it)*, the response mean score is close to neither agree nor disagree and suggests that city householders are not sure whether the waste created by a product before buying it or not.

First component explained about 21 percent of the variation, for *Waste is well managed in my household* (see Appendix 1). Also the variation is characterized, *I think about the waste created by a product before buying* and large negative coefficients and loadings for, *I do not regularly recycle goods* and *I do not regularly compost*. A positive (mean-centred) score of this component (Statements) of the 'Likert scale question data' indicates a high proportion of *Waste is well managed in my household* and *I think about*

the waste created by a product before buying, while negative values disagree with *I do not regularly recycle goods* and *I do not regularly compost* variables. Similarly, each of the other four components (Statements) gave a contrast between the original variables. Figure 5.14 shows the component weight value of management agreements new variables in the scree plot.

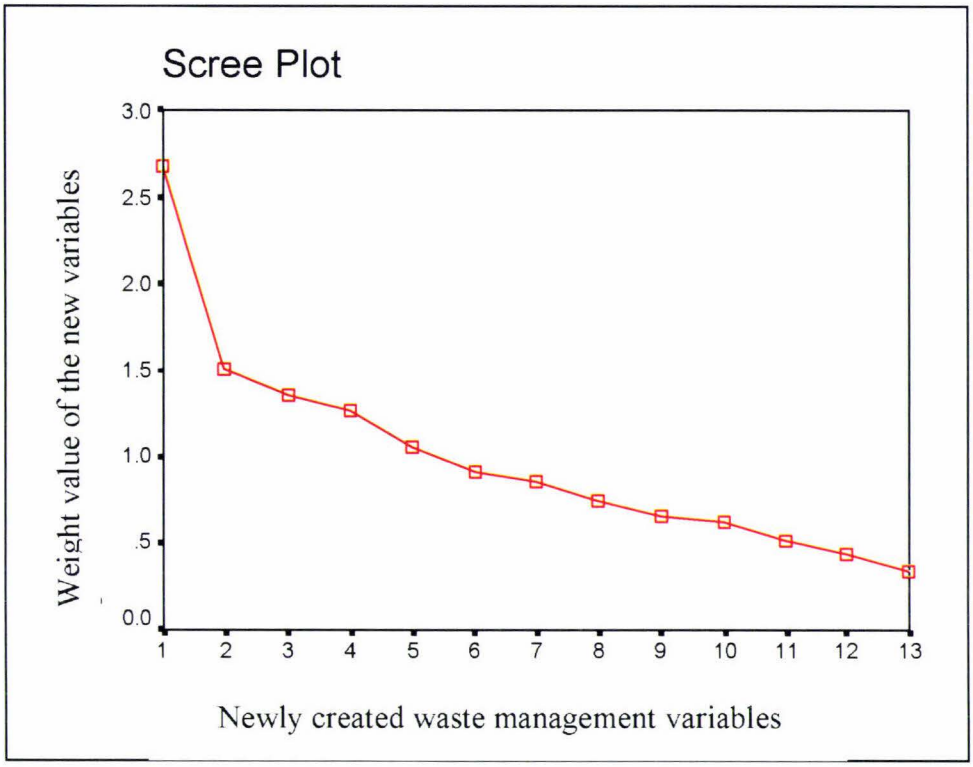


Figure 5.14 Ranking order of newly created household waste management variables

The scree plot agrees with the rank of choice of five components, as values 6-13 appear to flatten out. The scree plot argued that the dimensionality of the 'Likert scale question data' may be reduced to five dimensions from 13, accounting for about 61 percent of the total variation of waste management.

The results therefore conclude that without doing regular recycling goods and regular composting, waste management cannot sustain at household level. In other words regular recycling goods and regular composting is needed to have well managed at household, which enhances good environment.

Correspondence Analysis was also carried out to examine the profiles associated with two components (ideas) *visit recycling depot* and *waste is well managed in my household*. Percentage of the people who visit recycling depot weekly is lower than fortnightly, monthly and yearly with respect to strongly agreed. There is a contrast between the people, *who visit recycling depot weekly and fortnightly*, and *the people who do not know recycling depot* and *the people who visit recycling depot monthly*. There is also contrast between the people who *visit recycling depot monthly*, and the people who *visit weekly* and who *do not know recycling depot*. Similarly, there is a contrast for all above components between people who less agrees, and the people who neither agrees nor disagrees. There is also a contrast between moderately agree, and strongly disagree.

The result clearly shows that the association between 'time' of *Visit recycling depot* and response of *waste is well-managed* characterized that the people who visit the recycling depot *weekly* and *fortnightly* are associated with *less agree* and *moderately agree* responses. Similarly the people *who do not know about recycling depot*s are associated with *neither agree nor disagree* responses. The people who visit-the recycling depot *monthly* is associated with *neither agree nor disagree* responses (table in Appendix 1.)

It can be concluded that the people of Palmerston North who are aware of the environment and actively involved in visiting recycling depot to deliver recycling goods after use have less to moderately agree that waste is well managed in their households. The key is that even people who visit the recycling depot weekly have not strongly agreed 'waste is well managed in their household'. Thus, the results indicated that an effective programme is still needed to help and support the 'waste is well managed in householders, and public programme aimed to encouraging the view would motivate people to show greater concern and accept this challenge.

A Simple Canonical Correlation Analysis was also carried out to look at the relationship among 'waste_management' variables *waste is well managed in my household* (wwmh), *I would like to recycle goods regularly* (irrg), *I would like regular rubbish collection* (iwlrrc); among 'gender_waste' variaiables *Gender plays an important role in the management of waste in my household* (gpir), A *weekly collection of household waste is frequent enough* (wchwe), and the *government should initiate ideas for efficient*

household waste management (giehwm) and then between the 'waste_management' and 'gender_waste' variables. Table 5.22 shows the means and standard deviation of the chosen variables.

Table: 5.22 Correlation mean and standard deviation of the gender and environmental household waste management

Variables	Mean	Std Dev
Waste is well managed in my household (wwmh)	2.72	1.52
I would like to recycle goods regularly (irrg)	2.22	1.46
I would like regular rubbish collection (iwlrrc)	2.56	1.64
Gender plays an important role in the management of waste in my household (gpir)	4.15	2.14
A weekly collection of household waste is frequent enough (wchwe)	4.15	2.14
The government should initiate ideas for efficient household waste management (giehwm)	2.00	1.51

Source: Household Mail Survey, May 2000

There was small and positive correlation between the variables *I would like to recycle goods regularly* 'irrg' and *I would like regular rubbish collection* 'iwrrc' (0.23), *Waste is well managed in my household* 'wwmh' and *I would like to recycle goods regularly* 'irrg' (0.21), and between *Waste is well managed in my household* 'wwmh' and *I would like regular rubbish collection* 'iwlrrc' (0.16).

Within 'gender_waste' variables, there was very strong correlation between *I would like to recycle goods regularly* 'gpir' and *A weekly collection of household waste is frequent enough* 'wchwe' (1.00), but there was very small and positive correlation between *the government should initiate ideas for efficient household waste management* 'giehwm' and *I would like to recycle goods regularly* 'gpir' (0.09), and between *a weekly collection of household waste is frequent enough* 'wchwe' and *the government should initiate ideas for efficient household waste management* 'giehwm' (0.09).

The correlations between *'waste_management'* and *'gender_waste'* variables show that the variables *waste is well managed in my household* 'wwmh' and *the government should initiate ideas for efficient household waste management* 'giehwm' are positively correlated (0.22), but *waste is well managed in my household* 'wwmh' is negatively correlated to a markedly lesser extent with *I would like to recycle goods regularly* 'gpir' (>-0.02) and *a weekly collection of household waste is frequent enough* 'wchwe' (>-0.02). Similarly 'irrg' is negatively correlated to a very much lesser extent with 'gpir' (>-0.01) and with *a weekly collection of household waste is frequent enough* 'wchwe' (>-0.01), but positively correlated to a much lesser extent with *the government should initiate ideas for efficient household waste management* 'giehwm' (0.05). There was small and positive correlation between *I would like regular rubbish collection* (iwlrrc) 'iwlrrc' and *I would like to recycle goods regularly* 'gpir' (0.19), *I would like regular rubbish collection* 'iwlrrc' and *a weekly collection of household waste is frequent enough* 'wchwe' (0.19), and between *I would like regular rubbish collection* 'iwlrrc' and *the government should initiate ideas for efficient household waste management* 'giehwm' (0.15). The 'likelihood ratio' test confirms that both canonical correlations are significant (see appendix1).

The result confirms that people of Palmerston North have moderately agreed that '*waste is well managed in their household'*, '*they do like regular recycling goods and rubbish collection*', and '*the government should initiate ideas for efficient household waste managemen*t'. The majority of the people have neither agree nor disagree in '*gender plays an important role in managing household waste*' and for '*weekly collection of household waste is frequent enough*'. However, these responses indicate that there are gender differences for managing waste in the household and weekly collection of household waste is frequent enough. The results confirm that there is a positive relationship between wastes is well managed in the household, and people like regular recycling good and rubbish collections.

The results also confirm that there is very strong relationship between '*gender plays an important role in managing waste in household*' and '*weekly collection of household waste is frequent enough*'. The relationship between '*waste is well managed in my household*' and '*the governments should initiate ideas for efficient household waste management*' is positive and moderate. The relationship between these variables has indicated that the government needs to initiate or formulate the ideas to maintain well-managed waste in the household.

Chapter 6: Discussion

6.1 Introduction

Gender activities play an important role in waste management as shown by the household survey. The survey results confirmed that to manage the sustainable household waste environment a clear understanding of the perceptions of both men and women is required. In addition, the results indicated that educational level and the occupations of men and women are key factors in determining awareness and practice involved in household environmental sustainability. The household structure, family size, age, and sex composition of the household members are other factors involved in household environmental awareness.

