SEASONAL DEMAND FOR EMERGENCY DEPARTMENT SERVICES

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ABSTRACT

Hospital Emergency Departments (ED) often face wide fluctuations in demand for their services, which sometimes result in operational difficulties due to excessive demand. A better understanding of the patterns and the drivers of this demand would facilitate improved planning of facilities and staffing levels and a better quality of service.

This study uses statistical analysis derived from OLAP Cubes and Data Mining (DM) to investigate data about ED presentations at two hospitals in the Bay of Plenty District Health Board (BOPDHB) region over a period of three years, comprising a total of about 165,000 presentations. The study found variations in demand for each hospital on seasonal and monthly basis and also by day of week and time of day.

The characteristics of patients and the seriousness of their problems was also investigated which revealed differences in patterns of usage of the two hospitals. Cluster analysis revealed that patients under 50 years of age utilize ED facilities more frequently than those above, with teens and young adults being the most frequent patients at both EDs.

It is hoped that this detailed analysis of demand for ED services presented in this thesis will facilitate the planning of services to better meet future demand.

PREFACE

The Researcher's *interest in Data Mining* predates his interest in Health Informatics by a couple of years. The idea all along was that when an opportune time presented itself to indulge in further postgraduate study that the incorporation of some Data Mining functionality would hopefully be both justified and logical – and very importantly: that *the topic to be researched would directly relate to the Researcher's occupation and position* at the time. A third (and last) objective was that *the research should have some practical application value*. Fortunately that is the way it all turned out.

Derek Coutts – Tauranga - NZ - May 2008

DEDICATION

This Thesis is dedicated to **"BJ" (J C V DEVENTER)**

Guardian, Confidante, Mentor, Comrade and Loyal Friend

ACKNOWLEDGEMENTS

People / Organizations / Departments
Who / Which deserve special mention:

Dr. Richard WHIDDETT (Department of Management (formerly with Department of Information Systems), MASSEY University PN) My Supervisor - for his guidance and advice

SAS Corporation – for supplying me with the necessary software (via MASSEY University's IT Services) – i.e. SAS Enterprise Miner - to install and establish my own Data Mining environment in Tauranga, Bay of Plenty - NZ

Bay of Plenty District Health Board (BOPDHB) for allowing me the usage of their facilities – i.e. Cubes software, Data and Other facilities

Catherine ROSS (Manager: Information Development at BOPDHB Information Management) for accommodating my study and research aspirations, and recommending that I be given access to the BOP DHB ED Data

Owen WALLACE (General Manager: BOPDHB Information Management) for allowing me the usage of our department's facilities and for authorizing my use of BOPDHB ED Data (provided that patient confidentiality is ensured and strictly adhered to at all times)
(Formal authorization and some related correspondence can be found in **Chapter 13.4 APPENDIX D1** at the back of the thesis)

Dr. Siva GANESH (Department of Statistics, MASSEY University PN) – for his advice regarding SAS and general comments during a brief overview relating to statistics I employ in the body of the thesis

BOP ED Departments of Tauranga and Whakatane Hospitals, especially
Marama TAURANGA – CNM (Clinical Nurse Manager) - Tauranga Hospital ED
Joanne BAIRD – CNC (Clinical Nurse Coordinator) – Tauranga Hospital ED and
Priscilla BORGES – CTL (Clerical Team Leader) - Tauranga Hospital ED

Derek Coutts – Tauranga - NZ - May 2008

SEASONAL DEMAND FOR ED SERVICES

TABLE OF CONTENTS

SOME KEY TERMINOLOGY

Information and Communication Technology (**ICT**)

Information Systems (**IS**)

Data Base (**DB**)

Business Intelligence (**BI**)

Decision Support Systems (**DSS**)

Data Warehousing (**DW**)

Online Analytical Processing (**OLAP**)

OLAP Cubes

Data Mining (**DM**)

Statistical Analysis Software (**SAS**)

SAS Enterprise Miner (**SAS EM**)

Clustering

K-Means Clustering

Self-Organizing Maps (**SOM**)

SOM Kohonen Clustering

Microsoft (**MS**)

MS Word / Excel / EndNote

Emergency Department (**ED**)

Bay Of Plenty (**BOP**)

District Health Board (**DHB**)

Bay of Plenty District Health Board (**BOPDHB**)

TAKE NOTE

INTERPRETATIONS AND OPINIONS

EXPRESSED THOUGHOUT THE THESIS ARE

THE AUTHOR'S SOLELY

AND DOES NOT NECESSARILY REFLECT THOSE

OFFICIALLY SUPPORTED BY

THE BOPDHB

OR THAT OF BOPDHB EMPLOYEES

ACKNOWLEDGED IN

THE THESIS

1. INTRODUCTION

INTRODUCTION

1. INTRODUCTION

1.1 PROBLEM DESCRIPTION

There may be various explanations for what appears to be temporary breakdowns in the operations of Emergency Departments. One obviously can not anticipate natural disasters – what is also referred to as acts of God, but what of other situations which may develop ever so often?

This begs several questions, including:
- Are there "seasonal" factors at play which influence the influx of ED attendances?
- And if that is the case - are there "seasonality"-related problems with the management of such surges in demand for ED services?

In fact, when questions to this effect were first raised with some in ED Management in the "District" (managed by the District Health Board) the existence of "seasonality" was acknowledged, as was its potential for causing operational difficulties. In other words, there is an acknowledgement that there are "ebbs and flows" in demand for Emergency Services, and that while such can not always be anticipated absolutely, an attempt must none the less be made to pre-empt its fluctuations more accurately, and thus the following rephrased problem description "derived" from the foregoing questions:
There seems to be some seasonality in the demand for ED services and it is causing operational difficulties.

For the purpose of brevity the following succinct Problem Description will be used liberally throughout the remainder of this Research Project / Thesis, namely that this is an attempt at determining **Seasonal Demand for ED Services.**

This compacted rework of the original questions and discussion therefore represent mentioned questions and discussion. Whenever used in the remainder of this Research Project it implies that which precedes it in **Chapter 1.1**.

For the time being that will suffice, but the author will define "season" and "seasonality" more specifically later in the Thesis, in view of some of the earlier "weather" / "season"-related studies mentioned in the Literature Review / References (Section **2.4.2** of **Chapter 2**).

1.2 PROBLEM JUSTIFICATION

The Weekend Herald, Saturday, April 21st, 2007 featured an article about preventable deaths in NZ Hospitals. It included the following comment relating to a particular Emergency Department, namely that "...unacceptable time delays between admission and treatment..." contributed towards a couple of preventable deaths.

"Any preventable error in a hospital is unacceptable and regrettable" according to Patrick Snedden, Chair of the Quality Improvement Committee (a ministerial advisory body) as the government released the first ever consolidated report on serious and sentinel events across the 21 District Health Boards in NZ [Dominion Post, 20 Feb 2008] – viz. partway through the writing of the current thesis. This ministry report was compiled in response to Information Act requests to various health boards [The Press, 16 Feb 2008]. The statistics supplied are those for the 2006-2007 "year", i.e. for Financial Year = 2007 (Viz. July 1st 2006 – June 30th 2007), and found that there were 182 sentinel events (viz. actual or potentially preventable clinical incidents that resulted, or could have resulted in serious harm or death) of which 40 did result in death [Dominion Post, 20 Feb 2008].

Take Note: this report is not ED-specific, rather hospitals as a whole and nationwide-specific - and as such ED-inclusive. Furthermore, the idea was not to name and shame but rather to encourage health boards to lift their game, according to Health and Disability Commissioner Ron Paterson [The Press, 16 Feb 2008]. Professor Mike Ardagh concurs by saying that he would be reluctant for DHBs to release detailed information on adverse or sentinel events [The Press, 16 Feb 2008].

Another bottom-line statistic to emanate from the above ministerial report is that for every 10,000 patients treated in NZ hospitals 2.2 will be involved in sentinel events, and that New Zealand "...compared well with wealthier countries from the OECD...", according to Director-General of Health Stephen McKernon on a range of indicators [Dominion Post, 20 Feb 2008] .

There are "extenuating circumstances", of course. One of these circumstances, and arguably the most critical of circumstances, is the overcrowding of ED services. Ardagh and Richardson [2004] for example quote a statement in the British Medical Journal that "... overcrowding is the most serious issue confronting emergency departments in the developed world ..." They also refer to "... our overwhelmed ..." ED's.

Current staffing practices in EDs at the DHB in question may (or may not) adequately service fluctuating demand for ED services. By "fluctuating demand" is meant time of year, day of week and even time of day within day of week. Certain ED "shifts" may be extra-ordinarily stressful on a fairly regular basis. On duty Staffing and Roster practices may be in need of minor adjustment. This may (or may not) be possible for reasons of critical staffing levels – and Health funding – which may "impede" good intentions.

Incidentally, problems of local concern for an organization or a certain area are perfectly acceptable and appropriate as a research topic, according to Descombe [2002, p. 47]. The ED data used in the present research does indeed pertain to "... a certain area ..." in one somewhat out of the way, albeit rapidly growing (in population), corner of New Zealand.

Seasonal Demand for ED Services also begs a question within a question in that **Demand for ED Services** in a sense precedes "seasonal demand". This thesis often ventures into the area of "demand" more so than "seasonal demand" – for one can not address or understand the one without the other.

1.3 AUDIENCE

- The principal audience of the eventual outcomes of this Research Project is ED Management at the hospitals concerned. Cf. for example **Chapter 3.2.2** concerning the Data of multiple hospitals to be used in this project.
- A secondary audience would be ED Management at other hospitals across New Zealand.
- Health Care professionals in general may also find it informative.
- University Students doing papers in Health Care or Health Informatics – and University Lecturers teaching such courses in tertiary institutions across New Zealand.

2. DEMARCATION, BACKGROUND AND RESOURCES

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This chapter delineates and demarcates.

The research topic and research environment is more specifically declared.

It "sets the stage", gets some of the "props" in place, mentions a number of "scripts" from previous "productions" (cf. **Chapter 2.4** regarding related earlier Literature) and so forth.

2.1 DEMARCATION AND BACKGROUND

2.1.1 DEMARCATION

HIGH LEVEL OVERVIEW

Cf. **Flowchart 1** two pages along.

This is a high level overview of the "greater" ED environment. As is the case with all Hospitals departments, each ED serves a community. The regional population base / demographic is the "backdrop" against which an Emergency Department performs its function.

While ED per se "begins" when a patient "presents" her / himself at an Emergency Department, various regional population / demographic influences might conspire to culminate in a particular presentation.

Once a person has entered the system various assessments, decisions and actions will now follow – a whole sequence of events. Certain aspects of these events will be recorded electronically – and thus an "audit trail" of any one person's movements through the ED system recorded – culminating in a discharge, be it a discharge back into the community, a discharge out of ED into for example Inpatients, or in a worst-case scenario, a discharge as a result of the patient having passed away.

By investigating these "audit trails" of many patients' passage though ED a researcher endeavours to find potential explanations / trends / patterns – all of which in the hope of adding to the knowledge-base and understanding, and as a result of that to hopefully be more responsive and better equipped in the future. All of this (and more) is part of what Health Informatics hopes to achieve.

As for the current research; by investigating the date and time-stamped electronic patient data about patient processing in for the most part two, but at times three Emergency Departments, and across multiple years, this author hoped to form a better idea of Demand in general, but especially so about when the highest Seasonal spikes in Demand for ED Services are bound to occur. It is during these highest Demand spikes that EDs are potentially more vulnerable to overload. Bradley [2005] distinguishes between EDs being merely "busy" and EDs being "crowded". Being "busy" is not synonymous with being "crowded". Being busy is normal, whereas being crowded is not. She [Bradley, 2005] uses the mnemonic EDC in reference to Emergency Department Crowding. An overcrowded ED may be defined in a variety of ways. For example, take the following two definitions for EDC:

- When "... patients are being monitored in non-treatment areas, and
- When patient "...wait times exceed a reasonable period..."

The author thus investigated ED PRESENTATION and ED THROUGHPUT in order to better understand the seasonal spikes in Demand. One of the sources in producing **Flowchart 1** (cf. next page) is Wilson and Nguyen's [2004] NZ adaptation of an American ED model. (Cf. **Chapter 13.4 APPENDIX D5**)

PRELOAD / OVERLOAD / AFTERLOAD

These three terms relate to:

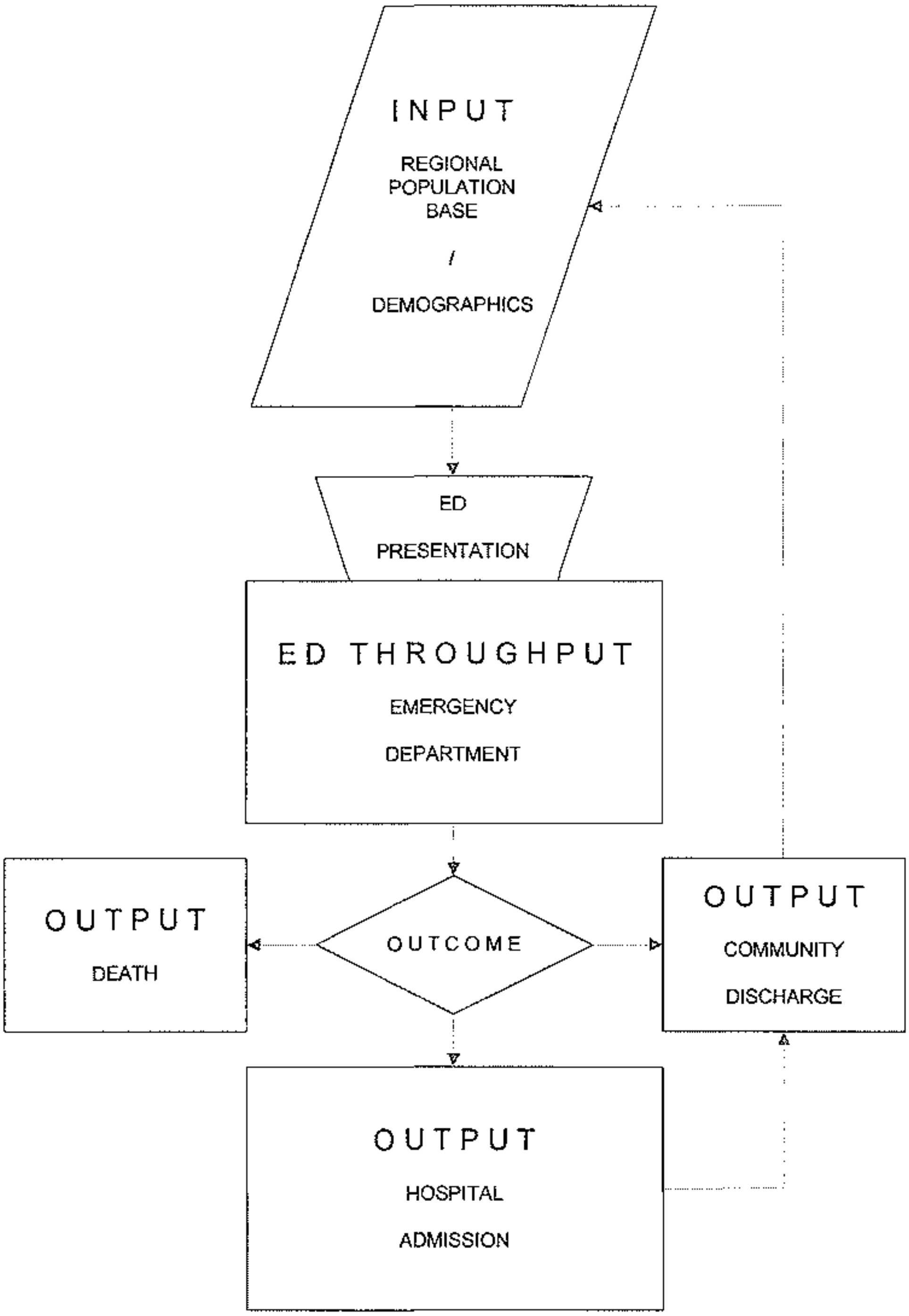
PRELOAD	The ability of an Emergency Department to receive Patients
OVERLOAD	The ability of an ED to treat Patients
AFTERLOAD	The ability of an ED to transfer Patients to other destinations

That is the current author's understanding of the purpose and usage of the above terminology as presented in a most informative article about ED overcrowding (at Christchurch Hospital) by Ardagh** and Richardson [2004].

PRELOAD, OVERLOAD and AFTERLOAD are implicit to ED PRESENTATION, ED THROUGHPUT and OUTCOME respectively, as used in **Flowchart 1** (cf. next page). These terms will be further elaborated upon towards the end of the thesis, especially so in **Chapters 10 & 12**, but suffice to say at this stage that during periods of excessive PRELOAD, OVERLAOD and AFTERLOAD Emergency Departments can end up being stretched beyond their limits.

** Professor Ardagh is both practicing physician at Christchurch Hospital and Professor of Emergency Medicine at the Christchurch School of Medicine

INPUT / THROUGHPUT / OUTPUT



Flowchart 1: Overview of INPUT, THROUGHPUT & OUTPUT

2.1.2 BACKGROUND - TAURANGA HOSPITAL ED

The thesis rarely ventures beyond the electronic patient trails, and the use of these patient trails to try and determine population base characteristics, seasonal spikes in demand for ED usage, and such like. The author, while having worked in Health Informatics for three years, is not a Health Professional or Practitioner. His focus is thus on the phenomenon up to the point where the patient "hits" the system – and just beyond! That in effect is the demarcation line. However, it is also at this point where each new ED presentation joins the queue, where "excessive preload" and "overload" [Ardagh and Richardson, 2004] becomes part of the equation.

What the author means by "... just beyond ..." the demarcation line includes ED facilities and ED staffing numbers. It is hoped that this thesis makes some contribution, however small, in perhaps improving a particular Emergency Department's responsiveness, or a more informed regional community with as a result improved service (and as a result of that a marginally less stressed or congested Emergency Department).

It is in the light of this that current ED staffing information at one hospital (viz. Tauranga Hospital) is produced – albeit in a condensed / compacted manner – so as not to get tied up in specifics. It is for the medical practitioners to gloss through, to read and subsequently decide if any aspect of this research might be worthy of trialling in practice.

For the record, though, here is some information concerning staff levels, staff shifts, ED ward bed numbers etc:

<u>ED Staff Shifts</u>:
These are grouped under Morning Shifts, Afternoon Shifts, and Night Shifts, also referred to as AM shifts, PM shifts and N shifts.
The Morning Shifts have five different / staggered start-times as well as shift durations.
The Afternoon Shifts have four different / staggered start-times as well as durations.
The Night Shifts have two start and duration times.

That is:

ED Staff Shifts:

Morning Shifts:	0700-1530, 0800-1630, 0830-1530, 0830-1730, 0900-1800.
Afternoon Shifts:	1130-2000, 1430-2300, 1700-2300, 1800-2300.
Night Shifts:	1900-0330, 2245-0700.

ED Staff Levels:
(Take Note: 0.5 signifies one person on duty for 0.5 (viz. half) of a full shift)

Nursing Levels:
AM: 9
PM: 10
N: 6.5
(Except for Dec 31st until Jan 2nd when **N=7** – i.e. "half" a nurse more)

Doctor Levels:
AM: 2.5
PM: 2.5
N: 2
(Except for Dec 31st and Jan 1st when **AM=3.5** on 1st and **N=3** on 31st and 1st)

Clerical Levels:
AM: 2.5
PM: 2.5
N: 2
(Except for Dec 31st and Jan 1st when **AM=2.5**, then **3** and **PM=N=3**)

ED Bed Numbers:

Beds have different purposes.
Examples:
There are five observation beds.
There is a paediatric room / bed.
There are six cubicle spaces.

Some extensions are currently in progress, and further refurbishment in the pipeline from May 2008 onwards (to conclude by the end of 2008).

Current bed capacity in ED:
22 in total namely **17** treatment areas / beds and **five** observation beds
New bed capacity in ED:
28 in total namely **23** treatment areas / beds and **five** observation beds

The latter may already be insufficient, were the divisor 1,100 rule of thumb [Ardagh and Richardson, 2004] to be applied to the aggregate of the most recent financial year's presentations – i.e. 36,179 / 1,100 = **33** treatment areas / beds.