The results have indicated that people in New Zealand are conscious of the need for environmental household waste management. Fourteen percent of the sample populations have replied that they do not think that waste is well managed in their households. There is a very small section of the population who either do not know, or who feel no sense of responsibility about household waste management. It is intended that environmental management systems in New Zealand should be integrated by the central government agencies (Ministry of the Environment/New Zealand, 1998). Nonetheless, the results of this research have supported the view that gender activities - especially women's activities are significantly higher in the successful organization of waste management systems. Demographic indicators, i.e. age, sex, gender, occupation, and education-together with environmental awareness of the need for organizing waste into compostable materials, recyclable materials, and rubbish for dumping, together with consciously purchasing environmentally friendly materials have influenced household environments. Logistic support and demographic differences have influenced waste management practices at the household level.

The majority of the respondents in Palmerston North City consider that they properly manage waste in their households-yet, significant quantities are being disposed to landfill. This result of this research show that there were, on average, of one bag of dumping materials produced in each ward in Palmerston North, per week and more than 50 percent of the dumping materials produced by each households in each ward goes to landfill. This study has clearly shown that genders do impact on household waste management. Some critical demographic, educational occupational, socio economic and cultural factors, also the household structure and many other small factors such as age, sex, gender, household structure, also affect environmental household waste management. Household structure and ethnic variation in household structural activities impacted on both gender roles and the type of activities in which they are involved. The impact on the study area was discussed ward-wise, and illustrated that gender plays an important role in sustaining the environment in New Zealand.

Gender and waste management practices in the household and shopping awareness and control over the household resources were analysed for the impact assessment of household waste management on landfill. Gender-based activities, such as shopping, cooking, cleaning, encouragement to reduce the household waste, recycling, house cleaning, laundry, washes the dishes, purchases items with less packaging, managing the wastebaskets, mostly taking the rubbish out, and actively educating children in environment management were considered. The variables were examined to look at the environmental impact assessment in this study. The findings are considered in relation to literature discussed earlier and information gathered from the household mail survey. The discussion below deals with considered the gender participation in different household waste management practices.

6 2 Participation of Household Work Activities by Gender

Men generally do very little housework in developing countries (Malathy, 1994). and the same applies in developed countries, too. These research results give a similar type of result in management of household work in the area of waste management. Women, therefore, take an important role in activities within the household. This research also

supports the view that urban women, in general, play an important role in heavy domestic work- including managing the household environment.

This study clearly showed a division of labour by gender in household waste management activities. This is not a biological phenomenon but it reflects particular social, economic and traditional customs to which local people adhere (Acharya, 1993). Women are always ready to carry out household work, cooking, and feeding the family roles, no matter whether they are rich, poor, educated, uneducated, housewives or jobholders. The women in this research activity participated in household waste management activities, including shopping activities, shopping awareness activities in terms of prevention of waste and conservation of household environment sustainability. The role of women in organizing and separating of the waste at the household level for sustainability of the household environment showed significantly higher profile than did that of men in Palmerston North, New Zealand.

6.2.1 Participation in Shopping Activities by Gender

Household shopping activities affect the amount of waste produced in the household. Only 26 percent of the sample population were used to taking bags to the shopping centre. The results show on in Table 5.19, concern gender participation of shopping awareness activities such as taking their own bags to carry shopping, refusing plastic bags, buying organic food, and preferring recyclable containers. The results show also that not even 50 percent of the respondents use any of the shopping bags or containers in protecting the household waste environment or to reduce the waste materials at home mentioned above for purpose of environmental protection for the household. Regarding gender participation, more women (81%) consciously tried to purchase environmentally friendly goods, and women (24%) deliberately chose to buy articles and products for recycling. Furthermore, women showed also higher (68%) participation than men in usually taking shopping bags to the supermarket; likewise (62%) women bought organic goods whereas only a very low percentage (30%) of men usually go to organic food shops.

6.2.2 Participation in Recycling by Gender

There has been a significant increase in the amount of waste collected for recycling in Palmerston North since 1995 (PNCC Report, 2000). This study also shows a similar trend in the significance of the management of recycling as shown in the Figure, which has been organized to show each and every ward of the city.

The participation in recycling program in Palmerston North is significantly ($P<0.001$) satisfied in this research where women led the gender participation. This was affected by different socio-economic, educational, occupational and other environmental attitudinal behaviour. The ward-wise management of recycling materials in terms of good management of household waste differed significantly. The implications of these results are that the people in Palmerston North are quite happy to use the two recycling centers in the city. Furthermore, educational program (PNCC, 2000) indicate that they need more recycling centers in the city without charges so that people will use them more and thus reduce the city waste. Relevant research was conduct by Mobbs (1998) into sustainable waste management through recycling strategies in household recycling, waste energy recovery, waste disposal and the need to improve the recycling activity participation development in New Zealand.

6.2.3 Participation in Composting by Gender

Gender participation in household waste management practices was discussed in terms of composting in the study area. The role of gender in these regards appeared to be important in all wards. Garden composting, landfill problems and huge organic and inorganic waste produced in the wards was discussed. Women's participation in all wards led in organising the organic and inorganic waste materials, separation and composting activities. Women are more involved than men in composting activities. The people who are most conscientious about composting are in ward 1 (20%), where women's participation forms the higher percentage (73%) was in ward 6 as men have low levels of participation in every ward.

6.2.4 Participation in Dumping by Gender

The roles of gender and environmental household waste management and their implications for household structure, divisional ward-wise household waste management were discussed. Both men and women carried out certain management of waste organization in recycling, composting and dumping materials in the 6 wards in Palmerston North. This study is confirmed by the following gender impact in Environmental Waste Management in Palmerston North, New Zealand. Ninety-four percent of women were involved in wards 1 and 2, 96% in ward 5 and 80 % in ward 6 demonstrating as higher percentage of women participation by women.

6.2.5 Participation in Landfill by Gender

The Ministry for the Environment (1997) and Palmerston North City Council (1997) AGFIRST indicated that the use of the landfill and transfer station helped to minimize the refuse by reducing waste (11%) and reusing waste (32%). Further, the report stated that the waste entering the landfill has reduced to 20% by composting and 23 % by recycling. This result found that the proportion of the respondents who use a car was higher than who use a tailor. Furthermore, the result indicated that the female's participation was higher than males to use car trips to the landfill. Also the result examined the people of Palmerston North prefer car to landfill than tailor trips to take rubbish into the landfill and transfer station.

6.3 Demographic Impact on Environmental Household Waste Management

The results of this research influence the impact of demographic information such as age sex, gender, education and occupation in household waste management. This research are similar to the Inner Sydney Waste Board Community attitudes to waste minimization research (2000), where women were 54 percent and men were 46 percent involved in the waste minimization activities in Australia. This similar case is very

relevant in the case of age groups participation and the effects of educational attainment.

The demographic data for study participants were similar to the data for all residents in the Moricopa Country Waste Report (1997) where the males were underrepresented. No wonder women's participation is greater than that of men in waste activities in both Australia and New Zealand. A similar impact of economic incentives as shown in the results of a Swedish Municipality Waste Survey done by Sterner (1998) determined the recycling and composting. Similar results were obtained in this research in New Zealand as income level was shown to impact on household waste management in Palmerston North. Haque (1996) examined the issues in municipal waste management in rural Monitoba in Canada, 1996 and found that waste management was affected by social, economic and political factors, which is similar to results obtained in this research. Another survey result, Dennison *et al.*, (1996), indicated that household waste characteristics are influenced by the social, economic and demographic data for household waste generation in a socio economic based household survey in Dublin city, Ireland. The results of this research are similar to those of the earlier research.

6.3.1 Educational Impact on Environmental Household Waste Management

Chung (1998) point out that environmental issues in the area of waste reduction needed more education and publicity to introduce general idea of environmental issues and to the citizens of Guangdong, China where most of the population were not familiar with the new environmental paradigm such as environmental household waste. In the area of household waste recycling, support for source separation of household waste and waste recovery practices is found in counterparts of this research where most of the respondents were very familiar with the need household waste management. A survey by Simmons (1990:1) in New York, where a pilot-recycling programme was initiated, which made recycling of household waste mandatory showed. It was found that there was a great need for a comprehensive public education program on recycling

This research also investigated the extent to which residents have adopted household - level solid waste reduction activities, which was found to be similar to other cities. Still

the matter of kerbside recycling and separation of composting materials has not been picked up by the City Council. An impressive public recycling educational programme is needed to initiate householders and the public in awareness of recycling. The research results show that there is not much differences in the level of participation in waste management according educational status in the study area, Palmerston North. In terms of educational status the level of participation by women's is slightly lower than that of men. The higher proportions of respondents were in the educational category of primary and secondary level. There were fewer participants in the postgraduate levels. The educational programme provided to the public from the City Council in the study area is not very effective as shown in this research, even although the recycling programme was run as a campaign on radio, and in newspapers, booklets, newspapers and junk mail delivered both officially and personally.

6.3.2 Occupational Impact on Environmental Household Waste Management

The impact of environmental household waste management by occupational status in the household was discussed. The research results show that occupational status has a positive impact on the environment. Unemployed people show a more positive impact on sustainable environmental household waste management than do people of other occupational status. It was found that the occupation of the respondents has as association with their attitude towards waste separation and effective management of household waste. Unemployed respondents were significantly more highly involved in waste management as compared to technicians and professionals.

This research result is similar to a household survey conducted in China in terms of occupational status and household waste management. In China, Chung (1998: 46) found that most government officials represented in the survey were not in favor of household waste separation. A similar result to that obtained by Chung (1998) in this research, the per capita family income of the respondents was found to be associated with recycling in that people on lower incomes tended to recover a greater portion of their normal waste than the more wealthy respondents.

6.3.4 Socio-economic Impact on Environmental Household Waste Management

The results of this research also relate similar implications to the findings of Sterner *et al.*, (1999) which were directly affected by the demographic and socio economic factors. Further this research added in terms of the gender differences in participation role at household waste management. Regarding knowledge and impact in general, the respondents were knowledgeable about aspects of their environmental household waste management. The respondents were read a number of statements about the environment and the impact of people upon it. This research output is similar to the environmental awareness attitude survey conducted in Waikato (1998). They were asked whether they agreed or disagreed with each statement, but were unable to make a firm decision because of other factors. They may have considered that an answer depends on too many other factors to simply agree or disagree. Most of the results have been discussed in statistical methods, factor and corresponding analysis in chapter 5.