APENDICES D3 and **D4** also contain some interesting information about the colour-coding used in ED bed-allocation, the use of the ED Locator, as well as an excerpt from Tauranga Hospital's ED re staffing – especially so that which reflects the intended staffing levels for New Year's Eve and January 1st & 2nd.

2.2 RESEARCH ENVIRONMENT

By way of explanation, and in very general terms: There are 21 District Health Boards, each administering / managing a New Zealand District, roughly along the lines of "provincial" regions. Each such DHB consists of a variety of Health / Medical institutions. These can include an assortment of institutions such as hospitals, nursing homes, maternity homes, mental health clinics, etc. The "hub" – for want of a better word – of each region would be the fully-fledged hospitals in the District. Such Hospitals more often than not deliver Secondary Health Care to the communities under their "jurisdiction".

By way of comparison and explanation:

- By "Secondary" is meant **operations of a certain complexity** which can be performed at such an institution (for example knee reconstruction) – as compared to the
- **Minor operations** done in Private Practice surgeries (such as removing a mole) by GP's – on the one hand - and
- Any surgery, including **the most complex and critical operations** such as open heart surgery – on the other.

The "pyramidal" structure of Health thus consists of:

TH **Tertiary Health** Care Hospitals
SH **Secondary Health** Care Hospitals
PH **Primary Health** Care Practices

With each "level" inclusive of the lower levels.

Therefore;

TH is inclusive of both **SH** and **PH**,
SH is inclusive of **PH** but not all of **TH** and
PH is inclusive only of itself.

The author is in the fortunate position of having worked in the Health sector for the last three years, in Secondary Health, as **Information Analyst** initially, but of late as **Reporting Co-ordinator**. Apart form the usual "legacy" systems, such as IBA (in effect a patient management system) and a host of other "front end" systems (one of which being Oracle), the DHB has a comprehensive and responsive Business Intelligence environment. This, in essence, consists of a Data Warehouse, Scheduled Reporting Packages across the board, OLAP Cubes (covering almost every aspect of the Health environment), and a Team of BI specialists supporting the BI environment and Users of the management information it delivers. The BI environment is "refreshed" / reprocessed overnight, five nights a week (immediately after completion of Backups), and some additional Cubes-related processing also occurs on weekends.

2.3 RESOURCES

These include the following:

ICT Environment of DHB:
- SQL Server
- Data Warehousing
- OLAP Cubes
- Business Intelligence (BI) ##
- Information Technology (IT) ##

ED Two Largest Hospitals in Region of DHB:
- TAURANGA Hospital Emergency Department
- WHAKATANE Hospital Emergency Department

(Take Note: OPOTIKI Hospital ED statistics are presented occasionally)

Care of MASSEY University:
- SAS Data Mining software **$$**
- Microsoft's ENDNOTE (used in **Chapter 14** – i.e. BIBLIOGRAPHY)

Other – Especially so:
- MS Word
- MS Excel

Information and Communication Technology (ICT) Department structure at the BOP DHB:
Information Management – consisting of
- Information Technology (IT) and
- Information Development (viz. BI)

$$ In the author's opinion SAS is *the* leading Statistical and Data Mining tool around. The Info-Tech Research Group – a technology advisory organization – also emphasises its "Strong reputation in statistical analysis software..." which also "...Automates the data mining process..." [Benjamin, 2003, p. 26].

2.4 LITERATURE REVIEW

2.4.1 REVIEW - OVERVIEW OF DSS LITERATURE

INTRODUCTION

The idea is not to deliver an exhaustive Literature Review concerning DW, OLAP and DM, from a historical perspective and "evolution" to the powerful products which are available today, but rather a brief overview – followed by an overview of some of the more readily available ED-related research. Such research presented some useful ideas, some of which were adapted and incorporated into the current research program.

DECISION SUPPORT SYSTEMS (DSS)

Shim et al [2002, p.111] define DSS as "computer technology that can be used to support ... decision making and problem solving".

In 2001 Liu and Guo wrote that with the development of data warehousing (DW), data mining (DM) and online analytical processing (OLAP), DSS in recent years have entered a completely new stage. They also emphasize DM and OLAP having become an integral part of the decision support process.

There is one more terminological issue that requires clarification, namely the relationship between MIS and DSS? In Figure **F2.4.1** (cf. 4 pages ahead) MIS and DSS are depicted as separate but adjacent "boxes" / phases in the evolution of IT. The *Oxford Dictionary of Computing* [2004], on the other hand, describes DSS is a "class" of Management Information Systems (MIS). In reality the lines between the phases are more so grey areas and less so demarcation lines – it is only for the sake of clarity that MIS and DSS are shown as distinct "boxes".

DATA WAREHOUSING (DW), ON-LINE ANALYTICAL PROCESSING (OLAP) AND DATA MINING (DM)

Marakas [2003] views the following three concepts as intimately entwined: Data Warehousing, Data Mining and Visualization. In other words: the source of the data, process / extraction of the data and the presentation of the data respectively. Berry and Linoff [2004] also see Data Warehousing, OLAP and Data Mining as intimately related.

DATA WAREHOUSING (DW)

A Data Warehouse (DW) is more useful than the traditional Database (DB).

A Data Warehouse (DW) differs from traditional Database (DB) systems in three respects [Dai et al, 2004], namely: (1) A DW contains historical and consolidated data whereas a DB contains raw data, (2) it is tuned for OLAP and Data Mining whereas a DB is for the purpose of transaction processing, and (3) it stores transformed and integrated data.

Furthermore, according to Dai et al [2004] a DW provides architectures and tools for management to organize, understand and make business decisions. Liu and Guo [2001, p.147] quote W.H. Inmon's definition of a DW as "an integrated, non-volatile, time-variant collection of data" designed to support management. According to Groth [1998] Data Warehouses are designed specifically for decision support. It might even, and quite often does integrate multiple transactional databases [Ibid]. Once stored – it does not change. And finally, the Data Warehousing of data is the bringing together of disparate data from throughout an organization [Berry and Linoff, 2004]. This small "selection" of definitions should suffice. Inman's [in Liu & Guo, 2001] concise definition is the most appropriate. It for example encapsulates "the bringing together of disparate data from throughout an organization" of Berry and Linhoff [2004] in the single word: "integrated".

DM *can* of course be performed on any body of data - including Base data, but there are compelling reasons why a Data Warehouse is the ideal and best source for data exploration [Marakas, 2003], some of which are: Its data is constant / non-volatile, it is time variant (it only changes at set times, like during an overnight "build"), integrated, summarized, and it contains Metadata – viz. "data" about data. Shim et al [2002] refers to the arrival of the DW in the early 1990s as the first new tool for Decision Support.

ONLINE ANALYTICAL PROCESSING (OLAP)

OLAP Defined

Shim et al [2002, p.115] describe On-line Analytical Processing (OLAP) as a category of software technology that "enables analysts, managers and executives to gain insight into data through fast, consistent, interactive access to a wide variety of possible views of information that has been transformed from raw data to reflect the real dimensionality of the enterprise as understood by the user". OLAP is indeed necessary and essential to Decision Support Systems [Goil et al, 1999].

Cubes

There are several types of Cubes. Berry and Linoff [2004] for example mention three types, namely *Summary Cubes*, *Individual Cubes* and *Event Cubes*. Liu and Guo [2001] refer to the aggregation of DW information – i.e. the summary type cube mentioned by Berry and Linoff.

The cube's design, in essence, involves Fact tables and Dimension tables. According to Nesterov and Jukic [2002] fact tables contain the basic *quantitative* measurements (i.e. the *facts*), and dimension tables provide the *descriptions* of the facts being stored. These facts equate to aggregations held in the data cubes [Goil and Choudhary, 1999]. The model that is produced by this method is known as a *star-schema* [Nesterov and Jukic 2002]. Other models also exist, and even variations "within", for example: Nesterov and Jukic also mention *star-schema* extensions such as *snowflake* or *constellation* [Ibid].

Nesterov and Jukic [1999] emphasize that it is not the cube's purpose to hold transactions, but rather to summarize the underlying transactions. They also illustrate how summation / aggregation in effect reduces the number of dimensions to the star-schema. The transaction level information is still available electronically, albeit not available online [Ibid]. Each *cell* (at the confluence of the particular values of the various dimensions) holds a *measure*. Such *measures* are in effect aggregations / summations of the unique sets of values of dimensions which together "identify" / form the "*compound key*" to that specific *cell*. According to Goil and Choudhary [1999] each *cell* represents a *tuple*, with the *attributes* of the *tuple* identifying the location of the *tuple*.

The whole idea behind OLAP Cubes is accessibility and fast retrieval of information for query and report purposes [Bain et al, 2001], and that in effect allows for timely / quick decision-making. It is thus all about quick turnaround time on queries – i.e. it is all about speed. Goil and Choudhary [1999] also discuss *pivoting* (i.e. rotating a cube to change its dimensional orientation), *slicing-dicing* (which involves the selection of a subset from a cube), and *roll-up* and *drill-down* against the "backdrop" of what these authors refer to as a cube's "latticed" structure [Ibid] – all of which is done in order to locate a summarized value (or a row / an array of summarized values) for a particular dimension or combination of dimensions.

DATA MINING (DM)

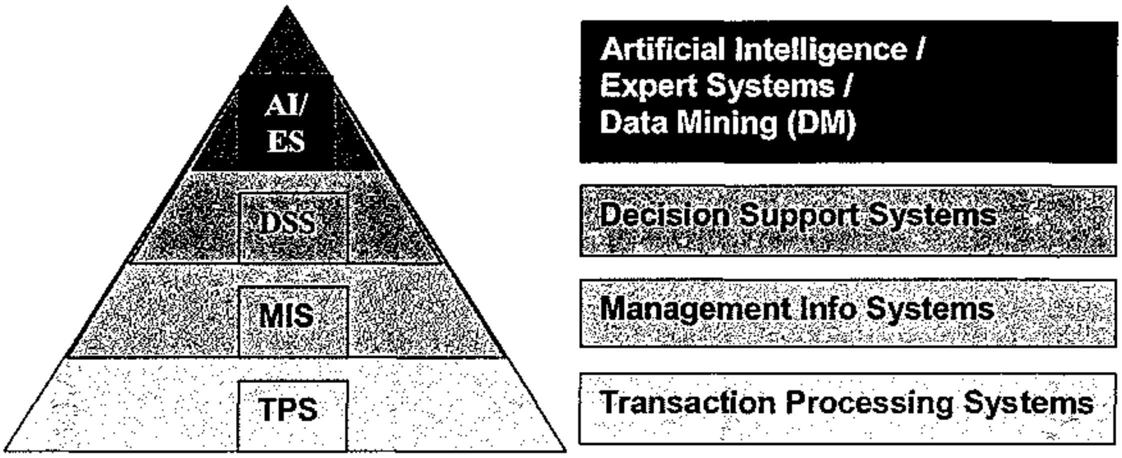
Data Mining (DM) and Knowledge Discovery (KD) Defined

Data Mining (DM) is the exploration and analysis of large quantities of data in order to discover meaningful patterns and rules [Berry and Linoff 2004, p. 7]. Groth [1998, p.1] defines Data Mining as the process of automatic information discovery. Variations along these lines abound, but usually with the twin components of Data Mining and Discovery included. Many authors even see the two terms as one and the same thing. Saraee at al [1998, p. 7/1] for example write: "Data Mining, also referred to as Knowledge Discovery in Databases is the nontrivial extraction of implicit, previously unknown, and potentially useful information from data". Goodwin et al [2003] go even further by stating that the terms "machine learning", "data mining" and "KDD" are often used interchangeably. Their definition of "Knowledge Discovery in data or databases (KDD) is the nontrivial extraction of implicit, previously unknown, and potentially useful information from raw data" [Goodwin et al, 2003, p.380]. In other words – it is almost identical to the definition of Saraee et al [1998].

The terms (DM on the one hand and KD or KDS on the other) are often used intermittently and synonymously. It isn't really a contentious issue for Data Miners / Knowledge "Discoverers", but in the long run one of these terms will more than likely prevail. The current author prefers the term Data Mining as *leading* to Knowledge Discovery, and also sees the "scope" of the definition of DM as representing all the various steps from data extraction through eventual prediction – cf. the next sub-section.

Putting Data Mining (DM) in Context

Engelbrecht et al's [2005, p.7] depiction of the "theoretical categories" which comprise Information System / IS support (cf. figure **F2.4.1** below) is ideal for positioning Data Mining within the bigger picture. The current author included the comment about "Data Mining (DM)" – even though it is implicit to Artificial Intelligence.



F2.4.1 IS Support: Theoretical Categories of IS Support [Adapted from Engelbrecht et al, 2005]

At the base of the pyramid are the "raw" transactions. Each higher level then adds value to the source data.

2.4.2 REVIEW: SEASONALITY AND ED LITERATURE

INTRODUCTION

The Emergency Department journal articles referred to in this section are readily available as PDF or DOC files – i.e. one did not have to subscribe to particular journals (over and above being formally enrolled at University) in order to have access to these articles. One only required access to University / Research related search engines available to enrolled students. The research covers quite a wide assembly of research from across the world – albeit more so the so-called "western" world. These articles address (at least) some aspect of Seasonality.

RELATED RESEARCH CONCERNING SEASONALITY AND ED

Firstly; all of the subsequent studies mentioned used ED data to analyse / rework / derive / glean from.

HOLIDAY SEASONS

An "assortment" of "seasons" is utilized, including the "conventional" summer and winter-holiday seasons (more often than not aligned with school holidays, including Christmas / New Year breaks).

Keatinge and Donaldson [2005] investigate December mortalities in South-East England. Their "season" is exceptionally short – i.e. it hones in on the dates December 19th and 27th (inclusive). Phillips et al [2004] also uses a very short "season" in their study of mortality during holiday seasons – namely the two weeks from December 25th to January 7th. However, a major difference is in the volume of data used in their research. While Keatinge and Donaldson [2005] investigates only ONE such period (circa 2003) Phillips et al [2004] uses such data from the period July 1st 1971 until June 30th 2001 – i.e. thirty years' worth of applicable two-week holiday periods – for the whole of the USA! (This will be elaborated upon further under section VERY LARGE DATASETS somewhat later.)

Concerning seasonal mortality; it should be born in mind that an Emergency Department (or Accident and Emergency Department, as it is sometimes called) will not necessarily know of all mortalities. They will generally only know of mortalities related to DOA (dead on arrival) would-be patients, and those who die during ED or shortly afterwards – while still at the hospital – on the operating table, under observation in ED itself, or in for example a subsequently-transferred to Inpatients ward.

Other researchers who use very short date-ranges include Humphrey et al [2003] who investigated injury-severity between alcohol-related and non-alcohol-related ED presentations (and a random sample at that) over one three-week period at Auckland Hospital in New Zealand. Yet again the volume of research data is very sparse – and with low volume the possibility of aberrational outcomes greatly increased. (Take Note: Humphreys et al's [2003] research is discussed in more detail later on in the thesis.) Having said that; the utilization of large volumes of data is not necessarily a prerequisite – but "... more data is (usually considered) better ..." [Berry and Linoff, 2000, p. 157]. The greater possibility for producing aberrational outcomes will be shown in time where the plotting of two overlapping age-groups (one small, the other much larger) are compared further along in the author's research. As for the "but" part of the "...more data is better, but ..." of Berry and Linoff [2000, pp. 157 & 158], these authors indicate that there may be occasions where limited data is preferred - for example data which records rare events.

The current author also relates some December / January (December 15th until January 15th inclusive, in fact) histograms to accentuate the highest of spikes in demand annually – but the focus of the present study is much wider - as will be made clear in the appropriate chapter (cf. for example Sections **3.2.2** & **3.3** of **Chapter 3**). Furthermore, as is the case with this sub-section's research, the "seasons" the current thesis focuses on are those of the national (school) holiday-seasonal variety, against each school holiday's respective winter, spring, summer or autumnal "backdrop".

POLLEN AND OTHER RESPITORY SEASONS

Other "seasons" also abound amongst the research located and reviewed in preparation for the author's own research. There is for example the relatively short "season" for the period July 24th to September 24th 2000 used by Karpati et al [2004] in their endeavour to find a causal link (if such existed) between pesticide spraying (for West Nile Virus Control) and ED visits in New York State in the USA. I.e. their "season" ensued in mid-Summer in North America, and lasted until late-Summer / early "Fall". (Incidentally; no significant causal link was found.)

In a certain respect the former is an "induced season", albeit induced in mid-Summer. Other such "induced seasons" include that by Lewis et al [2000] about the effects of aerobiological pollutants and chemical pollutants along with meteorological conditions (at date and time recorded, one would imagine) on asthma admissions to the EDs of two hospitals in Derbyshire in the UK over the four-year period 1993 – 1996 inclusive. (No causal links were found in this case either.)

The two cities of Portland (Maine) and Manchester (New Hampshire) in New England in the USA were also investigated [Wilson et al, 2004] for respiratory and asthma admissions to ER (Emergency Room) potentially resulting from the conglomeration of sulphur dioxide along with ozone and weather conditions. Interestingly enough, while no significant associations were found in Manchester, Portland showed a significant impact. The researchers thought this might be as a result of Manchester having a smaller population. However, the difference isn't that significant, namely 248,000 and 176,000 for Portland and Manchester respectively.

The "twin cities" and "twin areas or districts" ideas were also employed by the current author, in that the "cities" of Tauranga and Whakatane (and thus the two surrounding regions – viz. the Western Bay of Plenty and the Eastern BOP respectively) were employed in the investigation, or more specifically the ED presentations to the two hospitals – both incidentally classed as "secondary" institutions in New Zealand Health parlance. The advantage of using two or more hospitals is that differences may be detected, and "differences" tell as much of a story as does "similarities". As it turns out the current research produced significant differences – more than were originally anticipated. This will all become very evident as the reader progresses through the research.

The annual "pollen season" is commonly known, of course – especially to asthma sufferers. Other studies also tap into this source of ED presentation, including a six-town study of an assortment of towns in the states of Victoria and New South Wales in Australia – namely Wagga Wagga, Tamworth, Orange, Bathurst, Dubbo and Albury. Marks et al [2007] also used four years worth of data (as was case with Lewis et al's study in Derbyshire in the UK (cf. a few paragraphs earlier) namely 1995 – 1998 inclusive. In the case of Marks et al [2007] their collection of "sub-sets" of data was triggered, as it were, by thunderstorms in the various areas / viz. towns and each town's vicinity. These researchers' findings were consistent with the hypothesis that some epidemics or exacerbations of asthma are caused by high concentrations of allergenic particles produced by an outflow of colder air, associated with the downdraught from a thunderstorm, sweeping up pollen grains and particles and then concentrating them in a shallow band of air at ground level. This exacerbates asthma conditions during pollen season.

A Canadian study (circa 2003) by Cakmak et al [2005] involved an even larger set of towns, namely the ten cities of Calgary, Edmonton, Halifax, London, Ottawa, Saint John, Toronto, Vancouver, Windsor and Winnipeg. Their results incidentally suggested that "... younger males and those within less educated families may be more vulnerable to ... hospitalization for asthma ..."!

The current author also hones in on the socio-economic ingredient in determining regional ED usage propensities. This will become evident during the course of the current study, and progressively more so as the findings of the thesis are presented and discussed.

As far as "pollen season" studies are concerned two significant-sized studies which also warrant a mention are one by Anderson et al [2007] in London, UK (timeframe: 1987 - 1992) and another by Tobias et al [2004] in Madrid, Spain (timeframe: 1995 – 1998).

In the former of the two studies a causal link was found between air pollution as well as pollens and daily hospital admissions for asthma. However, there was a lack of consistency in the results - so the causal link could not be said to have been confirmed.

In the case of the latter the pollens were actually categorized into five groups determined on the basis of their respective distributions. One of these categories of pollens – i.e. pollens with allergenic capacity was found to be positively associated with asthma-related hospital emergencies.