There is increasing public awareness that the environment cannot continue to absorb without proper waste disposal practices, which can create adverse environmental impacts either immediately or in the future. All sectors of the New Zealand community are becoming increasingly aware that all aspects of human activity impact to some degree on the environment (Ryan, 1994). This research shows conclusively that women are the major focus of activity in sustainable environment management development. Good environmental management by householders leads to more efficient energy and resource use, and waste minimization. As the people in the study area have shown that they are good managers of environmental household waste management in Palmerston North, New Zealand.

6.4 Conclusion

The research results demonstrated that represents the majority of residents in Palmerston North use proper management and purchase household material considered to reduce waste materials. The research results show the following

- Women's participation rate was found to be higher than that of men in managing household waste. Demographic characteristics appear to have a direct relation to gender and household waste management. There was a positive correlation between socio-economic status (education, occupation and economic class) and household waste management. The relationship between gender and household waste management was significant.

- The results of this research show that the Palmerston North city population generally feels that most aspects of the city environment are good and that their household waste is well separated and well managed. Most of the respondents ranked waste management roles played by gender issues as either *strongly agree* or *disagree*. There are very few people in the city who are not concerned about the environment in some way or who do not place importance on environmental issues both within and outside the households. It can be easily seen from the waste regression analysis model that mostly people are separating the recyclable materials in their households. They are very much concerned to organize their waste at the household level.

- Women make the decision to handle household waste to sustain better environmental conditions in most industrial countries such as New Zealand. This research also indicates that the women are more capable and make more concerted efforts to reduce, recycle and reuse more and more industrial materials.

This research shows that it is especially women who hold the key position in household waste management. There are several more complex issues in gender and household waste management over which the people of this city are concerned. The main points this analysis represents are that people are mostly satisfied with their household waste management practices and their efforts to protect the environment outside the household. Some of them they feel that Councils waste bag management is not acceptable and that not enough is being done about garden waste and wheeler bins. The public has several complaints about the management of these aspects and about stuff for recycling not being collected or being left to blow around the streets.

The most important issues facing household environments today in Palmerston North are landfill dumps and materials for recycling, which are being scattered on the roads. The facts that environmental household waste management and understanding of environmental issues are influenced by socio economic and demographic variables together with gender, age, ethnicity, income and educational level have been clearly shown in this research.

In conclusion, this research pointed that the socio economic and demographic factors influence the waste management environment within the household, and that woman play a greater role than men in managing the household waste in Palmerston North, New Zealand.

Chapter 7: Conclusions Policy Implications and Recommendations

7.1 Introduction

New Zealand's population comprises multicultural communities. Both men and women are involved in the household structure and household activities. Women in general are subordinate although New Zealand is a developed country, women's situation in here are no different then the rest of the developed world. Substantial gender differences are common in household waste management activities, in buying and reducing reusing and reordering waste materials at home. Gender activity and shopping awareness activities are quite different in women than in men

Household waste management in New Zealand was examined using socio economic and demographic characteristics to identify the influence of gender in the context of 6 different wards in Palmerston North. The role of gender in environmental household waste management and household activities across the different wards was examined in this research. A mail survey was conducted to obtain information from individuals in each household, who were requested to answer an environmental household waste questionnaire, which was aimed mainly at collecting information on various aspects of waste management. Household questionnaires were sent to eligible respondents by individual interview, and the information was collected also on age, sex and other variable compositions.

Due to the limited time and financial resources available, the study was confined to only the City of Palmerston North. The findings from this study should, therefore be interpreted carefully when generalizing to other parts of New Zealand.

7.2 Conclusions

The results of this research show that the Palmerston North City population generally feels that most aspects of the city environment are good and that their household waste is well separated and well managed. Most of the respondents ranked waste management roles played by each gender as either *strongly agree* or *disagree*. There are very few people in the city who are not concerned about the environment in some way, or who do not place importance on environmental issues both within and outside the household. It can easily be seen from the waste regression analysis model that most people are separating recyclable materials in the household. They are very much concerned to organize their waste at the household level.

Women have the decision-making power to handle household waste in accordance with the top environmental issues in most industrial countries such as New Zealand. This research also indicates that the women are more capable and concerned to make efforts to reduce, recycle and reuse more industrial materials, of which the quantities produced over- whelm even the best treatment and disposal systems.

There are more complex gender and household waste management issues about which the people of the city are concerned. The main point this analysis shows is that people are mostly satisfied with their household waste management practices and their efforts to protect the environment outside the household. They feel that the Council's waste bag management is not good enough in the area of garden waste and wheelie bins and the public has plenty to complain and suggestions about in this management. In this research, it can be seen that especially women hold the key position of the household in waste management.

The most important issues facing the household environment today in Palmerston North are landfills, dumps, and materials scattered in the roads. The understanding of environmental household management and environmental issues is influenced by perceptions which are related to socio -economic and demographic variables together with gender, age, ethnicity, income and educational level as shown in this research.

In conclusion this research suggested that socio economic and demographic factors influence the waste management environment within the household. Women play a major role in managing the household waste in Palmerston North, New Zealand. This means that it is not only the women in developing countries are bound to heavy load of the household work, but also this study shows that the women in developed countries also have the greater role in household work.

The result conclude in this research that:

1. Women's participation was found to be higher than that of men in managing household waste.
2. Demographic characteristics appear to have a direct relation to gender and household waste management
3. There is a positive relationship between socio-economic status (education, occupation and economic class) and household waste management.

7.3 Recommendations

A just, fair, non-violent, healthy and sustainable society cannot be attained without an awareness and commitment to protecting the natural environment. Both genders have unique contributions to preserving and protecting the sustainability of the natural environment. Household waste management on the basis of maintaining the environment at the household level as all householders both men and women take roles as managers of household waste.

The support of community and industry initiatives is also needed to build a good environment. People should encourage the use and development of natural and environmentally safe products foods pesticide residues and chemical additives. The use and development of reduce packaging, recycled and biodegradable packaging for consumer products needs to develop projects, which work for population abatement and control, and for environmental development. Some steps must be taken in this field very soon.

- Sustainability must be seen as a win- win situation
- The techniques of burning paper and plastic should be technologically improved.
- Community organic systems should be developed to reduce waste at the landfill.
- The concept of Consumption, Production and Disposal awareness should be developed by the City Council.
- The behaviour of people in waste management at the household level needs to be changed.
- A sustainability network to reduce waste and increase recycling, reuse and packaging should be developed nationwide.
- There is a need to create public awareness about living environment sustainability, and protection of the environment.

7.3.1 Administrative Recommendations

It is recommended that the Palmerston North City Council extend its current District Plan and policies to incorporate, wherever possible, front -of -line waste minimization options, while continuing with present services of collection and disposal of waste. The Respondents recommended the following to the Palmerston North City Council.

- The Council should give the option to separate different waste. Free transportation to the recycling depot and dumping site would be more practical for the public.
- The City Council should fold old cars and bicycles, which should be processed before being dumped.
- Bags should be provided in two sizes i.e. large and small, so that people can use whichever they need.
- The Council should supply wheelie bins instead of plastic bags.
- Because the city's rubbish service is provided for householders it is recommended that householders be supplied with the following:

  a. Green bags per number of bedrooms per house i.e.

  b. 1 bedroom, 1 bag per week –i.e.52 bags

  c. 2 Bed room 1 bags per week –i.e. 52 bags

d. 4 bed room 2 bags per week –i.e. 104 bags

e. 5-6 bedroom 3 bags per week –i.e. 156 bags

f. Also, a plastic bin should be supplied for recyclable plastics as is done in other areas in New Zealand.

g. Paper can be put in plastic shopping bags: kerbside recycling is excellent.

h. Many householders rely on burning rubbish; kerbside recycling rubbish collection is missed during holidays. Glass collections at in the kerbside would be good for householders.

- The City Council needs to provide free vehicles to dump garden and other waste.
- A standard system for bags should be provided so that other manufacturers and users could choose when and what they burn. At present the Council runs a closed monopoly excluding alternatives.
- There should be a better system for getting rid of large garden waste.
- Trailer loads are expensive at the transfer station. The recycling depot should be regularly used, and also the refuse collection for paper and glass should take place on weekly refuse days.
- The City Council needs to provide wheelie bins for recycling, as well as bins for bottles, paper, glass, and kitchen waste.
- The City Council needs to organize more roadside collections and provide wheelie bins instead of plastic bags because animals get into bags far too easily and leave a mess.
- The Council should inform people through the mail of what can, and what cannot be recycled, what schemes are currently available for recycling etc.
- Bags of recyclable materials are sometimes collected. Providing different bags or collecting all types of rubbish would encourage people to practise waste management. More information should be provided to households on how to recycle, and the consequences of not recycling.
- The Council should establish a set of recycling spots in the neighbourhood.
- Branches unsuitable for composting could be given to a neighbour who uses firewood.
- Experience shows a lack of knowledge by Council staff about what to do with polystyrene mouldings etc. This should be addressed, as this product does not break down. Problems may occur with its disposal.

- When taking green matter and bottles only to the transfer station, the householder should be charged less to encourage greater use of this facility.
- Deposits on glass bottles should be re-introduced -also on all cans. Bring back milk in glass bottles.
- Recycling packaging should be provided at point of sale, like short packaging shoeboxes etc.
- Lots more conveniently placed recycling depots or bins are needed. Use a hole in the wall style.
- Find uses for the plastics not currently recycled. Award grants to people to find uses.
- Promote schemes for people to put out things they don't want and for others to help themselves--encourage reuse before recycling.
- Real Estate Agents could provide additional information about recycling in their advertising.
- Plastic containers from take-away places should be recyclable. All plastic packaging that is not recyclable should be banned.
- Appoint a City Council representative (and a different section) to see the environmental management in Palmerston North.
- Place an article in weekly newspaper outlining the Council's current recycling schemes e.g. Aluminium, plastic bottles, cardboard, milk cartons, where the respective recycling centres are (if not collected).
- Need more knowledge about for recycling and environmental management. Would like more education or recycling basic refresher courses.
- Plastic recycling should be collected weekly; there should be a nominated rubbish day for glass plastic/ cans/ paper. More frequent rubbish collection makes the city clean.
- Provision of a bin convenient for separation of materials for recycling. Also something to put at the kerb for collection especially on wet days for paper etc. Free visit should be arranged to tip for compost pick up.
- Wellington City Council offers a green land allowing a reduction in cost for those using the rubbish tip. This system could be followed to Palmerston North and other cities.
- More recycling drop points at supermarkets and other convenient spots.

- More information could be offered about how recycling works. Newcomers to the city need to know.
- No matter what the council decides to do the ratepayers will always end up paying the bill and the rubbish truck will always leave a certain amount of rubbish. People put out their rubbish bags on the footpath at night. The number of rubbish bags that are distributed every year would increase drastically. Convenience of the recycling centre is the key.
- Have fortnightly rubbish pick up, limit the amount of rubbish being picked up (2 bags per household). Increase free at the transfer station. Keep pickup of recycled goods by council fee. More Council provided recycling bins for no, or small, cost to all households would be an advantage.
- Kerbside recycling bins should be free. Recycling needs more recycling centres, which are open during the evening. Environmentally friendly and sustainable waste management system needs to start in Palmerston North.
- Bottles and can container should be placed in each ward.
- There is a need to developed compulsory environmental management courses at schools colleges and Universities.
- Recycling and waste management concepts need to develop through neighbourhood groups.
- Environmental information needs to be highlighted in public places.
- Environmental education can be extended through the media
- Hazardous waste needs strong bags and wheelie bins are needed for garden waste.
- Have separate wheelie bins for recycling papers bottles and glass, and have another wheelie bin for rubbish. Entrance to the landfills should be free.
- More information on weekly pickups is needed to attract attention through advertising.
- Encourage home composting.
- Encourage more recycling
- Householders should be encouraged to separate waste.
- Hazardous waste and garden waste needs separate strong bags and wheelie bins.
- Paper bags are preferable to plastic. Depending on the size of the average family 52 bags are not enough for a year. More bags provided by City Council mean

less recycling at home. Articles left out for kerbside recycling can become scattered around street and properties. People need more education concerning these problems.

- Bags can leach contents and bottles are frequently found in litter.
- Separate council rates for rubbish removal might prove attractive

7.4 Policy Implications

Gender must be incorporated into household waste management policies. This action will require consultation and co-operation with all the major sources of awareness and educational programmes in the waste management development process namely by the government and private sector, and civil authorities including trade unions, non-governmental organizations (NGO's) and international networks. The member of the household, who handles waste, men or women, is the major basic source of waste management in the household and within the community.

Action must be taken to ensure that all householders are made aware of the significance of gender for the development of waste management and its positive impact on landfill development. Gender division of labour, and differential access to resources vary access the countries, therefore careful assessment and analysis are required to understand the specifics, of how gender and social structures will affect household waste management development in any particular context.

7.4.1 Ways of Incorporating Gender Awareness in Recycling

A comprehensive public awareness recycling education programme is needed to provide both information and models to encourage practices, which produce less waste. For example public institutions, schools and service organizations could make a concerted effort to provide positive men's and women's role models of waste management practices in the city. Printing on both sides of paper, using recycled paper and providing reusable cups rather than disposable could develop environmental

awareness. To encourage people in recycling labels could be attached to products on grocery shelves indicating when recyclable packaging has been used and suggesting alternative non-throwaway products when applicable.

As recycling becomes a practice that is well integrated into daily activities and the pressures on an already overburdened waste disposal system increase, residents will be looking for creative ways of reducing the amount of solid waste they generate. They will need concrete, visible examples of alternative practices and behaviour patterns and a strong public education programme can provide these examples. The current recycling provisions are inadequate for the size of population they are serving.

- The existing drop -off centres need to be either transferred to strategic locations or upgraded on their present sites. They need to be located in such a way as to be convenient for the majority of users, especially as there is large number of people without private transport in the Palmerston North area. Locations should include areas of maximum public exposure such as schools, shopping centres, sporting venues, etc. Such sites are relatively easily supervised.
- The council should look to introduce a combination of kerbside and drop-off centres for recycling. This will accommodate all domestic user needs and ensure the highest possible participation rate.
- The council could increase the number of bags while continuing to distribute an annual quota of 52 rubbish bags per household. However, this should be done in conjunction with encouragement to use kerbside recycling. A new charging base, whereby people are charged on the basis of the volume or weight of non-recyclable or unsorted waste, needs to be introduced. Such a scheme will give an incentive for reduction in the number of bags used.
- Appropriate publicity of significant reductions in waste will also encourage people and help to make them aware of the importance of their contribution to an improved local environment.
- The Council should adopt in-house waste reduction and recycling policies and practices, which will include the reuse, and recycling of paper. It should support companies that use or produce recycled goods, either through direct grants or by exercising preferential purchasing powers.

- The council should look to extending its recycling schemes to the commercial sector. The amount of paper waste being produced by this group (one average bag per week per householder of rubbish has been taken to the landfill) is of a sufficient quantity to make this extension of council services feasible.
- The council should encourage both commercial and industrial recycling by the provision of a recycling hotline, which facilitates the transfer of waste.
- Like-wise the council should encourage institutional recycling by extending its kerbside scheme to the local schools and hospitals.
- It is essential that information services be provided, and that there be on-going publicity and environmental education campaigns to increase public awareness and ensure maximum participation in recycling schemes. Special efforts need to be made to effectively communicate with ethnic minority groups. These need to be two-way processes, which should involve close consultation.

7.4.2 Ways of Incorporating Gender Awareness in Composting

- A well-organized composting programme needs to be promoted amongst Palmerston North householders. New designs and techniques are needed for Palmerston North people to use the divided bin and bags. The recycling centre needs to be extended in different places for freely disposable materials. Householders should increase garden composting, to solve the landfill problem
- Providing free green waste bins and organic waste wheelie bins should reduce the huge production of organic materials.
- Composting and recycling facilities should be free so that more and more people can use free composting and recycling.
- Educational booklets should be provided door- to -door to raise awareness about composting.
- Alternative booklets are needed for young generations of New Zealanders by pushing awareness attitudes for composting and recycling.
- School programmes need to encourage environmental awareness among school-children.

- The program promoting recycling and composting to the householders, business centres, schools and the industrial sector should be continued by promoting major commercial composting systems.
- Managing composting and recycling in Palmerston North, New Zealand should encourage a multinational waste management industry.
- Zero waste programmes run by Massey University should be extended to the city.
- Waste-wise organized Recycling School Programme should be designed to create an awareness of waste and help schools improve their knowledge and understanding of ways they can reduce their own general waste, especially their own organic waste.
- Once the facility has been established, the Palmerston North City Council should consider using low-grade compost produced as an alternative covering to clean fill. Sewage sludge from the mill screening could be utilized as a component of this low-grade compost. The close proximity of the two-landfill areas will enable the sharing of this resource with minimal transportation cost.
- Garden waste skips should be provided at recycling depots and be regularly taken to the composting facility. The frequency of removal should be increased during Spring/Summer months. An extensive public awareness campaign should be launched to encourage both home composting and the use of these facilities.
- The council should look into providing composting bins to the public at a reduced price.

7.4.3 Ways of Incorporating gender Awareness in Dumping and Landfill

Use of the landfill system should be encouraged by new techniques and forming the habit of using landfill. The current landfill practice is acceptable by national standards; but there are some administration and management areas where change is needed. The following recommendations are made on the basis of the respondents' recommendations.

- Reduce the entry charge for ratepayers to the landfill.

- Recycling Schemes must be in place prior to the user charge being introduced so that those alternatives are available.
- Charges should be regionally consistent.
- Recycling facilities at the landfill need to be up-graded. This would boost collection rates and reduce material contamination. Users of the landfill need to be informed of the new facilities and charging rates through a variety of means that are culturally acceptable (especially regarding charges). Again, all possible avenues of education and communication should be explored.
- Dumped refuse is currently not being covered due to an insufficient supply of clean fill. Low-grade compost could be used either as a substitute or as an additional source of covering when the composting facility is up and running.

7. 5 Suggestions for Further Research

One of the challenges, which have been faced in the development field, is environmental management and how to encourage the participation of both genders in this area. Not only in the natural resources do women remain the pillars of the waste management sector, which is not acknowledged yet they are playing a key role also in the household waste management. The research has been proved that women can play an important role to sustainable environmental management from the household to community and national levels

There is a need to understand the nature and extent of men and women's participation in environmental waste management development programmes. It is important, for example to examine the differential impact of recycling, composting and dumping related to new technology being handling by men and women in different socio-economic and demographic characteristics aspects. This assessment should be with respect to educational status, occupational status and employment status as well as use of natural resource in the household and community.

As this study focussed only on Palmerston North, in New Zealand, the findings may not be fully applicable to other part of New Zealand especially, in rural areas, where

different socio economic and environmental awareness exists within households. Similar research for rural and other urban parts of New Zealand is recommended thus ensuring a comprehensive understanding of the gender roles in environment household waste management. This will help to ensure that gender-based policy planning works properly not only in New Zealand but also throughout the world.