OTHER ODD SEASONS

HOT WEATHER AND HEATWAVES

Another London, UK-based study is that of Kovats et al [2004] who endeavoured to establish a pattern of mortality and hospital admissions during hot weather and heat waves in Greater London. While non-significant increases in mortality were found, these were not paralleled by increases in heat-induced hospital admissions. However, the researchers state that it should be bourn in mind that "... many heat related deaths occur ... before they come to medical attention ..." Their study related to a six year period from April 1st 1994 to March 31st 2000. Heat waves suggest extra-ordinarily high temperatures which may occur once every ten or twenty years, or perhaps more frequently nowadays where global warming appears to have become a bit of a factor – although the scientific community remains divided in that count. It is "seasonal" in that it will occur during summer, but it is the exception more so than the rule. These researchers reiterate the current author's opinion (cf. paragraphs relating to the studies by Keatinge and Donaldson [2005] and Phillips et al [2004] above (under HOLIDAY SEASONS, especially so its third paragraph), i.e. that ED's mortality statistics are likely to under-reflect the true situation.

LUNAR CYCLES

This research is almost in the "Myth-busters" mould. University of Sydney lecturers Chapman and Morrell [2000] wanted to establish "... whether dog bites requiring hospital admission occur more at the full moon ..." They obtained 12 months' worth (timeframe: June 13th 1997 until June 12th 1998) of dog-bite related ED data care of the National Injury Surveillance Unit from across Australia. The outcome was that no positive outcome seems to exist between full moon and dog bites serious enough for a visit to ED. Their research was not altogether inconclusive, though. There is a marked increase in such ED visits over the festive season, so much so that these authors suggest more caution to be exercised with dogs over Christmas and especially at New Year – irrespective of full moon.

DAY OF WEEK RESULTS

While the research of Chapman and Morrell [2000] produced no confirmation, they applied two very useful and illustrative diagrams, one showing full moons underneath a 12 months' worth of related dog-bite admissions graph, and another showing Day Of Week (DOW) averages for the "year". The author will present some DOW results in like manner, albeit for total presentations per DOW - per annum.

Another study which employs DOW graphing / plotting liberally is that done by Brillman et al [2005] in New Mexico, and over quite an extensive timeframe, viz. 1994 to 2002. It is an extensive (and intensive) study, which incidentally also belongs to the respiratory genre of seasonal research already addressed, i.e. they modelled ED visit patterns for infectious diseases. While they do list an extensive respiratory-related assortment of complaints, these are grouped into six categories – called Chief Complaints – or CC for short. They then proceed to either plot all CCs together in some situations, or CCs separately in other situations. In some instances they would plot all the weeks in a year to present in effect 52 weekly peaks and troths – one after the other, and on other occasions they'll condense the plotting into the seven days of the week for one year. They incidentally found significant day-of-week differences, with ED visits for most categories of diseases peaking on Mondays. Their research established timely indicators which made it possible to pre-empt the outbreak of respiratory-related diseases one to two weeks in advance – in other words a very worthy study of respiratory fluctuations.

The research by the current author is less specific (but at the same time a whole lot more inclusive). It targets all ED presentations, not respiratory illnesses only, but then also within a DOW / annual context. And while the BOP DHB Emergency Departments also record a breakdown of the various ED illnesses / complaints in practice, the focus of the current research is more so on the impact of seasonal demand for all illnesses (*en masse*). With one exception: The author does eventually distinguish between injury and non-injury related ED presentations, and incidentally does so per age-group and male / female dimensions. Be that as it may, Brillman et al's research was most enlightening.

VERY LARGE DATASETS

Very large sets of data can be dependant upon the availability of for example state- or province-wide data – and especially so if that is in unison with many years' worth of such data. The current author has already alluded to the fact that Very Large Data Sets (VLDS) can be either an advantage or an encumbrance (where certain rare conditions are for example completely swamped and "diluted" into insignificance by the shear size of the dataset) – as long as researchers think through properly what it is they want to achieve, and the size and type of datasets which would be most appropriate.

Having made that point there are occasions when size of dataset does enhance the project – where "… more … is better …", as was mentioned earlier [Berry and Linoff, 2000, p. 157].

Two such studies are that of Phillips et al [2004] mentioned and discussed earlier – which not only uses thirty years' worth of data (albeit for an applicable two-week holiday period) – but also for the whole of the USA! This is obviously not the sort of dataset a researcher or a group of researchers would ever endeavour to first accumulate. In the case of Phillips et al [2004] they were given access to (and thus utilized) the computerized database on death certificates issued nationwide (for the USA) and held by the National Center (*sic*) for Health Statistics in America. The researchers were therefore able to examine daily mortality nationwide.

Another seasonal study done on a nationwide scale is that of Gotestam et al [1998] in Norway. These researchers utilized four years' worth (timeframe: 1990–1994) of data from all General Hospitals for the whole of Norway. They investigated seasonality in hospitalization (for eating disorders) in General Hospitals across Norway. As it happens the eating disorders under investigation were that of anorexia nervosa (AN) and bulimia nervosa (BN). Emergency admissions by age groups and gender were investigated. Incidentally, BN was found to be rather unusual, while AN was found to be prevalent, specifically so for women. The researchers also mentioned that seasonality had rarely been reported in relation to hospitalization prior to their investigation.

The New Zealand equivalent to such national data / database access would be that of the Ministry of Health. One would almost definitely have to be employed by the Ministry to have any chance of gaining authorization for such access. While some such national data would be (and are) available is not as cut and dried as it may appear. The reason for this is that the different District Health Boards operate independently, and while they are similar, they are not identical or equally sophisticated in their data processing – and thus the gathering of national data isn't always as straight forward as it might appear "on the surface".

LARGE DATASETS

However, in view of the present research it does not really matter, since time and capacity constraints would have rendered a national exercise as by far too big considering the time and technical constraints "delimiting" the scope of the present exercise. That is not considered a problem, though. In the current author's opinion the Bay of Plenty DHB database is more than sufficient for the purposes in mind, and having two fair sized Emergency Departments in its district gives one a more than useful sample of national data to work with. It allowed both the investigation of difference and similarity. In this regard cf. the earlier discussion concerning the "twin cities" and "twin districts" raised earlier in this section concerning the BOP DH Board's Tauranga and Whakatane Hospital ED's in view of the "twin cites" research done by Wilson et al [2004] regarding Portland and Manchester in New England. (A third ED was also occasionally included in the research, but as the reader will discover its presentation and admission frequencies being of such limited size as to produce obviously erratic and anomalous results every now and again.)

Therefore; while one does not have the volume of data a national database would offer, the current study's data sets are much larger than for example that used by Hardern et al [2003] in North Durham, Durham, UK. In the case of Hardern et al [2003] they had access to a reasonably large data set (of 105,000 new A & E attendees per annum - viz. 12 months' worth of data over years 2001 / 2002). However, the study proper, as it were, only ran for 16 days of the year in question – and the 16 days involved only 4,165 A & E patients.

In the current study's case the larger per annum BOPDHB data sets contained in the region of about 55,000 records, with per annum / per hospital ED records totalled around 36,000 for Tauranga and 18,000 for Whakatane. These are fair-sized data sets. Furthermore, as many as three years' worth of data was utilized, viz. about 3 X 55,000 records, i.e. approximately 165,000 ED presentations.

Incidentally, Hardern et al [2003] investigated the impact of a Rapid Diagnosis and Treatment Centre (RDTC) in lessening the load on bed usage in the rest of the hospital – not exclusively, but mostly Inpatients, one would presume. These patients "entered" the hospital via A & E (viz. ED) but are "intercepted" and "rapidly" placed (viz. admitted) by RDTC, as it were. Hardern et al [2003] also present the results of their research by mapping bed occupancy frequency (viz. number of admissions) and hour of the day (viz. 1 to 24), and they also supply a most informative table showing the cumulative "proportions" of admissions (ordered from highest to lowest frequencies) which eventually make up 100% admissions for a time period. Their mapping of per hour admissions over 24 hourly aggregations incidentally present a similar "profile" / "curve" as the hourly results of the current research project.

AGE, SEX, DAY OF WEEK, HOUR OF DAY AND ED

One study in particular bore a particularly close resemblance to that which the current author was hoping to achieve, namely a study done by Downing and Wilson [2002], both in the employ of the University of Birmingham. Their research (located in the West Midlands of the UK) investigated and "plotted" the "... pattern of attendance by hour, day and month, age, and sex ..." After excluding some 29,000 records because of one or more missing values they were still left with a substantial data set of some 939,000 records for the West Midlands area of the NHS in Britain. They amongst other established that the majority of patients were male, Mondays showed the highest attendance across the whole 12 months, and attendance peaked in December. These researchers incidentally only used one 12 month period's data (timeframe: April 1st 1999 – March 31st 2000).

Similarities included are that they also used rural and urban hospitals, 13 hospitals, in fact (six rural and seven urban). In the case of the current author's research the "rural" / "urban" distinction also applies, but more so by implication – i.e. the Western BOP (with the "city" Tauranga as its hub - viz. "urban"), and the Eastern BOP (with the much smaller "town" Whakatane as its hub – viz. "rural").

Downing and Wilson [2002] also used Age, Sex (*sic*), DOW, and Hour of Day (HOD) data. Age groupings are yet again applied. They also plotted per age-group ED usage over 24 per-hour-of-day "calibrations". However, they then proportionately mapped these various graphs, whereas the current author decided to utilize the actual frequencies (term preferred by SAS for number of events – and thus abided by for the most part by this author) – for the purpose of a comparative study of proportionate demand (urban ED versus rural ED). The current author also plotted DOW profiles, as did Downing and Wilson [2002].

Some of the major differences between this study and the current one are that the latter produces triage classification (a most vital aspect of ED ignored by all the previously mentioned research), some referral information, injury / non-injury illness, and so forth. Another most vital difference is that the current study utilizes Data Mining functionality liberally throughout, in collusion with OLAP Cubes.

DATA CLUSTERS

In fact, the only "seasonal" ED study the author could locate which applies clustering is that of Olson et al [2005] who used a combination of actual patient information (i.e. physical addresses in Boston and vicinity) and simulated respiratory-related disease outbreaks to develop a "... real time spatial cluster detection ..." method. Therefore, its not quite real data, but more so what they refer to as "semi-synthetic data"; and not quite "real time" either. According to Olson et al [2005] the "... timely access to health data, often as soon as one day after a visit to a health care facility ..." can facilitate outbreak detection when cases are determined to cluster geographically. Visit data being available as early as "... one day after ..." visits would suggest / imply the usage of management / business information via some OLAP Cubes functionality.

The latter study was done in Boston, Massachusetts in the USA. Timeframe does not really apply, and is therefore "Not Applicable" (N/A) – it being an exercise in simulation.

CONCLUSION

The current study is an exercise in clustering, in part – that is the clustering of data / events to hopefully expose clusters of previously "hidden" data patterns – to eventually produce some sort of "decision tree" which will give one a fair indication of ED usage trends in general, and seasonal ED usage in particular. This is achieved by a collaboration of sorts between Data Mining and OLAP Cubes – "collaboration" in the sense that these two approaches operate as a kind of "tag team" (to borrow a WWF (viz. World Wrestling Federation) term). Either OLAP Cubes and / or Data Mining are utilized, the former "directing" the DM exercise, and vice versa – i.e. an exercise in what is sometimes referred to as Directed Knowledge Discovery. (Take Note: *Data Mining* equates *Knowledge Discovery*.)

WHAT IF ...?

Now what if the DM delivers no "new" dimensional combinations, no new patterns / insights, except that which is already common knowledge?

Well, that is still a successful outcome in that it serves as a confirmation. Furthermore, what might be common knowledge to some (viz. certain Health Informatics Researchers or ED professionals) may well be news to many others – or may present the common knowledge in an original manner which engenders better understanding – and would thus still be adding to the pool of knowledge.

2.4.3 REVIEW: NON-SEASONAL ED RESEARCH

INTRODUCTION

The current author has already made mention of the scarcity of Data Mining related research. Only the last of the preceding ED studies in seasonality used DM, and that was only in an exercise in simulation. The author therefore had to look beyond purely "seasonal ED" and came across this "gem" – cf. Ceglowski et al [2005] in the next sub-section.

MOST USEFUL NON-SEASONAL ED RESEARCH

The first which warrants a mention is a most informative study at Monash University, Melbourne, Australia by Ceglowski et al [2005]:

- Since Emergency Departments are regarded as one of the main routes to admissions into Australian hospitals, these authors decided to data mine ED at a major metropolitan hospital in Australia. They used the ED data of this hospital for the 2002 calendar year. They used length of stay (LOS) as the yardstick, since LOS is one of the main determinants of Healthcare expenditure. As far as methodology goes they applied CART (classification and regression trees) and SOM (self-organizing maps).
- ED treatments were broken down into its distinct processes. The various combinations of these processes were *clustered* together. It yielded 41 *clusters*. They eventually found that 21 of these clusters accounted for 96.6% of presentations (viz. admissions), and just 14 of these 21 for over 90% of presentations.
- DM results also revealed another remarkable and unexpected pattern, namely that when graphed by hour of the day (i.e. for 24 x 60 minute periods) the ratio between the various processes remained consistent regardless of which hour of the day or night it occurred! This finding would simplify costing in the sense that hour of the day or night "by" specific process didn't vary much at all – one therefore didn't have to adjust costing for any particular process according to hour of day – only by income "bracket" of respective health practitioners.

What makes this study especially useful is that it goes much further than merely singing the praises of Data Mining. It gives actual results with real application value. It is an exceptional study, and (although conducted in Australia) from a New Zealand perspective most valuable.

Ceglowski at al [2005] produced a couple of very clear and informative by-hour-of-day calibrated outcomes. One of these shows a histogram-like proportional breakdown of ED processes, and another a most useful by hour of day multiple-graphed presentation. The latter shows a like plotted "profile" to that presented by the current author.

Another most useful journal article is that of Ardagh and Richardson [2004], namely: ***Emergency department overcrowding – can we fix it?*** While the current research focuses on INPUT, i.e. "who" and "when", Ardagh and Richardson [2004] focuses more so on the other side of the demarcation line, i.e. ED THROUGHPUT and OUTPUT (cf. **Flowchart 1** in Section **2.1.1**). Nonetheless, both efforts are an attempt at trying to shed light on the "why".

According to Ardagh and Richardson [2004] the causes of ED overcrowding are threefold, namely excessive PRELOAD, OVERLOAD (which relates to intrinsic capacity of a particular ED) and the ability of an ED to transfer the patients from ED to their respective destinations – i.e. one of the three outcomes illustrated in **Flowchart 1** during AFTERLOAD. PRELOAD, OVERLOAD and AFTERLOAD are thus associated with INPUT, ED THROUGHPUT and OUTPUT in mentioned **Flowchart 1**.

Ardagh and Richardson [2004] then present some suggestions / solutions regarding PRELOAD, intrinsic capacity (viz. OVERLOAD) and AFTERLOAD. The central theme of and solution (or more appropriately, solutions) is that there is no single solution. They make the point that "... the solutions to ED overcrowding are multidimensional ..." and that these dimensions must be "... addressed in concert to achieve the sum of incremental benefit ..."

One further study already mentioned in passing (in Section **2.1.1**) is that of Wilson and Nguyen [2004], viz. "***Bursting At The Seams***..." which also hones in on ED's INPUT, THROUGHPUT and OUTPUT.

Some of these authors' solutions / suggestions will be mentioned and briefly elaborated upon towards the conclusion of this thesis. While such solutions fall outside the scope of the current research, it needs mentioning none the less – if only to alert the reader to the need for a multifaceted and comprehensive solution.

3. RESEARCH CONJECTURE

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3.1 DESCRIPTION AND RESEARCH CONJECTURE

Under Problem Description (**Chapter 1.1** above) the Author already made mention that it was acknowledged that preventable / premature deaths have occurred. Miscommunication and staff being overstretched at vulnerable times were determined to be part of the cause. As previously mentioned, the "ebbs and flows" of demand for Emergency Services cannot always be anticipated to perfection, but an attempt must be made to pre-empt its fluctuations more accurately, and as a result the previously mentioned Research Conjecture:

There seems to be some seasonality in the demand for ED services which can cause operational difficulties
And thus this investigation into the **Seasonal Demand for ED Services**

In view of the above conjecture the following Questions beg investigation:

- Per Season: To determine seasonal demand over 12 month periods running from July to June (inclusive) - each such 12 month period defined as a "Financial Year" – using DHB terminology
  Cf. Cube **C3.1.1** on the next page which illustrates the start of one such Financial Year

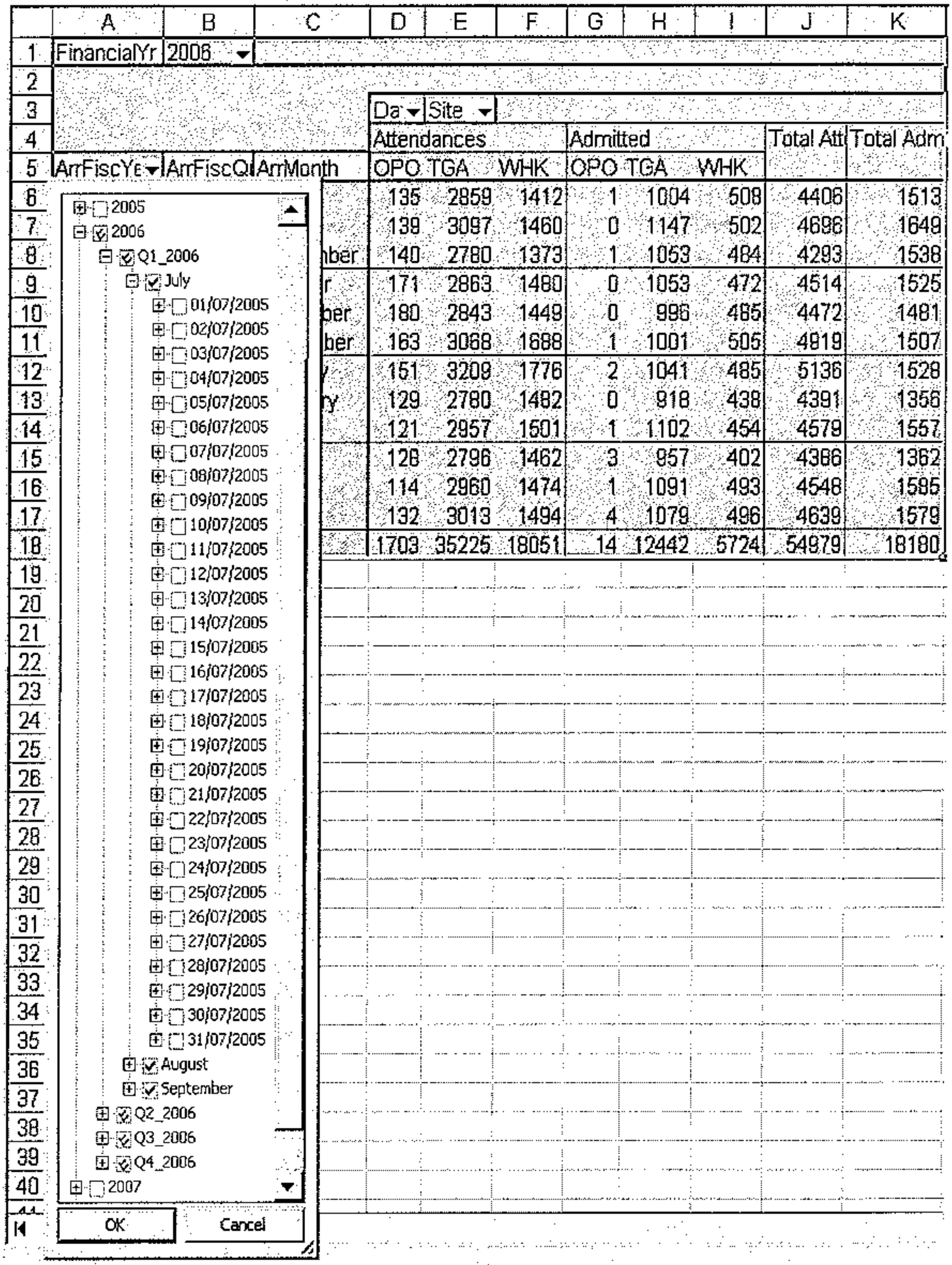
- Per Season: To determine proportions of demand for ED services per day of week

- Per Day of Week: To determine proportions of demand for ED services per time of day

- Per Season: To determine prevalence of various Triage / "urgency" ratings per Day of Week

- Per Day of Week: To determine prevalence of various Triage / "urgency" ratings per Time of Day

- Per Annum: To determine comparative per annum demand over several "Financial Years" – to see if there is a trend "for better or worse" over the years



	A	B	C	D	E	F	G	H	I	J	K
1	FinancialYr	2006									
2											
3				Da	Site						
4				Attendances			Admitted			Total Att	Total Adm
5	ArrFiscYe	ArrFiscQ	ArrMonth	OPO	TGA	WHK	OPO	TGA	WHK		
6				135	2859	1412	1	1004	508	4406	1513
7				139	3097	1460	0	1147	502	4696	1649
8			nber	140	2780	1373	1	1053	484	4293	1538
9			r	171	2863	1480	0	1053	472	4514	1525
10			ber	180	2843	1449	0	996	485	4472	1481
11			ber	163	3068	1688	1	1001	505	4919	1507
12			y	151	3209	1776	2	1041	485	5136	1528
13			ry	129	2780	1482	0	918	438	4391	1356
14				121	2957	1501	1	1102	454	4579	1557
15				128	2796	1462	3	957	402	4386	1362
16				114	2960	1474	1	1091	493	4548	1585
17				132	3013	1494	4	1079	496	4639	1579
18				1703	35225	18051	14	12442	5724	54979	18180

C3.1.1 Cube Pivot Table: Financial Year 2006 = July 1st 2005 until June 30th 2006 (inclusive)

3.2 METHODOLOGY

The Methods employed were quantitative for the greater part, although some qualitative research was also incorporated, especially so regarding the current shift and staff per shift policies / approach employed. In other words: A "Combined Qualitative and Quantitative design", but also a "dominant less-dominant design" (Creswell, 1994, pp. 173, 177). The quantitative research dominates.

3.2.1 CURRENT PRACTICES

Methods used: Mostly qualitative and to a lesser extent quantitative.

Current practices were discussed with some ED staff to establish how they determine shift-durations and associated staffing, what "rules" they currently consider when determining a roster – and how seasonal fluctuations are currently factored into this decision-making process. Opinions were also elicited from these staff members – what problems they've encountered and how they've handled such in the past, and am handing anticipated spikes in demand at present. This part of the research was mostly qualitative.

For Tauranga Hospital ED background the reader is referred back to the opening "stanzas" recorded in **Chapter 2.1.2** of this thesis.

ED also produces its own monthly statistical reports. These "facts and figures" for an immediately preceding month are generated in the first week of the month to follow. Statistics produced by one of the clerical staff members (tasked with maintaining and producing these monthly reports at the two hospitals concerned) was also incorporated. At Tauranga ED producing these monthly statistics is the responsibility of the Clerical Team Leader. The author had several brief discussions with a couple of ED personnel – as noted under ACKNOWLEDGEMENTS – cf. p. iv.

Take Note: These statistics were produced using applicable OLAP Cubes supplied by the Business Intelligence Team at the DHB, formally known as *Information Development* at the BOPDHB – viz. a team within the greater *Information Management Department*.

3.2.2 PROCESSING OF DATA

Methods used: Almost exclusively quantitative.

The methodological approach followed in this case was Directed Knowledge Discovery (DKD). Directed KD is goal-oriented [Berry and Linoff, 2000, p. 73]. The methodology can also be branded as Directed Data Mining.

The Decision Support Systems (DSS) the author applied towards achieving this goal essentially were:

- Online Analytical Processing (OLAP) / Cubes and
- Various Data Mining (DM) techniques.

Both points are discussed in more detail on the last page of **Chapter 3.3** to follow shortly.

The intention was also to utilize these two DSS approaches in a complementary manner and not in isolation. In essence DM was used in both a top-down ("directed") as well as a bottom-up ("knowledge discovery" as a kind of by-product of the DKD) manner, and related / associated OLAP Cubes subsequently used to replicate the DM results / findings, and further explore the source data by "drilling down" further where it was deemed necessary and possible. The complementary potential of using both OLAP and DM is acknowledged by Berry and Linoff [1997, p. 407] and Benjamin [2003, p. 3].

During the course of the various DM exercises two parameters were constantly adjusted in order to achieve the most lucid and uncluttered outcomes.
These parameters were:

- Experimenting with various selections of variables (i.e. either "input" or else "rejected" model roles). Cf. **S3.3.2** under **Chapter 3.3**.
- Experimenting with various numbers of data clusters. This is also referred to as K-Means Clustering, "K" representing such a designated number. [Berry and Linoff, 1997, p.191]

Furthermore, the author investigated the three most recently completed Financial Years' worth of OLAP Cubes and Data for Data Mining purposes – namely that of financial years 2007, 2006 and 2005 (from the three EDs within the jurisdiction if the BOPDHB).
In other words that of:

- July 1st 2006 until June 30th 2007 (i.e. Fin Year 2007)
- July 1st 2005 until June 30th 2006 (i.e. Fin Year 2006)
- July 1st 2004 until June 30th 2005 (i.e. Fin Year 2005)

That is: Sometimes three, often only two, and on occasion only one Fin Year's data was utilized – as was deemed most appropriate at the time. The one exception to the rule was when investigating Per Annum demand, in which case available statistics going back as far as financial year 1999 (i.e. from July 1st 1998) was included.

Then there were occasions where only four individual months' worth of data of certain Financial Years were extracted, namely one extract for July, one for October, one for January and a last for April - for example in the case of **Chapter 7.3**. See in particular tables **C7.3.1 / 3 / 5 / 7**.

These four months were chosen as somewhat representative of a season in the "life" of one financial year: the month of July representing "winter", that of October representing "spring", January representing "summer", and April representing "autumn". July (to a lesser extent) and January (most definitely) were anticipated to show some escalation in demand for ED services based on their coinciding with annual (school) holiday breaks.

In other words; seasonal population growth was anticipated.

3.2.3 CAVEATS REGARDING EXTRACTED DATA

Caveat 1: **"Clean" Data** – or as close as possible to it
It implies:

- Having values other than NULL in each "column" of each "row" of data of each data set / "file" to be Data Mined
- Having sensible values in each of these columns per row of data – for example: ideally Gender will always be either M (Male) or F (Female) – and not U (Unknown)
- As well as the detection and decisions relating to "outliers" – for example how to handle the Patient information of someone Aged 109 years at time of ED presentation in question – and thus falling outside the usual range of say zero to about 100 years of age

As Groth [1998, p.45] puts is: "Data is rarely 100% 'clean'", and Benjamin [2003, p. 20] concurs with: "Missing data and outliers are … extremely common".

Caveat 2: **Data to be Data Mined = Cube data** – or as close as possible to it
In most cases, i.e. for most of the Data Sets utilized the author was successful in achieving a rare 100% match between source data (on the SQL SERVER / DHB side) and extracted and imported SAS data, with two exceptions:

- In the one case the impact was calculated to be 3 thousandths of 1%, and
- In the other case the impact was calculated to be 4 hundredths of 1%

In other words; it had no impact whatsoever on the bottom-line statistics.
Yet again refer to the references to Groth [1998] and Benjamin [2003] of the previous paragraph about 100% clean data being the exception, not the rule.

3.3 STEPS UNDERTAKEN

Steps which were undertaken included the following:

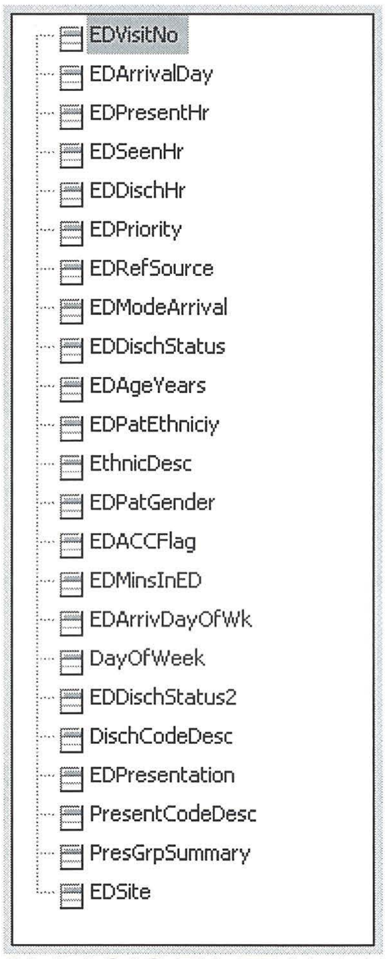
- Deciding on volume of data
  The author used whole "sets" of data, be it a whole month (of a particular Fin Year) or a whole Fin Year – and always Per Hospital.
  Example: A typical month will contain 3,000 records in the case of Tauranga Hospital ED.

- Data Sources
  Various tables were utilized, but the principal table is one which holds ED Visits data.

- Determining which Variables to extract from Data Sources
  A subset of variables was used. Decisions as to which variables to include were subjectively made, and in line with the Directed Knowledge Discovery (DKD) (cf. **Chapter 3.2** above) approach decided upon.

- Extracting Data
  SQL Scripts were created to extract data from a SQL Server Data Warehouse, and these extracts were written to Excel files.

  The following are the variables the author eventually settled upon:



S3.3.1 SAS EM: ED Variables used by SAS Enterprise Miner

Take Note: Patient anonymity was assured – only the Visit No could link a Patient to an ED event – and that variable was NEVER displayed in any outcomes.

Data extraction and data preparation can be (and more often than not is) a major and time consuming exercise. A number of options are available, but in the case of this thesis the above variables were extracted and collated from several Data Warehouse tables (viz. files) - and written to MS Excel files. In computing parlance the resultant files are what is referred to as “flat files”. [Groth, 1998, pp. 42 & 43]

- Importing Data to SAS environment
  These "flat files" were subsequently imported into a SAS environment for DM purposes.

- Experimenting with Data
  There was a great deal of experimentation to determine best-fit solutions.

- Molding data into shape
  The data was "tuned" further by including or excluding variables in order to achieve best results. Certain variables can unfortunately clutter up the Data Mined outcomes to such an extent as to make it well nigh impossible to spot any patterns.

  The following example shows the exclusion of certain variables by designating such as "rejected":

Name	Model Role	Measurement	Type	Format	Informat	Variable Label
EDVISITNO	id	interval	num	BEST12.	12.	EDVisitNo
EDARRIVALDAY	rejected	interval	date	DATE9.	DATE9.	EDArrivalDay
EDPRESENTHR	input	interval	num	BEST12.	12.	EDPresentHr
EDSEENHR	input	interval	num	BEST12.	12.	EDSeenHr
EDDISCHHR	input	interval	num	BEST12.	12.	EDDischHr
EDPRIORITY	input	ordinal	num	BEST12.	12.	EDPriority
EDREFSOURCE	rejected	nominal	char	$3.	$3.	EDRefSource
EDMODEARRIVAL	rejected	nominal	char	$3.	$3.	EDModeArrival
EDDISCHSTATUS	rejected	nominal	char	$3.	$3.	EDDischStatus
EDAGEYEARS	input	interval	num	BEST12.	12.	EDAgeYears
EDPATETHNICIY	rejected	interval	num	BEST12.	12.	EDPatEthniciy
ETHNICDESC	rejected	nominal	char	$25.	$25.	EthnicDesc
EDPATGENDER	input	binary	char	$1.	$1.	EDPatGender
EDACCFLAG	rejected	binary	num	BEST12.	12.	EDACCFlag
EDMINSINED	input	interval	num	BEST12.	12.	EDMinsInED
EDARRIVDAYOFWK	rejected	ordinal	num	BEST12.	12.	EDArrivDayOfWk
DAYOFWEEK	input	nominal	char	$9.	$9.	DayOfWeek
EDDISCHSTATUS1	rejected	nominal	char	$3.	$3.	EDDischStatus1
DISCHCODEDESC	rejected	nominal	char	$25.	$25.	DischCodeDesc
EDPRESENTATION	input	nominal	char	$3.	$3.	EDPresentation
PRESENTCODEDESC	input	nominal	char	$20.	$20.	PresentCodeDesc
PRESGRPSUMMARY	input	nominal	char	$40.	$40.	PresGrpSummary
EDSITE	rejected	unary	char	$3.	$3.	EDSite

S3.3.2 SAS EM: Example of temporary exclusion of certain variables

- The intention was to work with full sets of data – by "full sets of data" is meant a whole month's worth of ED Presentations for a specific Hospital was included in a specific exercise, or a whole financial year's.

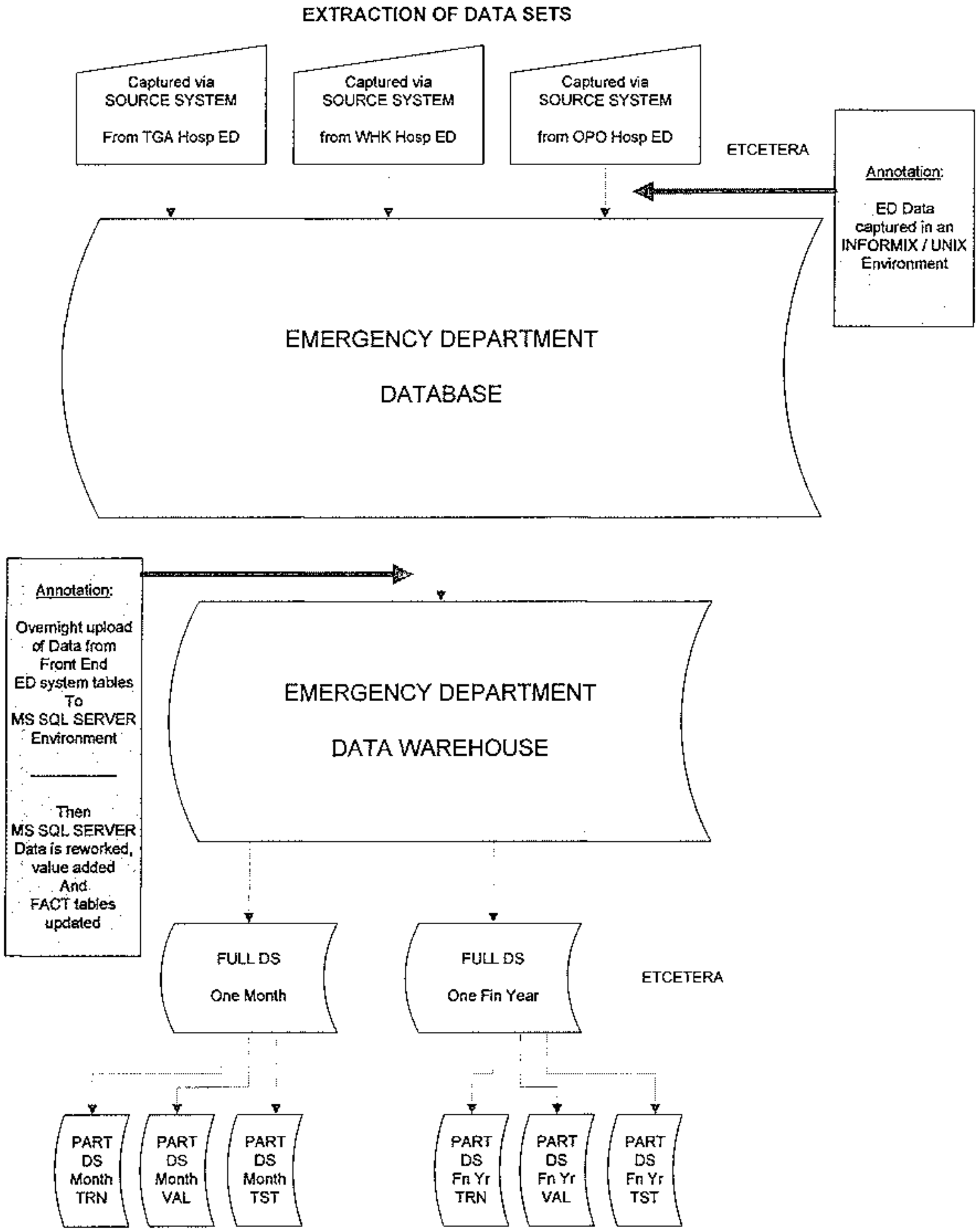
  The conventional approach is to partition data at this point – into two or three randomly determined sets, namely that of:
  a. Training
  b. Test and
  c. Validation.
  Very briefly put; a Training Set is used to build an initial model, a Test Set used to make the model more general and less tied to the idiosyncrasies of the Training Set, and lastly a Validation Data Set to gauge the effectiveness of the model should it be applied to previously "unseen" data [Berry and Linoff, 1997, p. 76] and [Benjamin, 2003, p. 18].

  For the purposes of the current Research Project the three-way partitioning of data was also applied – as follows:
  1. Training Data Sets
  2. Validation Data Sets and
  3. Test Data Sets.
  Take note; these are in a slightly changed naming order - i.e. **1** (a), **2** (c) & **3** (b). That is; the default order used in SAS EM – viz. SAS' Enterprise Miner – SAS' Data Mining package – and to the default breakdown of **1** (**40%**), **2** (**30%**) and **3** (**30%**) randomly selected records from a FULL DS.

  SAS' Box Plot functionality was also utilized over and above other comparative techniques which were employed. These Box Plots "plotted" the distribution of specific variables from partitioned Data Sets or full (viz. non-partitioned) Data Sets [Fernandez, 2003, pp. 37-38].

  Flowchart 2 on the next page gives a visual overview of the principle repositories of data, including the Full Data Sets (viz. "FULL DS ..." in **Flowchart 2**) - be it month or financial year - and subsequent Partitioned Data Sets derived from these Full Data Sets.

  The principal repositories are the ED Database – into which ED presentation data (captured online around the clock via an ED Source system) is imported overnight on an almost daily basis. Value is then added to selected data variables – and the value-added-data written to the ED Data Warehouse. It is from this latter repository that Full Data Sets were extracted, and lastly: Certain of these Full Data Sets were subsequently Partitioned to produce the Training, Validation and Test Data Sets (viz. "PART DS ... TRN (training), VAL (validation) or TST (test)" in **Flowchart 2**).



Flowchart 2: Extraction of Data Sets

- The two Data Mining techniques which the author used were:
    1. K-Means Clustering and
    2. SOM Kohonen Clustering

  Cluster detection, in essence, is the building of models that find records "that are similar to each other" [Berry and Linoff, 1997, p. 121]. While there are various techniques for finding clusters, it is an "inherently undirected" exercise in "data mining" [Ibid] – that is Undirected Knowledge Discovery (UKD). Much of the current Research has of course already been referred to as an exercise in DKD (Directed Knowledge Discovery) (cf. earlier **Chapter 3.2**), and the author believes that still applies in the sense that the researcher controls which Data Variables are included in the imported Data Sets to start with, with individual Variables subsequently flagged as either "rejected" or "included" in every new cycle of Data Mining. One thus has a situation of UKD operating within the overriding boundaries of DKD.

  Although originally used for images and sounds, Neural Networks can also be used for recognizing clusters in data [Berry and Linoff, 1997, pp.325-326]. In fact, Neural Networks are probably the most common of DM techniques [Berry and Linoff, 1997, p.122]. One of its variations is what is known as SOM, viz. Self Organizing Maps, also referred to as Kohonen Maps - after its Finnish inventor, Dr. Tuevo Kohonen [Berry and Linoff, 1997, pp. 325-326].

  Both techniques were experimented with, but K-Means Clustering eventually won the day as the most appropriate Data Mining technique to be used during the course of the research. Results and rationale behind the opting for K-Means Clustering over SOM Kohonen Clustering are soon to follow.

- OLAP Cubes were also used in conjunction with the decided upon K-Means Clustering Data Mining technique. While not a Data Mining technique itself OLAP Cubes [Berry and Linoff, 1997, p 409] can be (and was) used to complement Data Mining outcomes by extracting data using critical Dimensions, some of which identified by a Data Mining exercise [Berry & Linoff, 1997, p. 408].