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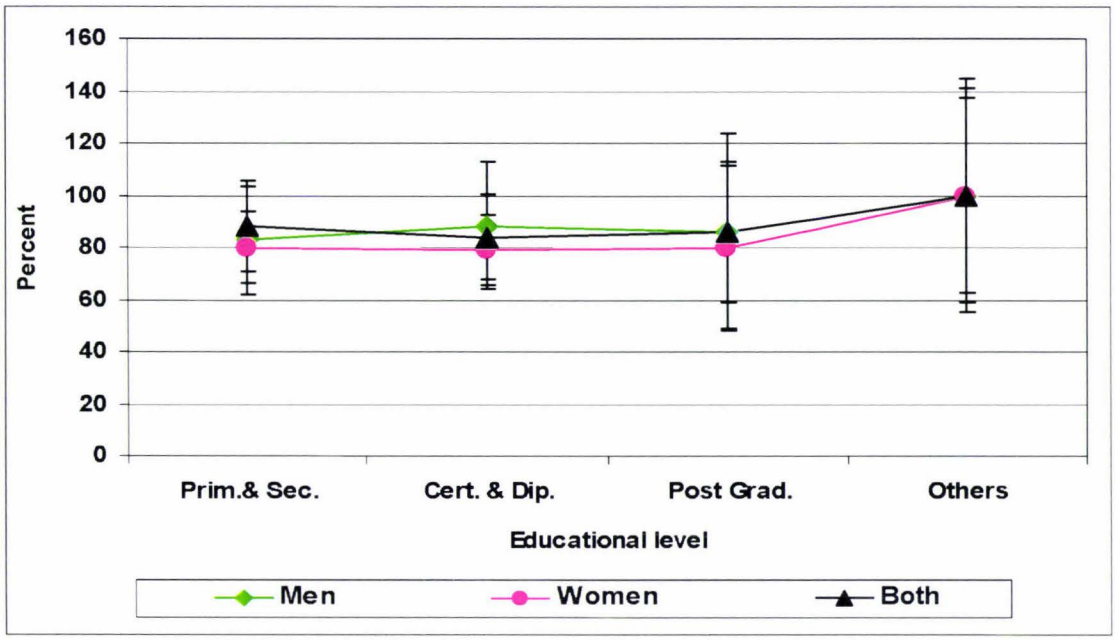
APPENDICES

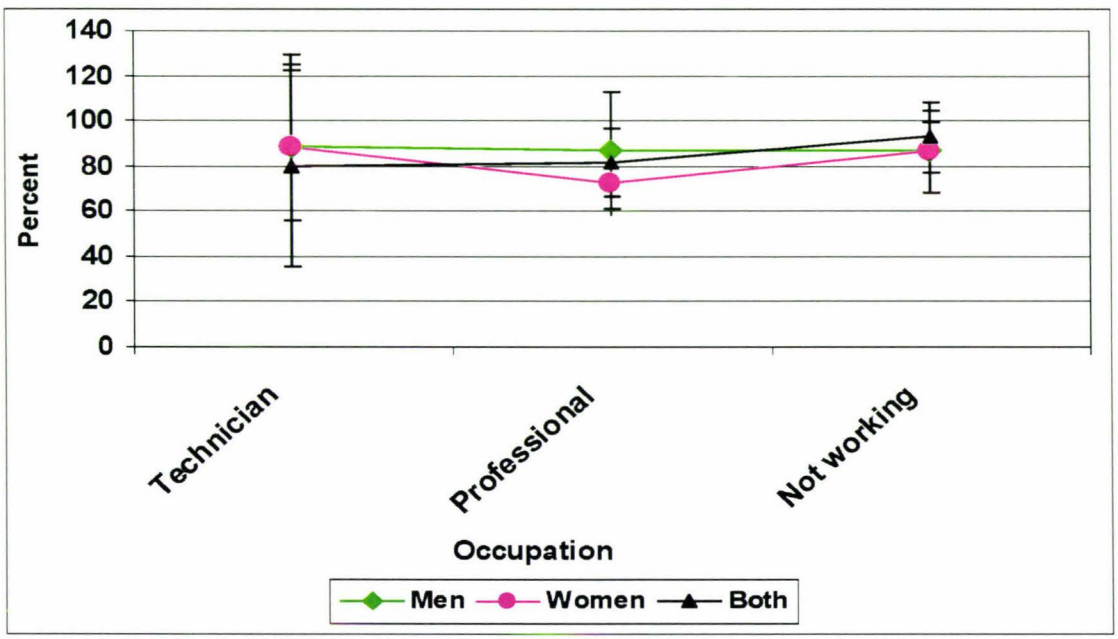
Appendix I

Figure 5.15 Gender differences in household waste management by education



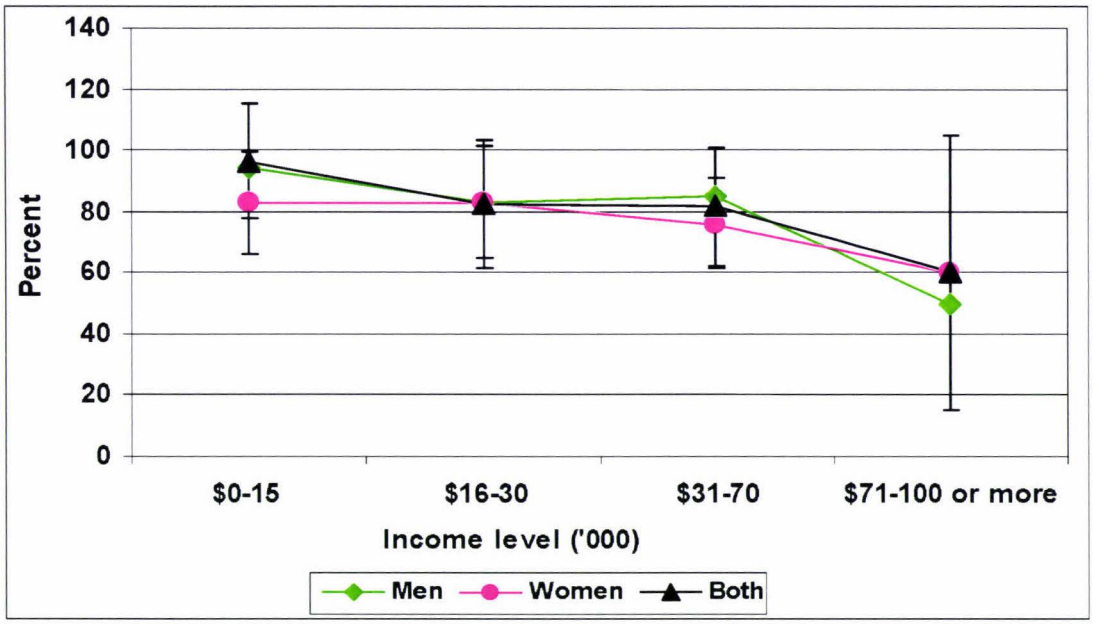
Source: Household Mail Survey, May 2000

Figure 5.16 Gender differences in household waste management by occupation



Source: Household Mail Survey, May 2000

Figure: 5. 17 Gender differences in household waste management by income



Source: Household Mail Survey, May 2000

A sample frame illustrating samples drawn by from Systematic Random Sampling (SRS) is shown in Table (3 2).

Table 3.2 Sampling Frame: Papaioea Ward

Ward	SRS	Systematic sample	Street Address of Household occupant	SRS	Systematic sample	Street Address of Household occupant
Papaioea Ward	1	1	Starting hh from	26	26	*
	2	2	17 Abraham	27	27	*
	3	3	Crescent	28	28	*
	4	4	*	29	29	*
	5	5	*	30	30	*
	6	6	*	31	31	*
	7	7	*	32	32	*
	8	8	*	33	33	*
	9	9	*	34	34	*
	10	10	*	35	35	*
	11	11	*	36	36	*
	12	12	*	37	37	*
	13	13	*	38	38	*
	14	14	*	39	39	*
	15	15	*	40	40	*
	16	16	*	41	41	*
	17	17	*	42	42	*
	18	18	*	43	43	*
	19	19	*	44	44	*
	20	20	*	45	45	*
	21	21	*	46	46	*
	22	22	*	47	47	To
	23	23		48	48	26.Wood field
	24	24		*	*	Avenue
	25	25		6671	160	

Note: Numbers **11,15,19**, and **47....160** are the sample size. The population followed by number random number 4 where 11 are the random starting points. The first 10 numbers of the households were left as an entry point of the sample households in Papaioea ward. 25159/6670= 3.77 or round number 4 followed the method.

Table 5.23 Ward-wise Gender Percentage Participation on Recyclable Materials in Palmerston North

Ward	Waste is well managed in household	Female %	Male %	Total
1	Yes	75	25	52(20)
	No	46	54	13(5)
2	Yes	89	11	46(17)
	No	100	0	7(3)
3	Yes	96	4	49(18)
	No	64	36	11(4)
4	Yes	100	0	6(2)
	No	0	0	0(0)
5	Yes	86	15	55(21)
	No	60	40	10(4)
6	Yes	80	20	15(6)
	No	100	0	2(0.7)
Total Number		183	83	266

Source: Household Mail Survey, May 2000

Table 5.24 Ward-wise gender percentage participation on compostable materials in Palmerston North

Ward	Waste is well managed in household	Female%	Male %	Total Number
1	Yes	54	46	52(20)
	No	39	62	13(5)
2	Yes	63	37	46(17)
	No	100	0	7(3)
3	Yes	55	45	49(18)
	No	27	73	11(4)
4	Yes	83	17	6(2)
	No	0	0	0(0)
5	Yes	69	31	55(21)
	No	60	40	10(4)
6	Yes	73	27	15(6)
	No	50	50	2(0.7)
Total Number		183	83	266

Source: Household Mail Survey, May 2000

Table 5. 25 Ward-wise gender percentage participation in rubbish dumping in Palmerston North

Ward	Waste is well managed in household	Female %	Male %	TotalNumber
1	Yes	94	6	52(20)
	No	85	15	13(5)
2	Yes	94	7	46(17)
	No	71	29	7(3)
3	Yes	94	6	49(18)
	No	91	9	11(4)
4	Yes	83	17	6(2)
	No	0	0	0(0)
5	Yes	96	4	55(21)
	No	100	0	10(4)
6	Yes	80	20	15(6)
	No	50	50	2(0.7)
Total Number		183	83	266

Source: Household Mail Survey, May 2000

Table 5.26 Ward wise Dependent Variable: LOGDUMP

	Mean	95% Confidence Interval	
Ward		Lower Bound	Upper Bound
1	0.91	0.74	1.11
2	0.96	0.72	1.27
3	1.16	0.94	1.43
4	1.14	0.67	1.97
5	3.55	1.49	1.33
6	1.16	0.46	1.60

Based on modified population marginal mean.

Table 5.27 Expected Value of Gender Waste Separation

Education Level	Gender wise waste separation in household			Total
	Men (%)	Women (%)	Both(%)	
Secondary	23(21.6)	50(48.9)	33(35.5)	106(106.0)
Certificate	12(13.9)	36(31.4)	20(22.8)	68(68.0)
Graduate	5(8.2)	19(18.5)	16(13.4)	40(40.0)
Post graduate	7(6.1)	9(13.8)	14(10.0)	30(30.0)
Other	6(3.3)	6(7.4)	4(5.4)	16(16.0)
Total	53(53.0)	120(120.0)	87(87.0)	260(260.0

Source: Household Mail Survey, May 2000

Table 5.28 Educational Attainment and waste separated in household by age, cross tabulation model.

Waste separated in household				
Age	**Education**	**Yes(%)**	**No(%)**	**Total(%)**
15-25	Secondary	5(71)	2(29)	7(3%)
	Certificate or Diploma	3(60)	2(40)	5(2)
	Bachelor	10(77)	3(23)	13(5)
	Postgraduate Degree	4(100)	0(0)	4(1)
		22(76)	**7(24)**	**29(11)**
26-35	Secondary	7(41	10(59)	17(6)
	Certificate or Diploma	15(88)	2(12)	17(6)
	Bachelor	7(88)	1(12)	8(3)
	Postgraduate Degree	4(67)	2(33)	6(2)
	Others	3(75)	1(25)	4(2)
		36(69)	**16(31)**	**52(19)**
36-45	Secondary	21(78)	6(22)	27(10)
	Certificate or Diploma	18(100)	0(0	18(7)
	Bachelor	8(89	111)	9(3)
	Postgraduate Degree	2(100)	0(0)	2(0.75)
	Others	2(100)	0(0)	2(0.75)
		51(88)	**7(12)**	**58(22**
46-55	Secondary	14(88)	2(12)	16(6)
	Certificate or Diploma	13(81)	3(19)	16(6)
	Bachelor	4(80)	1(20)	5(2)
	Postgraduate Degree	11(85)	2(15)	13(5)
	Others	3(100)	0(0)	3(1)
		45(85)	**8(15)**	**53(20)**
56-65	Secondary	18(95)	1(5)	19(7)
	Certificate or Diploma	7(88)	1(12)	8(3)
	Bachelor	2(100)	0(0)	2(0.75)
	Others	3(100)	0(0)	3(1)
		30(94)	**2(6)**	**32(12)**
Over 65	Secondary	19(95)	1(5)	20(8)
	Certificate or Diploma	6(100)	0(0)	6(2)
	Bachelor	4(100)	0()	4(2)
	Postgraduate Degree	5(83)	1(17)	6(2)
	Others	6(100)	0(0)	6(2)
		40(95)	**2(5)**	**42(16)**
	Total	**224(84)**	**42(16)**	**266**

Source: Household Mail Survey, May 2000

Table 5.29 Total Variance Explained, Extraction Method: Principal Component Analysis.

Component	Initial Eigenvalues	% of Variance	Cumulative %	Extraction Sums of Squared Loading	% of Variance	Cumulative %
1.Waste is well managed in my household	2.681	20.625	20.625	2.681	20.625	20.625
2.I do not regularly recycle goods	1.513	11.638	32.263	1.513	11.638	32.263
3 I would like to regularly recycle goods	1.358	10.445	42.708	1.358	10.445	42.708
4.I do not regularly compost	1.272	9.784	52.492	1.272	9.784	52.492
5. I would like regular rubbish collection from household	1.063	8.176	60.668	1.063	8.176	60.668
6. Gender play an important role in the management of waste in my household	.912	7.013	67.681			
7 In my household men plays important role in protecting the environment	.861	6.621	74.302			
8. In my household women play a major role in protecting the environment	.748	5.752	80.054			
9 Entrance costs to landfill and transfer station in PN are excessive	.666	5.126	85.181			
10 A weekly collection of household waste is frequent enough	.628	4.832	90.013			
11 Provision for recycling at the landfill or transfer station in PN is inadequate	.518	3.988	94.001			
12 The Government should initiate ideas for efficient household waste management	.441	3.391	97.392			
13 I think about the waste created by a product before buying	.339	2.608	100.000			

Source: Household Mail Survey, May 2000

Table 5. 30 Component Coefficients (Eigenvectors) of waste management variable

	PRIN1	PRIN2	PRIN3	PRIN4	PRIN5	
Y1	0.411648	-.166645	0.109438	0.008589	-.326448	waste wellma
Y2	-.425092	0.306454	0.062091	-.067210	0.276390	donot_recycle
Y3	0.353196	-.185877	0.160798	-.171060	0.422897	like_recycle
Y4	-.373239	0.238319	0.138471	0.242371	0.013777	donotreg_comp
Y5	0.227746	0.111747	0.387951	0.294047	0.447841	likereg_rubbcoll
Y6	0.056992	0.559362	0.280912	0.190025	-.032698	gendplay_immprole
Y7	0.121833	0.183479	0.373674	-.530412	-.196231	menplay_majroltoproenv
Y8	0.149385	0.370734	0.204110	-.096907	-.466390	womplay_majroletoproenv
Y9	0.042918	0.255934	-.498992	0.041665	-.152333	entcost_excessiv
Y10	0.305762	0.039991	-.105079	0.602259	-.109255	wklycoll_hhwastenogh
Y11	0.150835	0.291809	-.458459	-.145789	0.100839	recycling_inadequat
Y12	0.260563	0.294361	-.232776	-.309541	0.352584	govtinidea_effcnthwman
Y13	0.327928	0.227124	-.063419	0.112168	0.103565	wastcrea_bebuy

Table 5.31 Visit Recycling Depot and Waste Well Managed in Palmerston North New Zealand.

Contingency Table

	Strong_agree	Mod_agree	Less_agree		
Weekly	18	27	41		
Fort_night	28	26	31		
Monthly	24	28	24		
Yearly	25	19	35		
Dont_know	26	19	19		
Sum	121	119	150		
	Neithagre_nordis	Less_disagre	Mod_disagre	Strongl-Disage	Sum
Weekly	0	10	5	0	101
Fort_night	3	8	5	0	101
Monthly	11	8	5	1	101
Yearly	9	9	2	2	101
Dont_know	12	14	7	5	102
Sum	35	49	24	8	506

Chi-Square Statistic Expected Values

	Strong_agree	Mod_agree	Less_agree
Weekly	24.1522	23.7530	29.9407
Fort_night	24.1522	23.7530	29.9407
Monthly	24.1522	23.7530	29.9407
Yearly	24.1522	23.7530	29.9407
Dont_know	24.3913	23.9881	30.2372
	Neithagre_nordis	Less_disagre	Mod_disagre
Weekly	6.9862	9.7806	4.7905
Fort_night	6.9862	9.7806	4.7905
Monthly	6.9862	9.7806	4.7905
Yearly	6.9862	9.7806	4.7905
Dont_know	7.0553	9.8775	4.8379

Table 5.32 Inertia and Chi-Square Decomposition of waste management in Palmerston North, New Zealand.

Singular Values	Principal Inertias	Chi-Squares	Percents	14 28 42 56 70
0.25918	0.06717	33.9904	71.78%	**********
0.11021	0.01215	6.1461	12.98%	*****
0.10120	0.01024	5.1825	10.94%	****
0.06343	0.00402	2.0359	4.30%	**
	0.09359	47.3549 (Degrees of Freedom = 24)		

Row Coordinates	Dim1	Dim2
Weekly	0.357953	-.102016
Fort_night	0.175844	0.069982
Monthly	-.099408	0.181808
Yearly	-.023660	-.048636
Dont_know	-.406703	-.100147

Column Coordinates	Dim1	Dim2
Strong_agree	-0.06967	0.05001
Mod_agree	0.10623	0.10132
Less_agree	0.23628	-0.07591
Neithagre_nordis	-0.62387	0.14786
Less_disagre	-0.13510	-0.15659
Mod_disagre	-0.11612	-0.01869
Strongl-Disage	-1.05151	-0.47205

Table 5.33 Table of Inertia for visits to the recycling depot

OBS	_TYPE_	TIME	INERTIA	DIM1	DIM2	CONTR1	CONTR2
1	INERTIA		0.09359	.	.	0.06717	0.01215
2	OBS	Weekly	0.31028	0.35795	-0.10202	0.38073	0.17102
3	OBS	Fort_night	0.10701	0.17584	0.06998	0.09188	0.08048
4	OBS	Monthly	0.10140	-0.09941	0.18181	0.02936	0.54318
5	OBS	Yearly	0.08882	-0.02366	-0.04864	0.00166	0.03887
6	OBS	Dont_know	0.39250	-0.40670	-0.10015	0.49636	0.16645
7	VAR	Strong_agr	0.04893	-0.06967	0.05001	0.01728	0.04923
8	VAR	Mod_agree	0.07189	0.10623	0.10132	0.03951	0.19877
9	VAR	Less_agree	0.21819	0.23628	-0.07591	0.24638	0.14062
10	VAR	Neithagre_	0.32969	-0.62387	0.14786	0.40077	0.12450
11	VAR	Less_disag	0.05145	-0.13510	-0.15659	0.02631	0.19548
12	VAR	Mod_disagr	0.05531	-0.11612	-0.01869	0.00952	0.00136
13	VAR	Strongl-Di	0.22455	-1.05151	-0.47205	0.26023	0.29004

Table 5.34 Correlation among the waste_management variables, gender_waste variables, and between the waste_management and gender_waste variables.

Correlations Among the waste_management	WWMH	IRRG	IWLRRC
WWMH	1.0000	0.2120	0.1626
IRRG	0.2120	1.0000	0.2276
IWLRRC	0.1626	0.2276	1.0000

Correlations Among the gender_waste	GPIR	WCHWE	GIEHWM
GPIR	1.0000	1.0000	0.0940
WCHWE	1.0000	1.0000	0.0940
GIEHWM	0.0940	0.0940	1.0000

Correlations Between the waste_management and the gender_waste	GPIR	WCHWE	GIEHWM
WWMH	-0.0247	-0.0247	0.2297
IRRG	-0.0120	-0.0120	0.0494
IWLRRC	0.1890	0.1890	0.149

Appendix II

ACRONYMS

CBD= Convention on Biological Diversity

CIDA = Canadian International Development Agency.