  The complementary manner in which it can be utilized is that of allowing one to further investigate Data based on dimensions highlighted as particularly influential by a DM exercise – given that existing Cubes were developed using such "dimensions" in the first place. One manner of "further investigation" it allows is that of "drilling down". An example of this is the drilled down to individual days Cube **C3.1.1** - cf. earlier.

4. CLUSTERING TOOL SELECTED AND TOOL'S PARAMETERS FIXED

CLUSTERING TOOL SELECTED AND TOOL'S PARAMETERS FIXED

4. CLUSTERING TOOL SELECTED AND TOOL'S PARAMETERS FIXED

4.1 SOM KOHONEN CLUSTERING VERSUS K-MEANS CLUSTERING

Some Reasons for opting for K-Means Clustering over that of SOM Kohonen – and the idea is not to give an exhaustive analysis / critique of the two techniques at this juncture – but here are the principal reasons:

Cluster profiling of K-Means is found to be superior to that of SOM Kohonen. This is *the* overriding reason for choosing to use K-Means. SOM Kohonen's cluster profiling is one-dimensional (i.e. "2D" in appearance – but in reality only displaying one dimension), whereas K-Means is three-dimensional (and incidentally also "3D" in appearance). That is; comparing SAS charts **S4.3.1** (viz. SOM Kohonen) with **S4.3.2** (K-Means Clustering) (a couple of pages along), what is found is:

- SOM Kohonen colour-codes its rectangularly represented clusters to show frequency, and that's just about it.
  For additional information cf. **Chapter 13.4 APPENDIX D10.2**.

- K-Means, on the other hand, relays three essential bits of information with one "visual", i.e.:
  - Standard Deviation (viz. the size of the "slice of the pie") – simplistically put: an SD of less than 2.5 is considered "good" and acceptable – whereas an SD of 2.5 or greater would signify significant deviation and is considered "not good" (for additional information concerning SD cf. **Chapter 13.4 APPENDIX D2**)
  - Frequency (viz. the height of mentioned "slice"), i.e. the number of records in clusters relative to all clusters' frequencies, and
  - Distance of furthest member of cluster from cluster-seed – i.e. the "darker" (viz. "redder") the colour the further out the farthest cluster member is, and the closer in the farthest member the "lighter" (viz. "yellower") the colour.

  For additional information cf. **Chapter 13.4 APPENDIX D10.1**.

- Manner in which clusters are identified. K-Means clusters are numbered by a particular cluster number – for example "7" or "2" etc - whereas SOM Kohonen requires a "clumsier" "row" and "column" to identify any particular rectangular box within the overall rectangular "canvas". While this difference does not in reality affect the DM exercise, referring to for example a "fifth" cluster as "Cluster 5" (in case of K-Means) is preferable to referring to the equivalent cluster as "Cluster Row 2 Column 1".

Concerning Input Means Plotting the two techniques appear much alike, although SOM Kohonen more readily displays a breakdown in values of a particular variable than does K-Means. Take for example the variable EDPATGENDER. SOM Kohonen displays both M and F (i.e. Male and Female) while K-Means almost always displays only the one – the exception being if there were a situation of three genders (!) appearing amongst the presentations – for example if someone's gender was recorded as "unknown". However, considering the congested space available for the display of variables, there are occasions of the fewer the better, and where Measurement of a particular variable is *Binary* (*aka* SAS) the inverse of the one presented is always implied: 47% Female implies 53% Male – in other words one "row" (viz. for example only *Female* being plotted) is actually preferred. It leaves a "row" for some other measurement.

Distance charts (not reproduced here, but worth a mention) would also suggest that within the context of the current research the K-Means clustering algorithm appeared to be a bit more effective, and thus preferred, over the SOM Kohonen algorithm. K-Means certainly appeared to handle the incorporation of outlying cluster members better than did SOM Kohonen.

Incidentally, take note how similar the two Input Means Plots are (cf. **S4.3.3** and **S4.3.4** a few pages along) – especially so for the seven days of the week. SOM Kohonen's Input Means Plot also plots Gender = Male over and above Gender = Female. Furthermore, since no clusters were selected only the averages for _ALL_ are shown – and it clearly plots Fridays, Saturdays, Sundays and Mondays as days with higher presentation-frequencies than Tuesdays, Wednesdays and Thursdays – which is the general trend, albeit with the four peak days sometimes showing different priority permutations.

4.2 RATIONALE BEHIND VARIOUS DATA MINING PARAMETER DECISIONS

Firstly, a couple of questions:

1. Why partitioned into three and not just two Data Sets?
2. Why a 40%, 30% & 30% partitioned between TRN, VAL & TST Data Sets?
3. Why not in the "order" of Training, Test and Validation?

Reasons:

1. A decision was made to **abide by** the **SAS EM (SAS Enterprise Miner) defaults**. This was dictated more so by constraints of time and opportunity required to do the research. A very tight schedule did not allow for too much diversion from default package parameters.
2. That is also the reason for the order of the Data Sets – the SAS EM default order is Training, Validation and Test (Mnemonics TRN, VAL & TST used within context of the current research) in contrast to the textbooks' usual Training, Test and Validation order. A FULL / "source" DS is thus split into three randomly selected **partitioned Data Sets** to a **40% / 30% / 30% breakdown**. Furthermore, having gone down that road for some distance, time constraints did not allow for a Training and Validation (say 60% / 40% split) rework, for example.
3. The idea was also to use **TRN** to build, **VAL** to hone, **and** lastly **TST** to test the models – and while three Data Sets were available it did no harm including TST in Box Plots and Clustered outcomes – in fact, it is the author's opinion that it enhanced the outcomes.

Some of the other default parameters abided by:

Calibration: Left as defaulted. Take for example the histogram / bar chart of replicated SAS Box Plot **S7.1.1** in Section **6.2.8** a number of pages ahead. The ED Age Years calibration is in decimal *point 5.*

The **Cluster Pie Chart defaults** mentioned immediately before under **K-Means Clustering** in **Chapter 4.1**, i.e. SOM KOHONEN CLUSTERING VERSUS K-MEANS CLUSTERING – these were left as was and used consistently throughout the research.

A **default "base number"** used in the calculation of **cluster "seeds"** is also accepted consistently throughout the dissertation. This "base number" (author's own term for this default numeric code) is utilized by the clustering algorithm

As far as the **number of clusters** are concerned – here the author overrode the default number of clusters (of three) and experimented with various numbers of clusters. Through experimentation it became clear that eight clusters result in neither too few nor too many clusters.

Too few clusters result in a diffusion of cluster characteristics because the clusters are too widely scoped, and too many clusters fragments the outcomes into too many and too narrowly scoped clusters – and thus obfuscates the outcomes. That is: In the case of the former "one could not see the trees for the forest" and in the latter "one could not see the forest for the trees".

Or as put by Ceglar et al [2003, p. 71 in Pendharkar, 2003] "Mining result sets are often large and complex..." - their size often making them "...difficult to entirely represent in a form conducive to understanding...". Yes indeed, "Large result sets produce cluttered presentations..." [Ceglar et al, 2003, p. 71 in Pendharkar, 2003].

On the other hand, it was for example found that Age plays quite a role in ED presentation statistics, and that an **eight way "slicing"** of the "pie" results in "natural" age groupings of "infants", "teens and young adults" etc.

The following Questions might now come to mind:

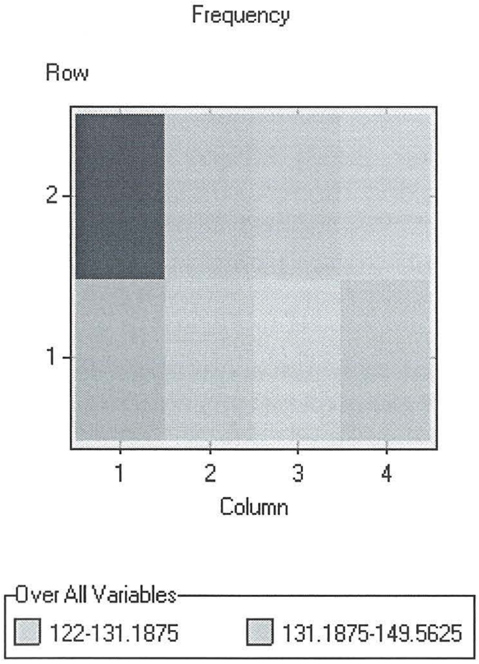
1. How are these clusters determined?
2. Is there an "ordinal" nature to the numbers assigned to clusters?

Concerning "**1**" above:
The parameter for the number of clusters being set at 8 means eight clusters will be generated. To start with; the default "seed" is used in the determination of the selection of eight "centroids" – viz. eight "suns" – each at the centre of eight little "solar systems". The remaining members (viz. minus the eight "suns" already used) of the Data Set (for example a TRN DS) are assigned to its nearest "centroid". Once all members of a particular DS have been assigned to one of the eight clusters a new centroid / "sun" is determined for each of the eight clusters / "solar systems", and then all the members of the DS are yet again assigned to a "nearest" centroid. This process is repeated a number of times – and finally the eight clusters (numbered "1" through "8") presented via the Results output of the particular DM process.

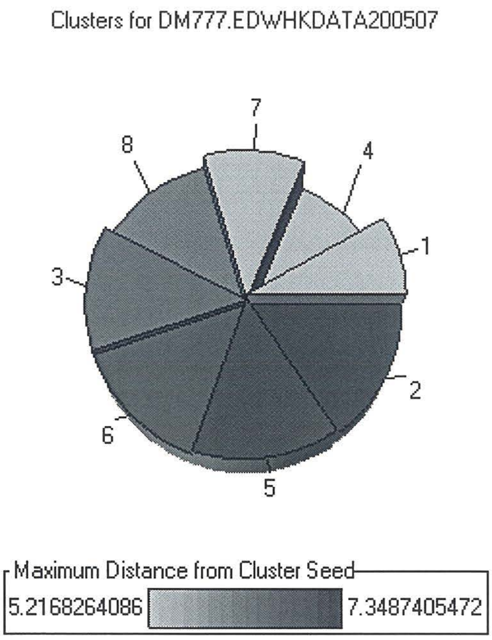
Concerning "**2**" above:
It is very important to keep in mind that the number assigned to any cluster is entirely accidental, and in no way indicative of an "ordinal nature" – i.e. that cluster "1" is not by implication the most frequented cluster, and cluster "8" the least frequented. Cluster "8" has as good a chance of being the most prominent cluster as has cluster "1". "The "ordinal" nature of clusters is determined by the frequency count of each cluster – i.e. the cluster with the highest frequency is the most prominent. The top cluster might be cluster "8", followed by cluster "2", followed by cluster "6" – and so forth.

4.3 SOM KOHONEN AND K-MEANS PRESENTATIONS

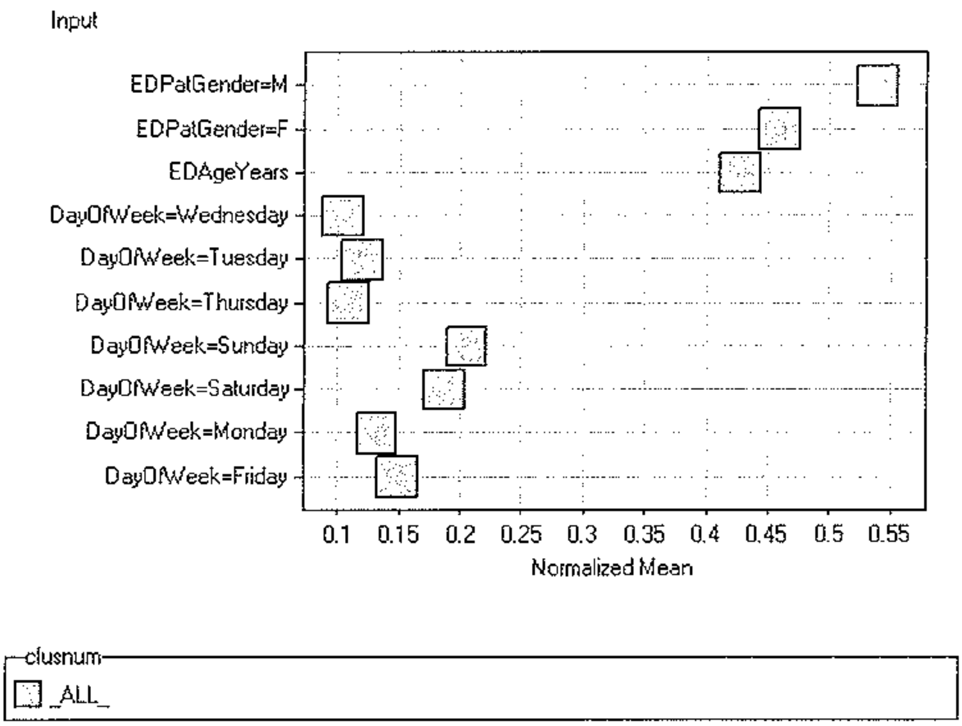
SOM KOHONEN CLUSTERING VERSUS K-MEANS CLUSTERING



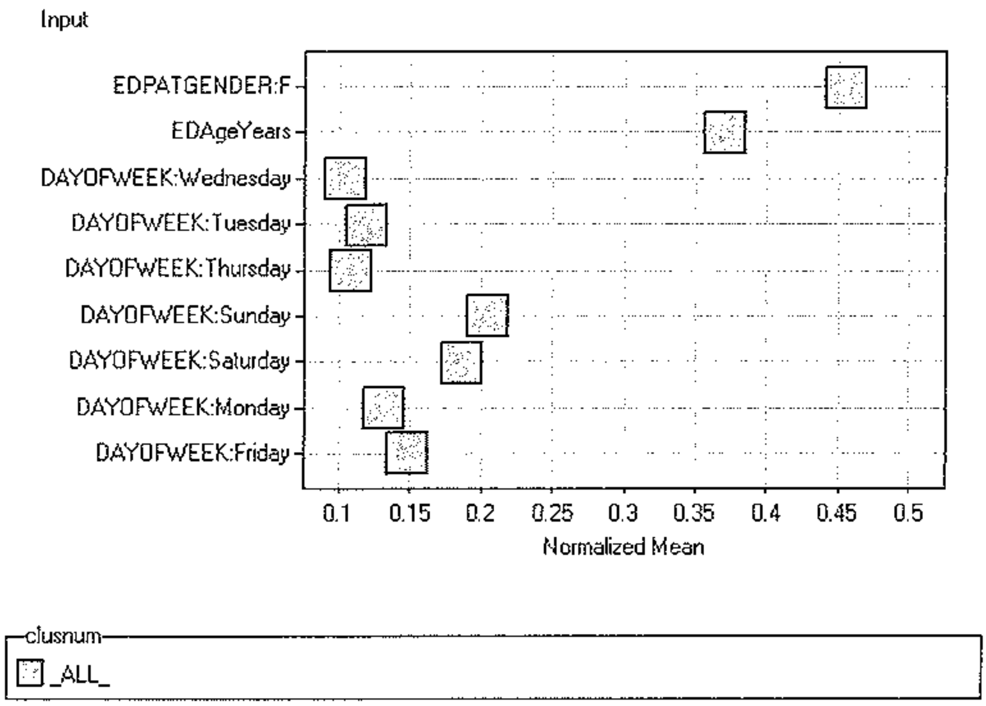
S4.3.1 Cluster Chart: SOM Kohonen Cluster Chart for WHK ED Presentations – JULY 2005



S4.3.2 Cluster Pie Chart: K-Means Cluster Pie Chart for WHK ED Presentations – JULY 2005



S4.3.3 Input Means Plot: SOM Kohonen Cluster Input Means Plot for WHK ED Presentations – JULY 2005



S4.3.4 Input Means Plot: K-Means Cluster Input Means Plot for WHK ED Presentations – JULY 2005

4.4 DATA VISUALIZATION - RATIONALE AND CONSIDERATIONS

One definition reads as follows: "Visualization employs graphics to make pictures that give us insight into certain abstract data and symbols" [Chen, 2005, p. 543 in Rao et al, 2005].

These pictures may present the data in innovative ways. Some visualization tools also allow "online real-time" (OLRT) interactive functionality [Chen, 2005, pp. 543-544 in Rao et al, 2005]. The thesis being a printed document obviously excludes such CAD-like OLRT capability, but "snapshots" of OLAP Cube and Data Mining generated results can be (and are) included. For example; Bar charts (OLAP) and pie charts (SAS) are none other than graphical visual presentations. The author can "drag" and "drop" dimensions of a Cube and then generate a chart (in the case of OLAP) and / or alter the number of clusters required and select (or deselect) variables to process (in the case of SAS EM) - and these results committed to printed page.

That is; Cubes can be made "visual" by converting selected columns and / or rows into a variety of 2D or even 3D chart representations of the underlying statistical data, and some Data Mined results can be presented in 2D (example: Cluster Distances "plot") or 3D (example: K-Means Cluster Pie Chart) – in the view of the current author. Cf. **Chapter 6** for examples of the same. A Cluster Pie Chart (as generated by SAS) is also a "typical" example of what Chen [2005, p. 544 in Rao et al, 2005] refers to as "a virtual 3D graphics object". It has geometrical form (the 3D "pie") as well as associated attributes (such as colours and shading) [Ibid].

This thesis, so heavily reliant upon statistical results presented in an assortment of different ways, is also an effort at providing (as Wilhelm [2005, 533-534 in Rao et al, 2005] puts it) "...intuitive and easy to use methods to encourage sound analysis of data" - in order to achieve the following "sometimes conflicting" [Carr, 2005, p. 418 in Rao, 2005] goals:

- To enable accurate comparison
- Appropriate interpretation
- To involve the reader, and to do all of this while
- Striving for "visual simplicity".

Having related the above, Carr [Ibid] also mentions that "... 3D pie charts ... are not (always) the best in terms of mentioned "accurate comparison". However, when used in combination with (as in the case of this thesis) associated Cluster Statistics, Input Means Plots and Distance Plots – it is quite accurate. On the other hand, "overlaying" [Wilhelm, 2005, pp. 505-506 in Rao et al, 2005] can be (and is) less accurate. But it is acceptable, and it is actually utilized in three sections of this thesis, i.e. **Chapters 7.2**, **7.3** & **9.3**. In the case of the latter the population bases are alike, whereas in that of the first two the populations are quite different. However, the "contours" of two super-imposed graphs can still be visually compared – albeit with a subjective element involved.

5. RESEARCH TEMPLATE OVERVIEW

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5.1 RESULTS AND DISCUSSION TEMPLATE

For the most part the RESULTS are presented within the framework of the various Questions posed in **Chapter 3.1** (DESCRIPTION OF RESEARCH CONJECTURE) namely:

- Per Season: To determine seasonal demand over 12 month periods running from July to June (inclusive).
- Per Season: To determine proportions of demand for ED services per day of week
- Per Day of Week: To determine proportions of demand for ED services per time of day
- Per Season: To determine prevalence of various Triage / "urgency" ratings per Day of Week
- Per Day of Week: To determine prevalence of various Triage / "urgency" ratings per Time of Day
- Per Annum: To determine comparative per annum demand over several "Financial Years" – to see if there is a trend "for better or worse" over the years

These preceding points subsequently became chapter / sub-chapter headings.

As for DISCUSSION of the RESULTS – the above chapters are yet again identified / reflected in the respective "condensed outcome" tables at the closing of each "mega" Chapter – viz. each associated "group" of chapters in this Thesis.

5.2 STUDIES IN DIFFERENCE AND SIMILARITY

The "core" of the research is contained in **Chapters 7, 8, 9** & **10**.

These chapters are divided into (in essence)

1. Firstly: A Study in **DIFFERENCE** (**Chapters 7** & **8**)

AND

2. Secondly: A Study in **SIMILARITY** (**Chapters 9** & **10**)

Firstly, Hospital T versus Hospital W – a comparative study (with the emphasis being on **DIFFERENCE**) and using FULL Data Sets – for example a FULL Month Hosp T being compared with a FULL Month Hosp W.