DCC = Dunedin City Council

EIA = Environmental Impact Assessment

EXCEL = Excellence Microsoft Word Excel

GAD = Gender and Development

GEF = Global Environment Facility

HCC = Hazardous Control Commission

Hh = Households

HSNOA =Hazardous Substances and New Zealand Act

HWM = Hazardous Waste Management

ICIMOD = International Center for Integrated Mountain Development

IMO = International Maritime Organization

MFE = Ministry for Environment

MOWF = Ministry of Women's Affairs

MSW = Ministry of Social Welfare

NGO = Non-governmental Organization

NSCC = North Shore City Council

NZ = New Zealand

NZODA = New Zealand Official Development Aid

OECD = Organization of Economic Co-operation and Development

OECED = Organization of Economic Co-operation and Environment Development

PN = Palmerston North

PNCC = Palmerston North City Council

PPP = Public Private Parternership

RMA = Resource Management Act

SAS = Statistical Analysis Software

SDC = Selwyn District Council

SIA = Social Impact Assessment

SM = Sampling Frame

SPM = Sustainable Project Management

SPSS/PC = Statistical Packages for Social Science Programs in Computer.

SRS = Stratified Random Sampling

TDC = Tararua District Council

UAC = Uniform Annual Charge

UK = United Kingdom.

UN =United Nations

UNCED = United Nations Conference on Environment and Development

UNDP = United Nations Development Programs

UNIFEM = United Nations

USA = United States America

USAID = United States America International Development

WCC = Wellington City Council

WCED= World Commission on Environment and Development

WDC =Wanganui District Council

WID = Women in Development

WMI = Waste Management Institute

WMINZ = Waste Management Institute New Zealand.

WSNZ = Waste System New Zealand

Appendix-III

ABBREVIATION OF THE VARIABLES

ADB= Animals Damaging Bags.

ARPC= Aware of Recycling Program in the City

BBT= Bags Burning or Tearing

BGOS= Buy Goods in Organic Shops

BR = Building Rubble

BRG= Burn Rubbish in the Garden

BSS= Bag Small Size

CA= Car Trip

CDBAPR= Choice, Deliberately, buy Articles and Products Recycled.

CDF= Cars Disposal Fees.

CPEFG= Consciously Try to Purchase Environmentally Friendly Goods.

CPWM= Children Participated in Waste Management

EWPHH= Estimation of Waste Produced in Household

G = Garden

GA = Garden Cutting

GIHWM= Government should Initiate Ideas for Efficient Household Waste Management

GPIR= Gender Plays Important Role

GSWHH =Gender wise Waste Separation in Household

HC= Home Composting

HW = Household Waste

ILMCF= Interested Learning more Composting in Future

IN= Incinerator

K = Kitchen

LC = Land Composting

LECPE =Landfill Entrance Cost is Excessive

LRRC= Like to Regularly Rubbish Collection

LRRG= Like to Regularly Recycle Goods

LTT =Large Truck Trip

MPIR= Men Play Important Role

MW = Metallic Waste

NEBPCC= Not Enough Bag Provided by City Council

NRC = Not Regularly Composting

NRG= Not Regularly Recycle Goods

OS= Other State.

OS= Other States

P = Paper

Pl = Plastic

PPCCRR= Prepared Pay to City Council Rubbish or Recycling.

PPCS= Prepare pay Composting Scheme

PRPNI= Provision for Recycling in Palmerston North is Inadequate

RB= Rubbish Bag

RCM =Rubbish Collection Missed

RDR= Reason Don't Recycling

Reduce Waste Prefer to Buy Recyclable Goods even if Expensive.

RLTSLY = Rubbish to the Landfills or Transfer Station Last Year.

RRHHW= Regularly Recycle Household Waste

RRM= Regularly Recycle Material

RVD= Regularly Visit Depot.

RWBEGRC= Reduce Waste buy Expensive Goods or Recycling Container

SBBOW= Separate Bags/bins for Organic Waste.

SHHWM= Suggestion Household Waste Management

SOIWHH= Separate Organic Waste in the Household

SRC= Spillage Rubbish During Collection

STT= Small Truck Trip

TA= Trailer Trip

TWCPBB= Think about the Waste Created by a Product before Buying it

UMOW= Usually Managed Organic Waste

UTLTS= Usually Take Rubbish to the Landfill and Transfer Station.

UTSBSM= Usually Take Shopping bag to Supermarket

UUDCN= Usually Use Disposable Children's Nappies.

UVPBPG= Usually Refuse Plastic Bags for Purchased Goods

WAECEM= Actively Educate Children in Environment Waste Management

WB= What Material Burned

WBUHH= Wheeler Bins used in the Household

WCHWE= A weekly Collection of Household Waste is Frequent Enough

WHUF= Wheeler Bins Used for

WMC= Waste Mostly from Composting

WMCo= Waste Mostly from Cooking

WMHC= Waste Mostly from house cleaning

WMR= Waste Mostly from Recyclable

WMWB= Waste for Managing Waste Baskets

WPIR= Women Plays Important Role

WSHH= Waste Separated in Household.

WTRO= Waste for Taking Rubbish out

WUERHHW= Usually Encourage to Reduce Household Waste

WUOWHH= Who Usually Organize Waste in Your Household

WUWD= Waste from Purchase Items with Less Packaging

WUWL= Waste Usually from Washes Dishes

WWMH= Waste Well Managed in Household

WWMHH= Waste is well Managed in Household.

DEFINED VARIABLES IN SPSS ANALYSIS

adb = Animals damaging bag

age = Age

ahw = All household waste

almunium = Aluminum

arpc = Aware of recycling program run in the city

batterie = Batteries

bbt = Bags burning or tearing

bgos = Buy goods in organic shops

b r= Building rubble

bss = Bags small size

can = Can

cardbmil = Cardboard milk

caryn = Car to land fill

cdbap = Choice deliberately buy articles and products for recycle

cdf = Cars disposal fees

cdpef = Consciously try to purchase, environmentally friendly goods

compo = Compostable Materials

cpg = Compost pit garden

cpwm = Children Participate in waste management

ct = Car trip no of times

dewel = Dewelling Owned or rented

dk = Don't know

dybrg = Do you burn rubbish in garden

eco = Ecological group

eco2 = Economic status Res1 = Residual

edu = Education

edu2 = Educational attainmentethic2 = Ethnic Group

entomolo = Entomology Society

ethnic = Ethnic

femalead = Female adult

femalech = Number of female children below 18

garden = Garden

geiehwm = Government should initiate ideas for efficient household waste management

glass = Glass

greypowe = Grey power

grnpce = Belongs to green peace

group = Environmental Group belongs to

gswhh = Genderwise waste separation in household

hhwm = Suggestion household waste management

housestr = Household Structure

hw = Household waste

id = Identity

idrc = I don't regularly compost

ilmcf = Interested to separate organic waste in future

in = Insinkarator

income = Annual income

irrg = I would like regularly recycled goods

iwrrc = Gender plays important role

kitchen = Kitchen

lc = Land composting

lece = Landfill and transfer station entrance is excessive

ltt = Large truck trip no of time

magazine = Magazines

maleadul = Male adult

malech = Number of male children below 18

mowhc = Usually manage organic waste home composting

mp = Mainly plastic

mpir = Men plays important role

mpw = Mainly paper waste

mw = Metallic waste

nebpdcc = Not enough bag provided by city Council

nsoco = Name of the society

nzhpt = New Zealand historical places Trust

occup2 = Occupational status

occupa = Occupation

ot = Other

ote = Other

others = Other

otho = Other

paper = Paper

papers = Papers

plastcb = Plastic Bottles

plastiba = Plastic bags

plastic = Plastic

ppccr = Prepare to pay cc to separate rubbish or recycling

ppcs = Prepared pay composting scheme

prop = Area of property

prpni = Provision for recycling PN is adequate

rb = Rubbish bag

rcm = Rubbish collection missed

rdr = Reason don't recycle

recycled = Recyclable Materials

rfbs = Belongs to royal Forest bird

rrg = Regulaly recycled goods

rrhhw = Regularly recycle household waste

rtltc = Rubbish taken to landfill or transfer station by car trip no of time.

rubbished = Rubbish for dumping

rvd = Regularly visit depot

rwpbegrc = Reduced waste , prefer to buy good even if expensive

sex = Sex

soiwh = Separate organic and inorganic waste in household waste

src = Spillage rubbish during collection

stt = Small truck trip no of time

tcb = Traditional compost bin

th = Other

thhn = Total household number

tinittin = Friends of tinitini Matanagi

tt = Trailor trip no of time

twcpbb = Think about the waste created by product before buying

urpbpg = Usually refuse plastic bags for purchased goods

utgc = Usually take garden cutting to the landfill or transferstation

utsbs = Usually take shopping bag to supermarket

uudon = Usually use disposable children's nappies

waecem = Who actively educates children in environment management

ward = ward

wbmgw = Mainly garden waste

wbuhh = Wheeler bins used in household

whuerhhw = Who usually encourages to reduce household waste

wmco = Who does most of the cooking

wmhc = Who does most of the house cleaning

wmr = Who does most of the recycling

wmwb = Who manages the wastebaskets

wonwe = Weekly collection of household waste is frequent enough

wpilp = Who purchase items with less packaging

wshh = Waste separated in household

wtro = Who mostly takes rubbish out

wuowh = Who usually organize waste in your household

wuwl = Who usually washes the laundry

wwmh = Waste well managed in household

wwmhh = Waste is well managed in household

DEFINED VARIABLES IN SAS ANALYSIS

y1 = wwmh = Waste is well Management in my household.

y2 = idnrg= I do not recycle goods.

y3 = irrg = I would like to regularly recycle goods.

y4 = idnrc = I do not regularly compost.

Yy = iwlrrc = I would like regular rubbish collection.

y6 = gpir = Gender plays an important role in the management of waste in my household.

y7 = mpmrpe = In my household men play major role to protect the environment.

y8 = wpmrpe = In my household women play a major role to protect the environment.

y9 = eclpne = Entrance cost to landfills in Palmerston North (PN) are excessive.

y10 = wchwe = A weekly collection of household waste is frequent enough.

y12 = giehwm = The government should initiate ideas for efficient household waste. Managemen.

y13 = itwcpb = I think about the waste created by a product before buying it.

Appendix IV

Gender Roles in Environmental Household Waste Management in New Zealand: A Case Study in Palmerston North

Part 1: Demographic Information

1. What sex are you? (circle number)

1 Male
2 Female

2. What is your highest educational qualification? (circle number)

1 None
2 Home Schooling
3 Primary
4 Secondary
5 Certificate or Diploma
6 Bachelors Degree
7 Postgraduate Degree
8 Other (state)----------

3. What is your age grouping? (circle number)

1	15-25	4	46-55
2	26-35	5	56-65
3	36-45	6	Over 65

4. What ethnic group do you belong to? (circle number)

1 European/Pakeha
2 Maori
4 Pacific Islander
5 Asian
6 American
7 African
8 Other (state)----------

5. What is your main occupation? (circle number)

1 Technician or Associate
2 Professional
3 Service and Sales
4 Agriculture and Fisheries
5 Trade worker
6 Plant or machine Operator or Assembler
7 Retired
8 Student
9 Homemaker
10 Not Working
11 Other (state)----------

6. Which of the following best describes your household? (circle number and fill in total number of persons in home)

1 Single person
2 Single person with boarder (No.------)
3 A couple
4 A couple with children (No.-------)
If boarder (No.-------)
5 Two couples with children (No.-------)
If boarder (No.-------)
6 Flat mates (No.-------)
7 An organized group (No.-------)
8 Other (state)----------

7. Please indicate the gender and number of persons in your household

Sex	Below 18	Above 18
Male(s)		
Female(s)		

8. What is your personal annual income before tax? (circle number)

1 Nill or Zero Income
2 $ 1-$5000
3 $5001-$10,000
4 $10,001-$15,000
5 $15001-$20,000
6 $20,001-$25,000
7 $25,001-$30,000
8 $30,001-$40,000
9 $40,001-$50,000
10 $50,001-$70,000
11 $70,001 -$100,000
12 $100,001 or more

9. Is the dwelling where you live? (circle number)

1 Rented
2 Owner Occupied

10. What is the land area of the property where you live? (circle number)

1 Less than 400 m^2
2 400-800 m^2
3 800-1200 m^2
4 More than 1200 m^2
5 Don't Know

11. Do you belong to any environmental groups, e.g. Green Peace, Forest and Bird Society etc.? (circle number)

1 Yes
2 No

12 If yes, please name the group(s)/societies

Part 2: General information of waste organization at home

13. In general, do you think that waste is well managed in your household? (circle number)

1 Yes
2 No
3 Don't know

14. Is household waste separated in your household? (circle number)

1 Yes
2 No
3 Don't know

15. Estimate (in number of rubbish bags), how much of the following is produced in your household per week (insert number)

1 Compostable Materials (----------bags)
2 Recyclable materials (----------bags)
3 Rubbish for dumping (---------- bags)

16. What gender <u>usually</u> separates waste in your household? (circle number)

1 Male
2 Female
3 Both

17. Are you aware of the recycling programmes run in your city? (circle number)

1 Yes
2 No

18. What materials do you <u>regularly</u> recycle? (circle numbers)

1	None		
2	Glass	7	Papers
3	Cans	8	Magazines
4	Aluminum	9	Batteries
5	Plastic bottles	10	Plastic bags
6	Cardboard milk	11	Other (state)

19. On average, do you visit the recycling depot? (circle the number)

1	Weekly	4	Yearly
2	Fourtnightly	5	Don't know

20. Do you <u>regularly</u> recycle household waste?

1 Yes
2 No

21 If you don't recycle, what is your main reason? (circle number)

1 Unable to transport waste.
2 Don't like to separate waste.
3 Haven't got time
4 Haven't thought about it
5 Other (state)----------

22. If you have a choice, do you deliberately buy articles and products that have as little packaging as possible or that can be recycled?

1 Always
2 Occasionally
3 Rarely
4 Don't think about it

23. Do you consciously try to purchase environmentally friendly goods e.g. chemical free, cleaning agents, recycle paper?

1 Yes
2 No

24. What do you usually take to the landfill or transfer station when you or a household member visits it?

1 Garden cuttings
2 Building rubble
3 Metallic waste
4 Household waste
5 Other (state) ----------

25. How many times did you take rubbish to the landfill or transfer station last year? (circle numbers)

1 Car trip (No. of times ---------)
2 Trailer trip (No. of times----------)
3 Small truck trip (No. of times ---------)
4 Large truck trip (No. of times----------)
5 Don't know
6 Other (state)----------

26. Do you usually use disposable children's nappies rather than linen?

1 Yes
2 No
3 Not applicable

27. Do you separate organic waste and inorganic waste in the household?

1 Yes
2 No

28. If yes, do you usually manage organic waste by? (circle only one number)

1 Home composting
2 Landfill composting
3 Rubbish bags
4 Insinkerator
5 Other (state)----------

29. Do you burn rubbish in your garden?

1 Yes
2 No

30. If yes, what do you burn?

1 Mainly garden waste
2 Mainly paper waste
3 Mainly plastics
4 All household waste
5 Other (state)----------

31. Do the children participate in waste management in your house?

1 Yes
2 No

32. Are wheeler bins used in your household?

1 Yes
2 No

33. If yes, what are they mainly used for?

1 Green waste
2 Other household waste
3 Recyclable waste

Part 3: Looking ahead

34. If you do not separate organic waste from other waste, would you like to start separating in the future?

1 Yes
2 No

35. Which of the following you would be interested in learning more about?

1 Worm composting
2 Traditional compost bin
3 Compost pit in garden

36. Would you prepare to pay to establish a composting scheme at home?

1 Yes
2 No
3 Unsure

37. Would you prefer separate bags/bins for organic waste from the City Council?

1 Yes
2 No

38. Would you be prepared to pay the City Council to separate your rubbish for recycling? (circle number)

1 Yes
2 No
3 Unsure

39. Do you think the cost of cars in NZ should include a disposal fee?

1 Yes
2 No
3 Unsure

40. Do you have any suggestions for household waste management in Palmerston North?

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41. Indicate which of the following are a problem to your household:

Please Tick (√) appropriate boxes	1 Occasional problem	2 Major problem
a Bags bursting or tearing		
b Animals damaging bags		
c Spillage of rubbish during collection		
d Bag size too small		
e Rubbish collection being missed		
f Not enough bags provided by city council		
g Other (state --- --- ---		

42. Please tick (√) in the appropriate boxes

Gender activities

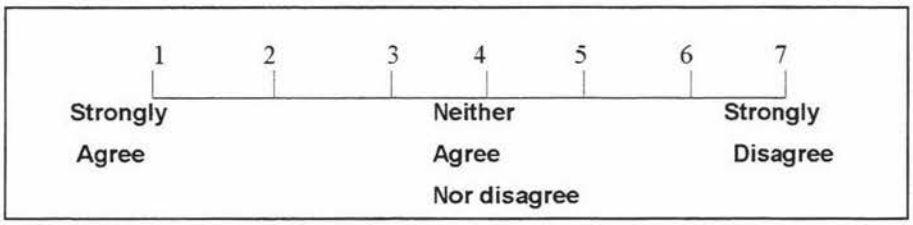
Activities	1 Male	2 Female	3 Both
a Who usually organizes the following waste in your household?			
1 Garden			
2 Kitchen			
3 Paper			
4 Plastic			
b Who usually encourages to reduce household waste?			
c Who does most of the recycling			
e Who does most of the composting?			
f Who does most of the house cleaning?			
g Who does most of the cooking?			
h Who usually washes the laundry?			
i Who usually washes the dishes?			
j Who tries to purchase items with less packaging?			
k Who mostly manages the wastebaskets?			
i Who mostly takes rubbish out?			
n Who actively educates children in environment management?			

43. Please tick (√) in the appropriate boxes

Shopping Awareness Activity

Shopping	1 Yes	2 No	3 Sometimes
a. Do you usually take your own shopping bags to the supermarket?			
b. Do you usually refuse a plastic bag for purchased goods?			
c. Do you buy goods in 'organic' shops?			
d. To reduce waste, would you prefer to buy, even if it were more expensive, goods in recyclable container (e.g. glass)?			

44. To what extent do you agree with the following statements? (*circle appropriate number*)



a	Waste is well managed in my household	1	2	3	4	5	6	7
b	I do not regularly recycle goods	1	2	3	4	5	6	7
c	I would like to regularly recycle goods	1	2	3	4	5	6	7
d	I do not regularly composting	1	2	3	4	5	6	7
e	I would like to regularly rubbish collection	1	2	3	4	5	6	7
f	Gender plays an important role in the management of waste in my household	1	2	3	4	5	6	7
g	In my household men play a major role to protect the environment	1	2	3	4	5	6	7
h	In my household women play a major role to protect the environment	1	2	3	4	5	6	7
i	Entrance cost to land fills in Palmerston North are excessive	1	2	3	4	5	6	7
j	A weekly collection of household waste is frequent enough	1	2	3	4	5	6	7
k	Provision for recycling at the landfill or transfer station in Palm. Nth. is inadequate	1	2	3	4	5	6	7
l	The Government should initiate ideas for efficient household waste management	1	2	3	4	5	6	7
m	I think about the waste created by a product before buying it	1	2	3	4	5	6	7

URBAN PALMERSTON NORTH

OLIVETREE VILLAGE

ASHHURST

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CITY COUNCIL

Map Production: *LandInfo*
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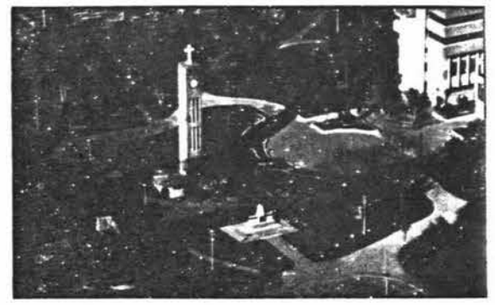
Palmerston North City Council
July 1995

PALMERSTON NORTH

Linton Military Camp

Ashhurst



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