Secondly; Tauranga Hospital data was partitioned into TRAINING, VALIDATION and TEST Data Sets, and the randomly partitioned Training, Validation and Test Data Sets compared (the emphasis being on **SIMILARITY** between partitioned DS "siblings" originating from the same FULL DS or between equivalent DS from different Fin Years).

Thus, **Chapter 3.2.2** (PROCESSING OF DATA) involves FULL and PART DS, i.e.:

1. FULL Data Sets (be it FULL Months or FULL Financial Years) are compared between Tauranga Hospital ED and Whakatane Hospital ED

AND

2. PARTITIONED Data Sets (be it a partitioned Month or a partitioned Financial Year) of Tauranga Hospital are used for the purpose of in effect "validation".

The terminology used to identify **Results of** (**1**) is:

- **Hospital T**, "abbreviated" to **Hosp T** for Tauranga Hospital's ED

AND

- **Hospital W**, "abbreviated" to **Hosp W** for Whakatane Hospital's ED.

The terminology used to identify **Results of** (**2**), on the other hand, is:

- **TGA** for Tauranga Hospital's ED

AND

- **WHK** for Whakatane Hospital's ED.

The WHK component in (**2**) is very low key, in that the main thrust here is that of comparing / validating randomly partitioned TGA Data Sets for either a Month or a Financial Year with that of the randomly partitioned TGA Data Sets of either the "same" Month (another Fin Year) or another Financial Year.

In other words:

- Equivalent Months belonging to different Fin Years are compared

OR

- Different Financial Years are compared.

On rare occasions the equivalent Partitioned Data Sets for WHK were also utilized – to confirm or negate the earlier findings of the comparative study – viz. that of:

- Comparing Seasonal Demand of two hospital's Emergency Departments

AND

- Comparing Seasonal Demand between equivalent Data Sets (different Months or different Fin Years) of the same Emergency Department

And thus the chapters:

- **FINDINGS: HOSP T VS HOSP W <u>USING FULL DATA SETS</u>**
  [A STUDY IN DIFFERENCE]
- **DISCUSSION: <u>Using FULL DS</u>: HOSP T VS HOSP W USING FULL DATA SETS**
  [A STUDY IN DIFFERENCE]

AND

- **FINDINGS: TGA <u>USING PARTITIONED DATA SETS</u> (I.E. TRAINING, VALIDATION & TEST) VS SOME WHK**
  [A STUDY IN SIMILARITY]
- **DISCUSSION: <u>Using PART DS</u>: TGA USING PARTITIONED DATA SETS (I.E. TRAINING, VALIDATION & TEST) VS SOME WHK**
  [A STUDY IN SIMILARITY]

That is subsequent **Chapters 7**, **8**, **9** & **10** mentioned at the start of this sub-section.

The six-fold questions presented in the template overviewed in **Chapter 5.1** (viz. RESULTS AND DISCUSSION TEMPLATE on the previous page) were investigated and reported on in each of **Chapters 7**, **8**, **9** & **10**. Of these, **Chapters 8** and **10** "condense" the Results to the six questions posed in six sub-sections apiece (viz. six sub-section within each of **Chapters 7** and **9**) into an overview of the combined outcomes.

Well, that is almost the "skeletal structure" of the "mega" **Chapters 7** & **9**, with one exception / correction: While there is a **Chapter 7.6**, there is no equivalent "Chapter 9.6". The nature of **Chapter 7.6** is such that there was no need of an equivalent "Chapter 9.6".

In other words, but for this one exception where appropriate the six question rule is always adhered to – even in so far as the splitting of the Appendices into:

- **Chapter 13.1 APPENDIX A**

AND

- **Chapter 13.2 APPENDIX B**,

Where the Research Results are recorded with the following dual purpose in mind:

- To keep the sub-chapter numbering in "sync" with the six question rule

AND

- To un-clutter the two "mega" chapters for ease of use and reading.

With respect to the last point made regarding the un-cluttering of the two "mega" chapters:
The reader will notice that the author uses the terminology "FINDINGS" and "RESULTS", and for the sake of mentioned un-cluttering thus keeps the

- FINDINGS and
- RESULTS apart.

These two terms are defined as follows within the context of this thesis:

- RESULTS are the actual output from
    - SQL SERVER based OLAP CUBES and / or
    - SAS EM based (downloaded) Data Sets (DS) / files

AND

- FINDINGS are the interpretation and discussion of these RESULTS.

These FINDINGS can be (and often are) condensed into Tables - and such Table-names identified by the first character being the letter "T". These tables are used extensively within chapters dedicated to FINDINGS and DISCUSSION.
Example: **T7.1.1** is a Table (**T** = Table) to be found in **Chapter 7.1**.

(Incidentally; the terms "outcomes" and "results" are considered synonymous.)

6. RESULTS PRESENTATION AND INTERPRETATION

RESULTS PRESENTATION AND INTERPRETATION

6. RESULTS PRESENTATION AND INTERPRETATION

6.1 VARIOUS WAYS OF RESULTS PRESENTATION

Various ways of graphical results presentation were utilized, especially the following:

- Cube Pivot Tables (using Cubes and Excel)
- Line, Column and Bar Charts (using Cubes and Excel)
  Synonymous Terms: Histogram / Bar Chart and Graph / Chart
- Input Means Plots (using SAS)
- Cluster Pie Charts (using SAS)
- Statistical Charts (using SAS)
- Cluster Proximities / Distance Charts (using SAS)
- Cluster Profiles (using SAS)
- Box Plots (using SAS)

The various graphical presentations occur via one of two forums, i.e.

- OLAP Cubes (viewed via Microsoft Excel)

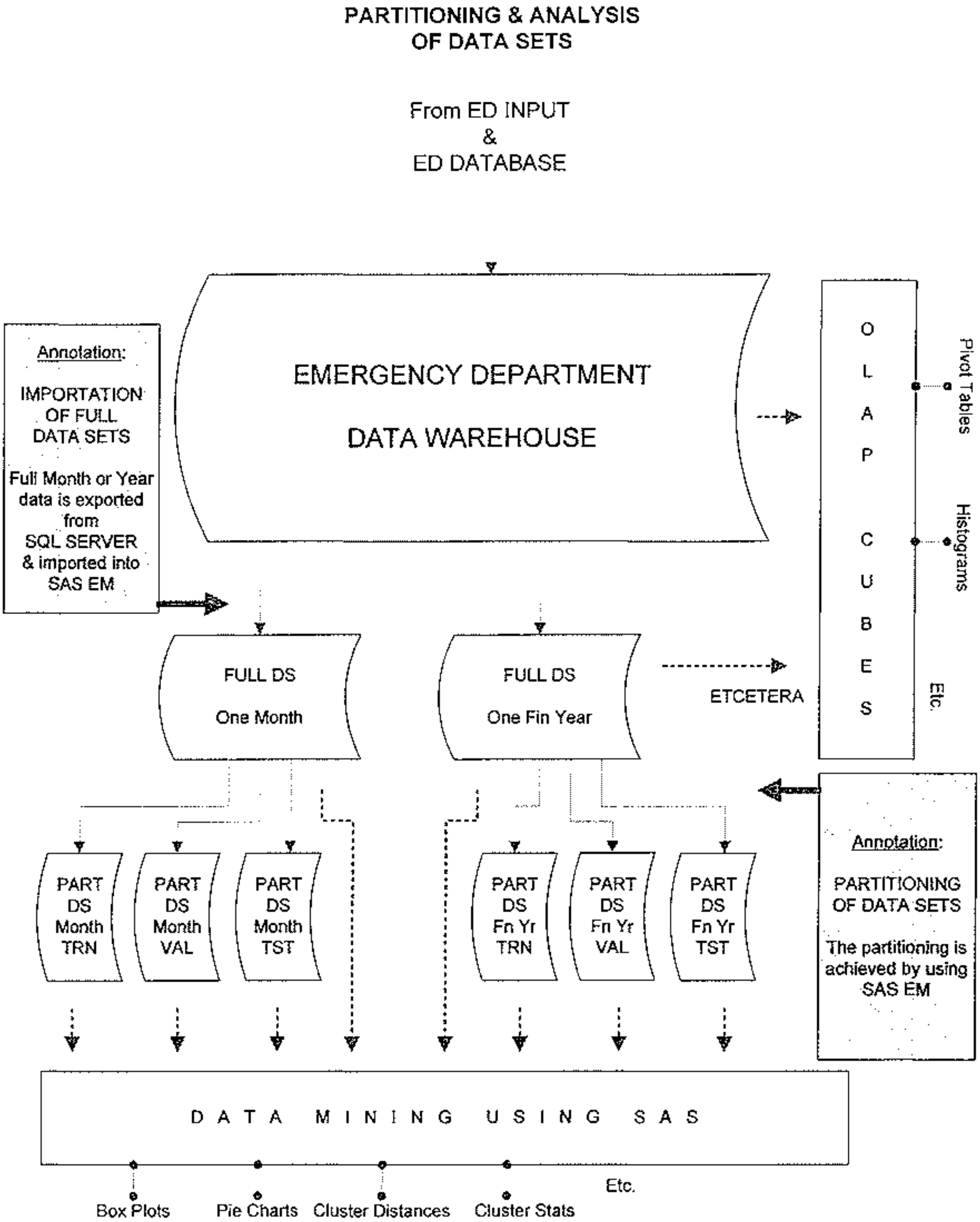
OR

- SAS EM (SAS Enterprise Miner)

Regarding SAS EM parameter defaults: cf. earlier Section **4.2** - especially so concerning Cluster Pie Charts and Clusters.

Cf. **Flowchart 3** on the next page for a visual overview of the partitioned research environment.

The research was thus observed, analyzed and interpreted via one of the above forums, or to be more precise, via either the one or the other, or both.



Flowchart 3: Extracted Data Sets observed via OLAP CUBES or SAS EM

6.2 SOME OF THE LESSER KNOWN PRESENTATION TOOLS EXPLAINED

Several of the aforementioned graphical presentation tools would be familiar to most readers, for example the MS Excel tables and plotted graphs.

On the other hand some readers may well be unfamiliar with some of the other presentation tools, especially those produced by SAS EM. The author only used a sub-set of SAS EM tools. The unfamiliar reader is now introduced to some of these.

This section thus explores some of these lesser used presentation tools, and the **reading** of the first encounter with each.

The term "**reading**" is also used as synonymous with "interpretation" within the context of this thesis.

But first; the term OLAP CUBE – or CUBE for short - needs to be defined.

6.2.1 DEFINING CUBE / OLAP CUBE

In computing parlance a CUBE and an OLAP CUBE is the same thing. It's a matter of preference – either term will do - but the one most commonly used is CUBE – which still implies an OLAP CUBE.

Now to further remove the mystique from these terms:

OLAP = **O**n-Line **A**nalytical **P**rocessing

CUBE = Multiple dimensions of data extracted and displayed

OLAP in effect means one is analysing data online / real-time (OLRT) – i.e. right "now" – at the "press of a button".

The original CUBE is a box with six square faces, all of which precisely the same size. In reality it is a three-dimensional object – it has length, height and width. Visualize Rubik's Cube, for example. Now imagine that one looks at more than three selection parameters / dimensions (i.e. more than only 3D) – to four dimensions, or five, or six etc.

In other words – OLAP CUBE simply means the viewing of statistical data selected via one or more parameters / dimensions, and doing so "right now – as we speak".

This information is then presented via for example MS (viz. Microsoft) Excel's Pivot Table functionality. MS SQL SERVER (which is part of what the author used in the current research) thus presents its results via MS Excel's Pivot Tables.

6.2.2 THE READING OF A CUBE / OLAP CUBE

The three-character mnemonics used to represent the three ED departments are:

- TGA
- WHK and
- OPO.

The reader will usually notice one of these three mnemonics, or otherwise "All Site" on any Pivot Table whenever the Site parameter is shown in the "filter" (top left corner) of each Cube.

Incidentally; the Site parameter is usually followed by the Financial Yr parameter. This parameter will show one of three types of selections, viz. a particular Fin Year (for example "2006"), "All Financial Yr" or (in parenthesis) "(Multiple Items)".

Other parameters may now follow, always displaying one of the *specific*, *All* or *Multiple* threesome.

The top left parameters are known as the "Filter", and it is the term which will also be used in this thesis.

One can now look at the first CUBE (**C7.1.1**) presented a few pages further along under **6.2.8.1**REPLICATED CUBE in Sub-Section / **Chapter 6.2.8**:

Its top left corner (viz. Filter) displays the parameters Site = TGA and Financial Yr = 2006. One therefore knows the statistical data displayed is that of Hospital TAURANGA ED and it is for the period JULY 1st 2005 until JUNE 30th 2006.

Fin Yr = 2006 in effect indicates the year in which a particular Fin Yr concludes – and in this case it concludes on JUNE 30th 2006. In other words, the "July" referred to in the CUBE is July 2005, "December" is December 2005, "January" is January 2006, and "June" is June 2006.

The data (that is statistical data) is displayed on an MS Excel "worksheet".

The data contained in this CUBE is henceforth converted into the Bar Chart. While not replicated here the associated chart (viz. **C7.1.2**) can be viewed in **Chapter 13.1 APPENDIX A1**. This bar-chart is generated using the usual MS Excel functionality to achieve that goal. Incidentally, charts, be it bar-charts / histograms, line-charts and so forth are often generated during the course of this thesis, invariably because of the usefulness of visual presentation.

6.2.3 THE READING OF A BOX PLOT

Box Plots – obtained via SAS – are ideal for acquiring statistical information concerning Data Sets. A quick "tour" of some of the statistics pertaining to one of the subsequent box plots will illustrate such. Take the first box plot (i.e. **S7.1.1** *replicated* under **Section 6.2.8.2**) which represents one month's worth of ED data from Tauranga Hospital. Also take note that **Chapter 13.4 APPENDIX D2** contains definitions of several statistical terms used in related box plot statistics.

N = 2,859 are the number of records comprising the month of JULY 2005.

Mean = 39.45 represents the average age of the patients.

Kurtosis = -1.18 has to do with how normal the distribution of the data is. A kurtosis of closer to 3 would signify normal distribution, in other words a -1.18 is not normal at all. If it were normal the density histogram would show a normal / peaked curve – which of course it does not. However, the fact that babies represent a large number of ED presentations does "skew" the normal curve as a result – and that would be one of the reasons why a normal (viz. bell-shaped) curve would remain the "impossible dream" in such ED research. A -1.18 indicate a flat rather than a peaked curve.

Skewness = 0.25 relates to symmetry in distribution (i.e. curve). Skewness approaching 0 (zero) would signify symmetry. In other words, this data set is not quite symmetric. Yet again the principal reason for this is that babies would "skew" the distribution.

Those would be the most essential of pointers to reflect on when reading the box plot statistics, especially so the Mean, within context of the present research.

The dark line (or band) in the top plot (the box plot per se) incidentally shows the **Median**. The calibration unfortunately does not assist its reading as well as one would have preferred, but in a later chapter it will be quite useful in illustrating a rounding up or rounding down of the ordinal Triage classifications of ED presentations. The Median is however pinpointed under the Quartiles statistics (viz. "50% Med") below – i.e. it is 36 years of age.

The Quartile statistics incidentally indicate such statistics as "youngest" and "oldest" patient, i.e. **"% Min"** = 0 (viz. under one year old) and "**Range**" = 100 years old respectively. Over and above that "**25% Q1**" = 16 indicates that 25% of the presentations concerned ED patients of ages 0 – 16 years of age. "**50% Med**" (viz. **50% Q2**) = 36 signifies the Median. It in effect indicates that half the patients are 36 and under years of age, and the other half thus over 36. "**75% Q3**" = 64 indicates that 75% of patients were from 0 – 64 years old.
(Where **Q1**, **Q2** & **Q3** equates Quartiles 1, 2 & 3)

6.2.4 THE READING OF A CLUSTER PIE CHART

Important Introductory Note (pertaining to Sections **6.2.4/5/6/7**) regarding any set of clusters' outcomes: Keep in mind that one must read and interpret cluster results in combination. One visual image may only give part of the answer, but read in unison with one or more related visual and / or tabular output can present the full picture.

Now, viewing **S9.2.1** – viz. the Pie Chart *replicated* under **Section 6.2.8.3** - one can make the following introductory observations:

Cluster Numbering

The "pie" is sliced eight ways and the eight "slices" numbered accordingly. As already indicated in an earlier section, these numbers are totally co-incidental and does *not* hold any significance beyond the identifying of each cluster.

Based on the 3D graphic presentation already discussed under **Chapter 4.1** (SOM KOHONEN CLUSTERING VERSUS K-MEANS CLUSTERING), and viewing mentioned replicated Pie Chart **S9.2.1** one can derive the following:

Cluster Width – i.e. **Standard Deviation** (SD)

Standard Deviation is represented by the size of the "slice of the pie". In fact, the pie chart does not supply the actual SD values – it only supplies some proportional / comparative information. One can for example see that slices (i.e. clusters) **3** and **6** are the smallest, and slices **4**, **8** and **2** the largest – and thereby derive that the SD of one of first two (slices) is bound to be the lowest, and the SD of one of the last three bound to be the highest.

The answer to which is lowest and which is highest is found under column three in **S9.2.3** – viz. the Cluster Statistics *replicated* under **Section 6.2.8.3**. Clusters **3** and **6** have Standard Deviations of **0.96** and **0.75** respectively. The latter, cluster **6,** therefore has the lowest SD – viz. **0.75**. Similarly the SD values of clusters **4**, **8** and **2** are **1.52**, **1.36** and **1.34** respectively. The first of these clusters, cluster **4**, thus has the highest SD – viz. **1.52**.

Now simplistically put: an SD of less than 2.5 is considered "good" and acceptable – whereas an SD of 2.5 or greater would signify significant deviation and is considered "not good". For more information in this regard cf. SD and Significance in **Chapter 13.4 APPENDIX D2**.

Cluster Height – i.e. **Frequency**

While a pie chart is easier to read in colour, one can none the less still make out subtle variations (albeit in black and white and shades of grey) in the "heights" of the various slices – and "height" represents the number of records in particular clusters – or to use SAS EM terminology – "frequency".

At closer scrutiny of the Pie Chart slice heights, Cluster **2** appears to be the highest, with clusters **6**, **7** and **5** quite high as well. As the reader will see shortly (in Section **6.2.6**), Cluster **2** is in fact the cluster with the highest frequency.

For more information in this regard yet again cf. **S9.2.3** (viz. Cluster Statistics) *replicated* under Section **6.2.8.3**.

Cluster Colour – i.e. **Distance**

That is Distance as a measure between cluster-"seed" and the most far-flung other-than-"seed" member of this same cluster. That is; the furthest / most-outlying "planet" in this cluster's little "universe".

The darker (viz. "redder") the colour the further out the farthest cluster member lies, and the closer in the farthest member the lighter (viz. "yellower") the colour - as per the Distance colour-bar immediately below the "pie" of the pie chart. In this instance the closest of the eight furthest (per cluster) member is measured at 4.57 (and "yellowest"), and the furthest out of the eight (per cluster) member measured at 7.45 (and "reddest").

Incidentally, for the precise measurement on all eight one can yet again refer to **S9.2.3** (viz. Cluster Statistics) *replicated* under Section **6.2.8.3**. As the reader will notice cluster **4** is in fact the cluster with the furthest distance between cluster seed and cluster **4**'s outermost member.

6.2.5 THE READING OF A CLUSTER DISTANCE CHART

Cf. **S9.2.2** (viz. Cluster Distances) *replicated* under Section **6.2.8.3**.

In all eight ellipses are shown, each with a "centroid" (*sic*) (viz. cluster-"seed") in the middle, and the borders of each ellipse obviously inclusive of the furthest out member of its particular "universe".

Take note how the eight clusters' ellipses lie across the two-dimensional "canvas" – showing the proximities of the clusters over the spectrum and more specifically those clusters edging onto one another. Consider Age - a very important dimension in the current study and central to this particular set of SAS outcomes – and one can read the spectrum and its proximities as spanning across the approximately 100 years between the youngest recorded member (at time of presentation to ED) and the oldest member (at time of presentation to ED).

Incidentally, as shown at the top of the page above the Pie Chart itself (and as can be seen via the subsequent **S9.2.3** (viz. Cluster Statistics) *replicated* under Section **6.2.8.3**, Age is not the only dimension being measured by this set of four graphs (viz. **S9.2.1/2/3/4)** but also Gender and DOW (Day Of Week) – but Age does form the "backbone".

Lastly, also take note how especially two pairs of adjoining clusters overlap (viz. intersect), in this case clusters **7** and **2** as well as clusters **5** and **3**. These overlaps are a function of the number of Variables (i.e. Dimensions) being partitioned as well as the Number of cluster Parameters specified, according to the current author. The fewer Clusters / more Dimensions could thus result in more overlaps, and the more Clusters / fewer Dimensions potentially resulting in fewer overlaps. An extreme example: a Full (i.e. pre-partitioned) Data Set can in a sense be viewed as a single cluster where everything overlaps. That of course would not make sense since it will include the whole sourced Data Set, but just by way of illustration.

6.2.6 THE READING OF A CLUSTER STATISTICS

Cf. **S9.2.3** (viz. Cluster Statistics) *replicated* under Section **6.2.8.3**.

The first column identifies the eight clusters.

The second column relates the frequencies.

A reminder: It is not the number of the cluster but the number of members (viz. ED presentations) which ranks the clusters from highest to lowest frequencies. Based on this one can put the clusters in the following order from highest to lowest:

First	**Cluster 2**	with freq = **207**
Second	**Cluster 6**	with freq = **176**
Third	**Cluster 8**	with freq = **153**
Fourth	**Cluster 4**	with freq = **148**
Fifth	**Cluster 5**	with freq = **145**
Sixth	**Cluster 7**	with freq = **138**
Seventh	**Cluster 1**	with freq = **124**
Eighth	**Cluster 3**	with freq = **053**

The next two columns, i.e. Standard Deviation and Maximum Distance have already been addressed in the previous two sub-sections.

The Nearest Cluster column is self-explanatory, and if needs be can be interpreted with the next column – i.e. Distance to Nearest Cluster. Without getting bogged down on the length of a "unit" in the measurement of the distances between a particular cluster-"seed" and its nearest adjoining cluster-"seed", one can make the observation that the two most-overlapped clusters (for want of a more appropriate word or phrase) – i.e. clusters 5 and 3 - have the shortest distance of the eight nearest-neighbour distances – and it is the same (viz. 10.09) – obviously.

The seventh column, Age, relates the *average ages* for the various clusters. Incidentally, the three most frequent clusters, i.e. clusters 2, 6 and 8 are 23.30, 2.01 and 37.12, or approximately 23 years and 4 months, 2 years, and 37 years and 1 month respectively.

Column eight relates Male / Female proportions. Take note that only "F" (Female) results are supplied, with the "inverse", Male, implied. Therefore; Cluster 1's 0.48 (that is about 48% Female) implies about 52% Male.

And lastly; the seven DOW (Day of the Week) columns: Since each row's (viz. clusters') seven entries are "related" they should be read together, in that each row of seven members equates to 100%. That is: the seven aggregate to 100%.

6.2.7 THE READING OF A CLUSTER INPUT MEANS PLOT

In this sub-section the *replicated* SAS graph **S9.2.4** is read and explored, i.e. the Input Means Plot.

As was mentioned earlier in Sub-section **6.2** only three dimensions are under investigations in this set of the four closely-interlinked graphs (**S9.2.1/2/3/4**), and that is Age, Gender and DOW.

In the replicated example **S9.2.4** under Section **6.2.8.3** the "normalised" outcomes / "characteristics" of the topmost three clusters (i.e. the three highest frequency clusters: 2, 6 and 8) are mapped on the same "canvas". They are identified by the colour-coded Legend below the "canvas".

Take Note: These colour-codes are particular to this Input Means Plot only. There is absolutely no colour-association between the colours used in the Pie Chart (**S9.2.1**) and the colours used in this Input Means Plot (**S9.2.4**). In the former colour signifies "distance" between seed and outermost member of cluster, here it identifies the cluster.

While only the topmost three clusters were selected to be mapped, four colours are identified below. The leftmost, labled "_ALL_", represents the average for all eight clusters together. One of its uses is to help us determine whether a certain cluster is under, over or on "par", so to speak.

Incidentally, by only mapping "_ALL_" one can see the averages for a partitioned Data Set as a whole – as it was used in the discussion in **Chapter 4.2**. If in this case Age and Gender had not been used then the seven rows comprising DOW would have been "staggered" across the whole canvas, but with Age and Gender included the seven DOW's are confined to the leftmost side of the canvas. Still, the prominence of Friday, Saturday and Sunday is evident.

Whatever the case may be, this Input Means Plot is best read with **S9.2.3** (viz. Cluster Statistics) in tow. Taking one example, cluster 6: Its Age hugs the leftmost edge of the "canvas" - explained by it representing the 2-year old (give or take a couple of years) cluster, it has the highest Female proportion of the three – viz. 51% compared with 46% and 45% of clusters 2 and 8. As far as the DOW is concerned its ED visits peak on Sundays, followed by ED visits on Saturdays, and then Fridays. Its lowest DOW ED usage days are on Mondays, Wednesdays and Thursdays.

Of course, these graphs are best read in colour, but if not too many clusters are included in an Input Means Plot the "black and white and shades of grey" also does the trick. That will suffice, and that concludes this chapter.

6.2.8 REPLICATED PRESENTATIONS

The following replicated CUBES and SAS graphs are the first ones of a kind encountered in this thesis and are used in the discussions about how to read a first CUBE, a first BOX PLOT, and so forth. These were replicated here for ease of use.

Each replicated graph's "source" chapter is implicit in its alpha-numeric identifier. Two examples: The first of these to follow, **C7.1.1**, is a **C**UBE (**C** = CUBE) and belongs to **Chapter 7.1**. The second graph, **S7.1.1**, emanates from **S**AS (**S** = SAS), and so forth.

6.2.8.1REPLICATED CUBE

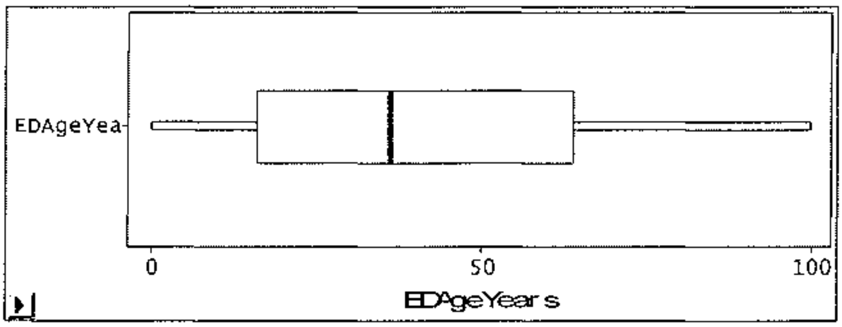
Site	TGA
FinancialYr	2006

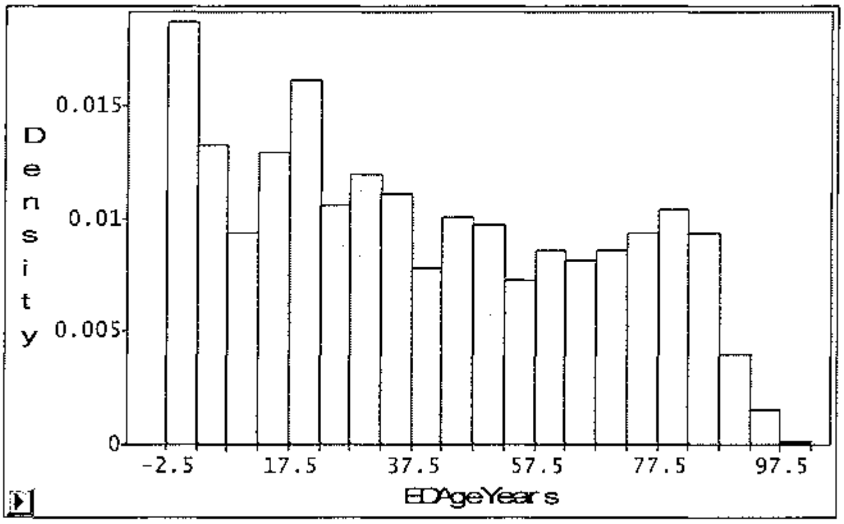
			Data		
ArrFiscYear	ArrFiscQuart	ArrMonth	Attendances	Admitted	AdmPropn
2006	Q1_2006	July	2859	1004	35.12%
		August	3097	1147	37.04%
		September	2780	1053	37.88%
	Q2_2006	October	2863	1053	36.78%
		November	2843	996	35.03%
		December	3068	1001	32.63%
	Q3_2006	January	3209	1041	32.44%
		February	2780	918	33.02%
		March	2957	1102	37.27%
	Q4_2006	April	2796	957	34.23%
		May	2960	1091	36.86%
		June	3013	1079	35.81%
2006 Total			35225	12442	35.32%

C7.1.1 Cube Pivot Table: Hospital T – Fin Yr 2006 Seasonal demand over 12 months

6.2.8.2REPLICATED BOX PLOT

EDAgeYears





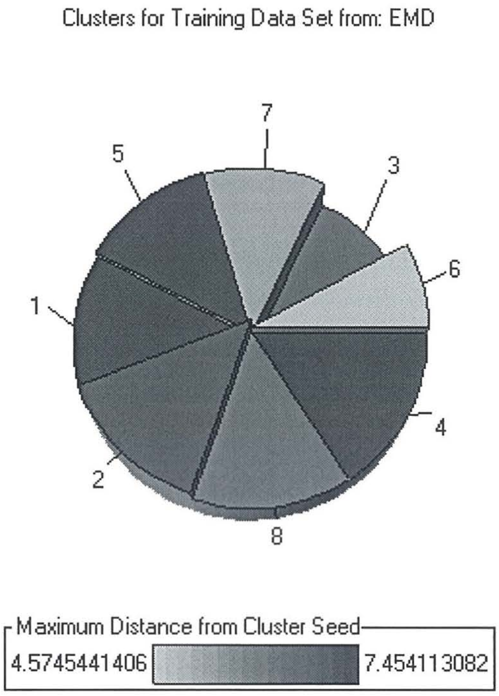
Moments			
N	2859.0000	Sum Wgts	2859.0000
Mean	39.4561	Sum	112805.000
Std Dev	27.7811	Variance	771.7877
Skewness	0.2545	Kurtosis	-1.1810
USS	6656615.00	CSS	2205769.24
CV	70.4101	Std Mean	0.5196

Quantiles			
100% Max	100.0000	99.0%	92.0000
75% Q3	64.0000	97.5%	88.0000
50% Med	36.0000	95.0%	85.0000
25% Q1	16.0000	90.0%	80.0000
0% Min	0	10.0%	3.0000
Range	100.0000	5.0%	1.0000
Q3-Q1	48.0000	2.5%	0
Mode	0	1.0%	0

S7.1.1 Box Plot & Distribution: Hospital T - JUL 2005 Age distribution of ED Presentations

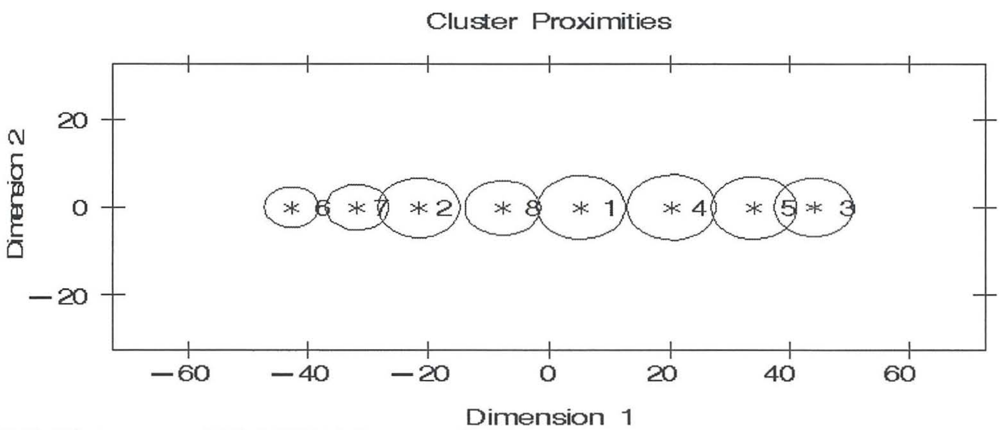
6.2.8.3REPLICATED PARTITIONED OUTPUT
CLUSTERING RESULTS – EMPHASIS ON AGE, GENDER & DAY OF WEEK
MONTH – JULY 2005 (OF FIN YEAR 2006)
TGA
EDData200507
TRAINING:

CLUSTER PIE CHART



S9.2.1 Pie Chart: TGA TRN Data – JULY 2005

CLUSTER DISTANCES



S9.2.2 Distances: TGA TRN Data – JULY 2005

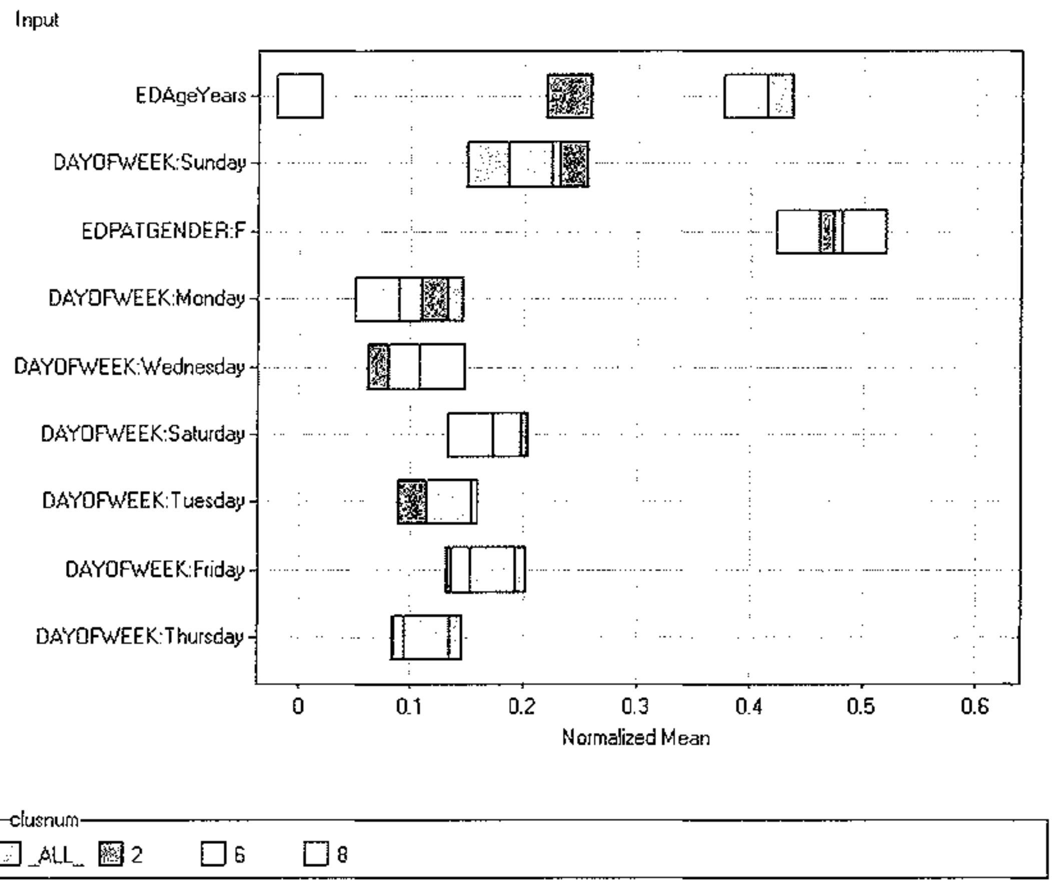
CLUSTER STATISTICS

CLUSTER	Frequency of Cluster	Root-Mean-Square Standard Deviation	Maximum Distance from Cluster Seed	Nearest Cluster	Distance to Nearest Cluster	EDAgeYears	EDPATGENDER:F
1	124	1.3228673951	7.2553181943	8	12.877263702	50	0.4838709677
2	207	1.3463883334	6.7909217949	7	10.341291177	23.304347826	0.4637681159
3	53	0.9670010932	6.6496158765	5	10.094882687	88.981132075	0.679245283
4	148	1.5255111691	7.454113092	5	13.856451712	65.033783784	0.5337837838
5	145	1.2245015319	7.1482169926	3	10.094882697	78.889655172	0.4413793103
6	176	0.7540582843	4.5745441406	7	10.947370796	2.0170454545	0.5113636364
7	138	1.1053422298	5.2739368786	2	10.341291177	12.963768116	0.4782608696
8	153	1.3609785965	6.2225105662	1	12.877263702	37.124183007	0.4509803922

CLUSTER	DAYOFWEEK:Friday	DAYOFWEEK:Monday	DAYOFWEEK:Saturday	DAYOFWEEK:Sunday	DAYOFWEEK:Thursday	DAYOFWEEK:Tuesday	DAYOFWEEK:Wednesday
1	0.2096774194	0.2016129032	0.1209677419	0.1129032258	0.1774193548	0.0887096774	0.0887096774
2	0.154589372	0.115942029	0.1884057971	0.2415458937	0.1062801932	0.1111111111	0.0821256039
3	0.1698113208	0.1886792453	0.1509433962	0.0943396226	0.1132075472	0.1509433962	0.1320754717
4	0.2162162162	0.1689189189	0.1351351351	0.1081081081	0.1418918919	0.0810810811	0.1486486486
5	0.2137931034	0.1034482759	0.1517241379	0.1379310345	0.1310344828	0.124137931	0.1379310345
6	0.1590909091	0.0909090909	0.1818181818	0.2159090909	0.1079545455	0.1420454545	0.1022727273
7	0.2028985507	0.152173913	0.1376811594	0.1594202899	0.1449275362	0.115942029	0.0869565217
8	0.1764705882	0.0718954248	0.1568627451	0.2091503268	0.1176470588	0.137254902	0.1307189542

S9.2.3 Stats: TGA TRN Data – JULY 2005

CLUSTER INPUT MEANS PLOT



S9.2.4 Input Means Plot: TGA TRN Data – JULY 2005

7. FINDINGS: HOSP T VS HOSP W USING FULL DATA SETS

FINDINGS: HOSP T VS HOSP W USING FULL DATA SETS

A

STUDY IN

DIFFERENCE

7.1 FINDINGS: Using FULL DS: PER SEASON – DEMAND OVER 12 MONTHS

RESULTS HELD IN APPENDIX

Cf. Pages **211 – 238**

7. FINDINGS: HOSP T VS HOSP W USING FULL DATA SETS

7.1 FINDINGS: Using FULL DS: PER SEASON – DEMAND OVER 12 MONTHS

- **(Postulate1)** Per Season: To determine seasonal demand over 12 month periods running from July to June (inclusive).

7.1.1 Using FULL DS: FINDINGS

Cube results **C7.1.2/4/6/8** reflect such seasonal highs and lows.

With Hosp T there appears to be (at least) two "highs" – i.e. December / January, as well as in August.

In the case of Hosp W, on the other hand, December and January rule supreme.

As for Hosp O: October / November / December show highest frequencies.

The BOP DHB as a region show December / January outstripping the other months of the financial year.

These results do not come as a surprise. Logic suggested that such seasonal ebbs and flows were bound to be a feature of any research regarding seasonality. The extent of such seasonal swings, however, was more of an unknown. That is what the current research is more so about.

Earlier research also highlighted seasonal swings, for example:
- In their research regarding ED visit patterns for infectious disease complaints Brillman et al [2005] found that respiratory complaints peaked in January or February (USA).
- Downing and Wilson [2002], on the other hand, recorded a marked increase in attendance of ED in November and December (UK).
- And in their study relating to cardiac arrest Phillips et al [2004] found cardiac mortality to peak in December and January (USA).

In other words – three groups of researchers, three designated research topics, and three different sets of peak months per annum. This author included the countries where the respective research was done – and that would be one of the factors impacting on peak months. Associated school holiday periods are likely to differ as well. At any rate, end-of-year months (in the case of the above-mentioned three seasonal studies) do seem to hold firm regarding peaking around November and / or December and / or January.

DISCREPANT DATA

The first inter-hospital discrepancy highlighted by the current study is that of Age. The rather significant discrepancy (of between 4 and 5 years) on average Age per hospital holds firm across By Month as well as Per Year Data Sets.

As can be seen in Box Plots **S7.1.1 – S7.1.8** in **APPENDIX A1** in **Chapter 13.1** - and in line with the general aim of keeping Research discussions / notes and Research results separate from one another - what was thought to be a temporary aberration for the month of JULY 2005 (Age: Hosp T = 39.45 versus Hosp W = 35.57), upon further investigation held true for other months and financial years as well.

The same trend was subsequently found for the FULL Financial Year 2006 (viz. June 2005 until July 2006 inclusive) – namely Hosp T = 39.42 and Hosp W = 35.37 respectively.

The same yet again for JULY 2006, where the respective outcomes were Hosp T = 39.07 and Hosp W = 36.27.

And yet again, when comparing mean Ages for the FULL Financial Year 2007: Hosp T = 39.74 and Hosp W = 35.13.

This is only the first of several inter-ED discrepancies to be observed more closely. As the reader will discover, inter-ED discrepancies are rather plentiful. Several more will be put under the microscope during the course of this study – and no doubt many more will become evident in any comparative investigation.

DIFFERENCES IN DEMAND

Here one might look at overall demand, demand per hospital, growth in demand, and so forth, but first, by way of introduction, the District inherent in the mnemonic "DHB", viz. District Health Board – or to be more specific – the BOP DHB – i.e. the Bay of Plenty District Health Board.

The Bay of Plenty proper is actually serviced by not one, but *two* District Health Boards, namely Lakes DHB (the hub of which consists of Taupo and Rotorua), and the already introduced BOP DHB – which in reality services the other half of the BOP, i.e. more so the coastal and slightly inland belt of the BOP province.

And to be even more specific: the focus of the present research is Emergency Departments in the BOP. Therefore, while the BOP in reality comprises about 15 hospitals, nursing homes and other health-related facilities in such out of the way places like Murupara, only three of these have ED departments:

- Tauranga (in the western BOP)
- Whakatane (in the eastern BOP) and
- Opotiki (north east of Whakatane).

Therefore, only the above three of the 15 odd institutions comprising the BOP DHB have Emergency Departments. While Opotiki will rarely be part of the equation in subsequent chapters / sections, it is included here to present the full picture. Its ED capacity is very limited (with Whakatane handling almost all of its more critical caseload), and it also only represents about 3% of the BOP DHB ED presentations. Nevertheless, it will be mentioned on occasion, and its statistics included to show that "the numbers stack up" where the "All Site" option is selected for parameter "Site" on some OLAP Cube "builds" / enquiries.

Where summated statistics for Tauranga and Whakatane do not add up as compared to All Site statistics, statistics for Opotiki are bound to make up the difference.

The next section explores some CUBES outcomes.

CUBES OUTCOMES

Cubes **C7.1.1 – C7.1.16** present the Per Financial Year statistical data / outcomes for Financial Years 2006 & 2007 in the sequence Cube and Cube's Bar Chart for Hosp T ("TGA") 2006, Hosp W ("WHK") 2006, Hosp O ("OPO") 2006 and BOP DHB ("All Site") 2006 – and repeated for Fin Year 2007.

The outcomes highlight further discrepancies between Hosp T and Hosp W – and on this occasion Hosp O as well. Furthermore; All Site outcomes are also presented, which supplies the BOP DHB district's outcomes. As the reader will notice; Hosp T Admission results exceed that of All Site, whereas Hosp W Admissions "trail" that of All Site, and then there's Hosp O – which's Admissions proportions are a complete anomaly.

T7.1.1 Financial Year 2006 Outcomes per Hospital ED Presentations

Fin Year	Hosp ED	Tot Pres	Tot Admit	% Admit	Histogram
				(rounded)	
2006	**TGA**	35,225	12,442	35%	Mild spike for Jan
	WHK	18,051	5,724	32%	Significant spike for Dec & Jan
	OPO	1,703	14	1%	Significant spike for Oct, Nov, Dec & Jan
	All Site	54,979	18,180	33%	Fair spike for Dec & Jan

T7.1.2 Financial Year 2007 Outcomes per Hospital ED Presentations

Fin Year	Hosp ED	Tot Pres	Tot Admit	% Admit	Histogram
				(rounded)	
2007	**TGA**	36,179	13,168	36%	Plateau 'd out – Aug & May exceed Jan
	WHK	18,800	5,422	29%	Mild spike for Dec & Jan
	OPO	1,511	19	1%	Spike for Jan
	All Site	56,490	18,609	33%	Very marginal spike for Dec & Jan

When comparing Fin Years 2006 and 2007; note increased demand at Hospitals T and W (and thus for the BOP DHB), the drop in Admissions for Hosp W, and the mild spike having plateau 'd out for Hosp T. Over and above that there is a significant inter-hospital difference in proportion re Admissions between Hosp T and Hosp W (and Hosp O, but the latter is considered anomalous).

PERCENTAGE GROWTH ABOVE BASE MONTHS PER FIN YEAR

Certain values of the rightmost columns of Cubes **C7.1.17/19/21/23** (for Fin Year 2006), and Cubes **C7.1.18/20/22/24** (for Fin Year 2007) were transcribed onto the table to follow, viz. **T7.1.3.**

T7.1.3 Percentage Growth above Base Month per Fin Year

Hosp ED	Fin Year	Highest %Growth	Ave % per Fin Year	Base / Lowest Month	Three Highest Months
TGA	2006	**15%** (15.43)	**6%** (5.59)	Sep & Feb	(1) Jan (2) Aug (3) Dec
	2007	**13%** (12.79)	**8%** (8.02)	Feb	(1) May (2) Aug (3) Mar
WHK	2006	**29%** (29.35)	**10%** (9.56)	Sep	(1) Jan (2) Dec (3) Mar
	2007	**17%** (17.22)	**9%** (8.80)	Oct	(1) Jan (2) Dec (3) May
OPO	2006	**58%** (57.89)	**24%** (24.49)	May	(1) Nov (2) Oct (3) Dec
	2007	**59%** (59.38)	**31%** (31.16)	Aug	(1) Jan (2) Dec (3) Feb
BOPDHB	2006	**20%** (19.64)	**7%** (6.72)	Sep	(1) Jan (2) Dec (3) Aug
	2007	**12%** (11.73)	**6%** (6.38)	Feb	(1) Jan (2) Dec (3) May

Legend: GREY=JAN=Highest BLUE=Dec=2nd Highest
GREEN=May=3rd Highest YELLOW=Aug=4th Highest

Observations based on the above table (**T7.1.3**) include:

- Jan is the most prominent month with 6 from 8 highest incidences
- Dec is the next most prominent with 5 2nd and 2 3rd highest incidences
- Aug and May share the honours of 3 incidences apiece
- TGA results are the most conservative with its 15% / 13% and 6% / 8%
- Both WHK and BOPDHB reflect complete 1st and 2nd highest consistency
- Both WHK and BOPDHB thus portray a "Mount Cook" profile
- OPO has by far the highest growth-span of almost 60% over Base month

EXTENT OF PROPORTIONAL ROLL-OVER FROM ONE FIN YEAR TO NEXT

Definition of "proportional roll-over": Differences between equivalent months' proportions determined and the 12 differences then plotted. The calibrated distance between the highest and lowest differences determines the band-width. Part Cube / part Table **C7.1.25** is derived from **C7.1.17/19/21/23** (for Fin Year 2006), and part Cube / part Table **C7.1.26** from **C7.1.18/20/22/24** (for Fin Year 2007). **C7.1.25/26**'s **Proportions** columns were derived from Cubes to their "left".

By then applying a four colour coded highlighting of "highest" to "lowest" of the top four proportions to each of **C7.1.25** and **C7.1.26** the following is quite evident:

- The pre-eminence of December and January in every instance for both 2006 and 2007 – that is in **16** out **of** a possible **16** instances (**100%**)
- That 7 (for 2006) and 7 (for 2007) of a potential eight Fin Year by ED combinations for each of 2006 and 2007 respectively are of the three "highest" proportion variety – and thus **14 of** a possible **16** (i.e. **88%**)

Furthermore, with the exception of OPO (which appears a bit "helter-skelter") the other three members have an air of consistency about them across Fin Years – but precisely how consistent is not possible to tell from the evidence in hand. In order to do just that this experiment in colour is taken one step further.

Table **T7.1.4** reflects the transcribed proportions for Fin Years 2006 and 2007 (viz. transcribed from Cubes / Tables **C7.1.25** and **C7.1.26**), and for each ED involved, as well as for the DHB in totem. Following that the roll-over differences between Fin Years were determined for each month per ED (as well as for the DHB). Bar charts were subsequently plotted for each of the four members. Cf. Figures **F7.1.1/2/3/4**.

The Year to Year roll-over outcomes are as follows:

Hosp **TGA** ED (**F7.1.2**): The band of change lies between **-0.6% and +0.6%**, i.e. a **band width** of **1.2%**. Such a narrow "swing" suggests little proportional change between Fin Years – and the result as a result very "consistent" and gradual.

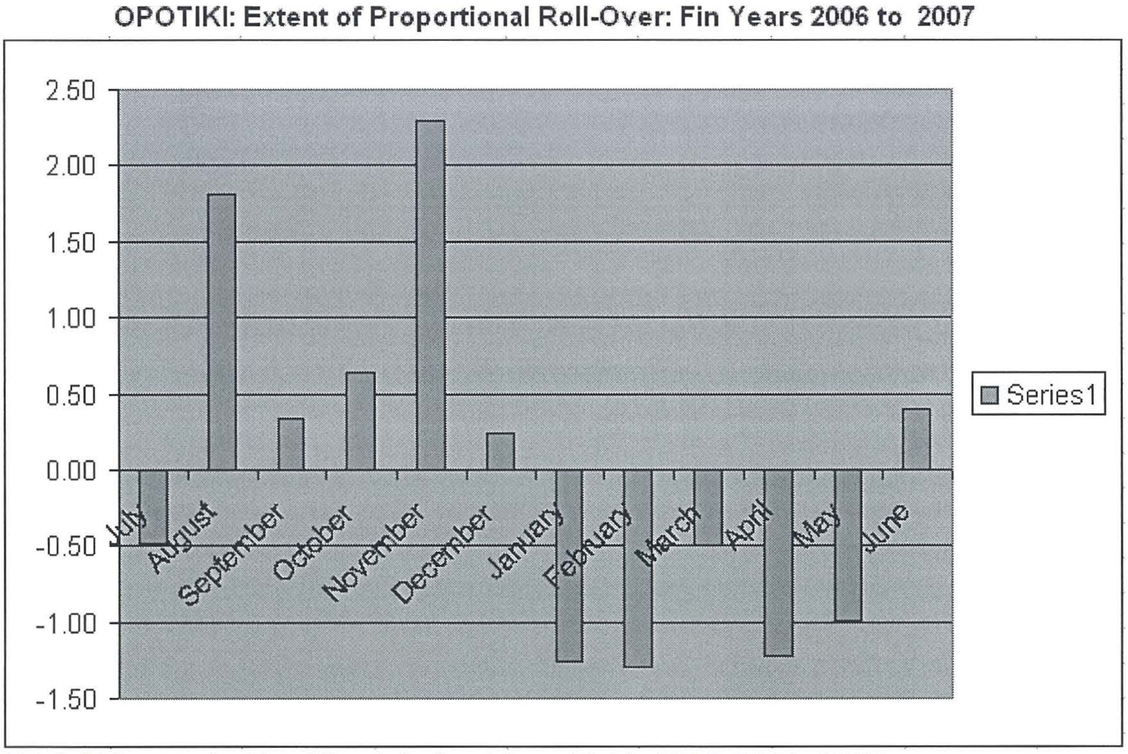
Hosp **WHK** ED (**F7.1.3**): The band of change lies between **-0.8% and +1.0%**, i.e. a **band width** of **1.8%** percent in width. Not as narrow a "swing" as is the case with TGA, but not excessive either.

Hosp **OPO** ED (**F7.1.1**): The band of change lies between **-1.5%** and **+2.5%**. That is a total **band width** of about **4%**. Such wide "swings" would suggest some "volatility", which is indeed the case.

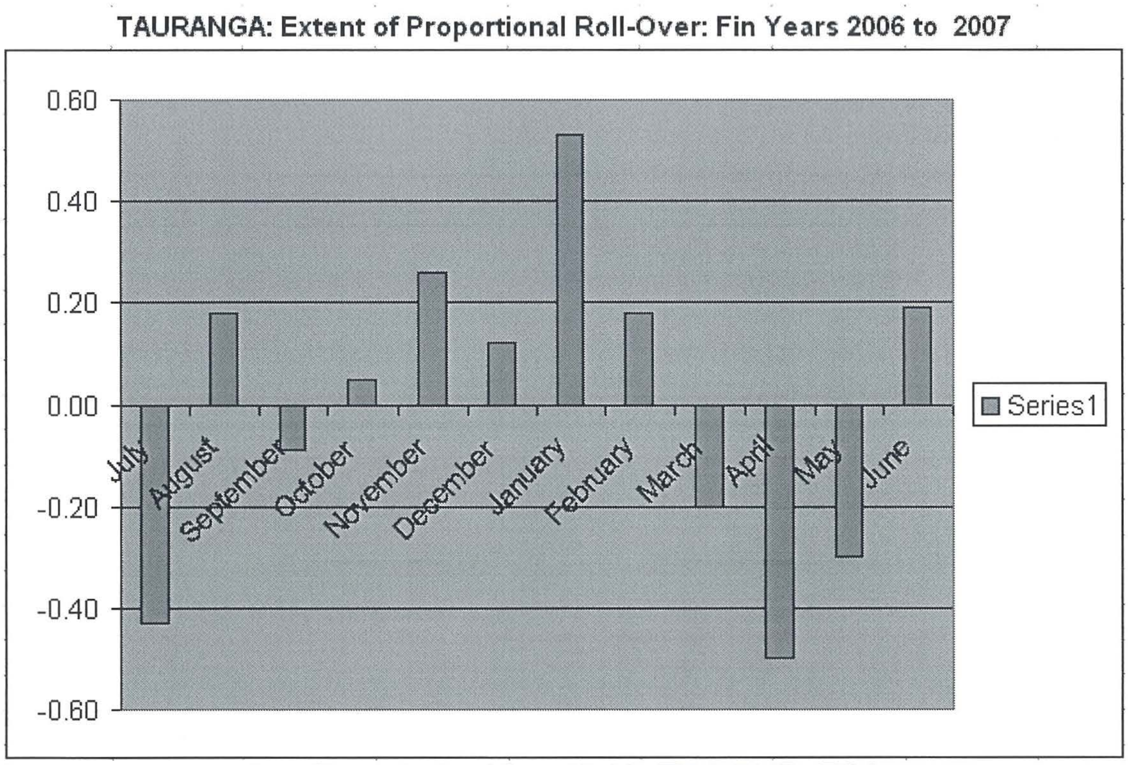
All of **DHB** ED (**F7.1.4**): The band of change lies between **-0.6% and +0.6%**, i.e. a **band width** of **1.2%** percent – as was case for TGA. In other words: a reassuring outcome. It shows proportional consistency.

T7.1.4 Composite Table holding Transcribed Proportions per ED per Financial Years 2006 and 2007

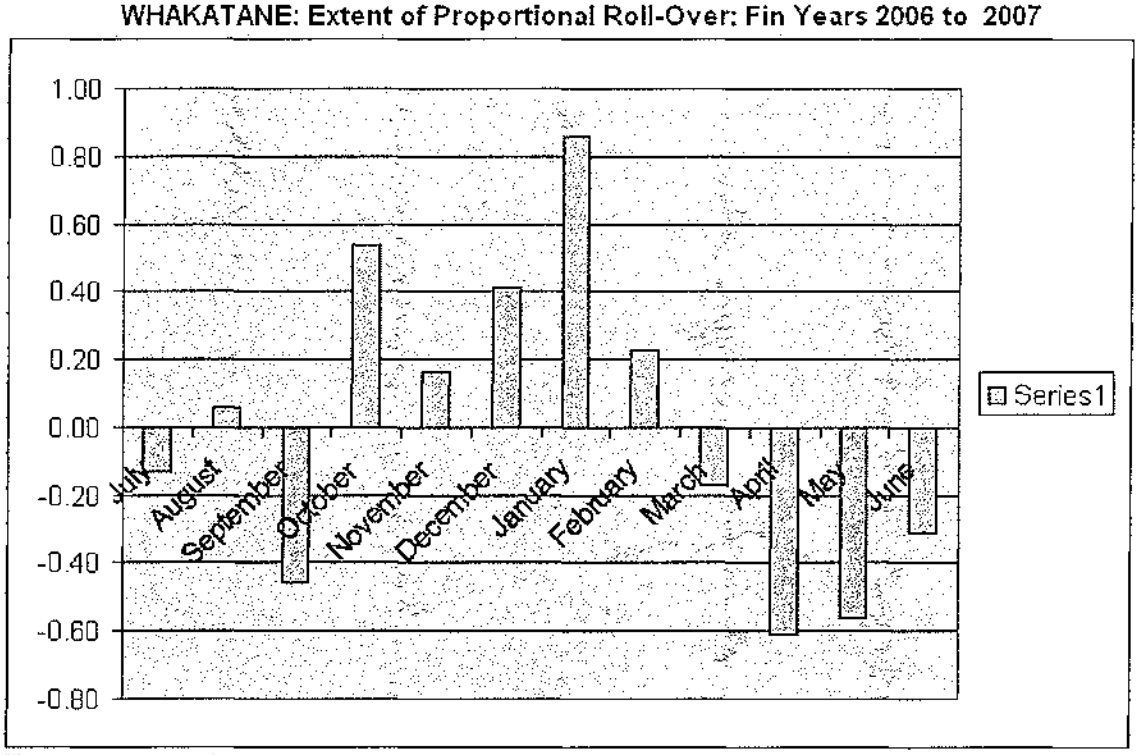
Month	OPO			TGA			WHK			BOP DHB		
Of Year	2006	2007	Diff	2006	2007	Diff	2006	2007	Diff	2006	2007	Diff
July	7.93	8.41	**-0.48**	8.12	8.55	**-0.43**	7.82	7.95	**-0.13**	8.01	8.35	**-0.34**
August	8.16	6.35	**1.81**	8.79	8.61	**0.18**	8.09	8.03	**0.06**	8.54	8.35	**0.19**
September	8.22	7.88	**0.34**	7.89	7.98	**-0.09**	7.61	8.07	**-0.46**	7.81	8.01	**-0.20**
October	10.04	9.40	**0.64**	8.13	8.08	**0.05**	8.20	7.66	**0.54**	8.21	7.97	**0.24**
November	10.57	8.27	**2.30**	8.07	7.81	**0.26**	8.03	7.87	**0.16**	8.13	7.85	**0.28**
December	9.57	9.33	**0.24**	8.71	8.59	**0.12**	9.35	8.94	**0.41**	8.95	8.72	**0.23**
January	8.87	10.13	**-1.26**	9.11	8.58	**0.53**	9.84	8.98	**0.86**	9.34	8.75	**0.59**
February	7.57	8.87	**-1.30**	7.89	7.71	**0.18**	8.21	7.98	**0.23**	7.99	7.83	**0.16**
March	7.11	7.61	**-0.50**	8.39	8.59	**-0.20**	8.32	8.49	**-0.17**	8.33	8.53	**-0.20**
April	7.52	8.74	**-1.22**	7.94	8.44	**-0.50**	8.10	8.71	**-0.61**	7.98	8.54	**-0.56**
May	6.69	7.68	**-0.99**	8.40	8.70	**-0.30**	8.17	8.73	**-0.56**	8.27	8.68	**-0.41**
June	7.75	7.35	**0.40**	8.55	8.36	**0.19**	8.28	8.59	**-0.31**	8.44	8.41	**0.03**



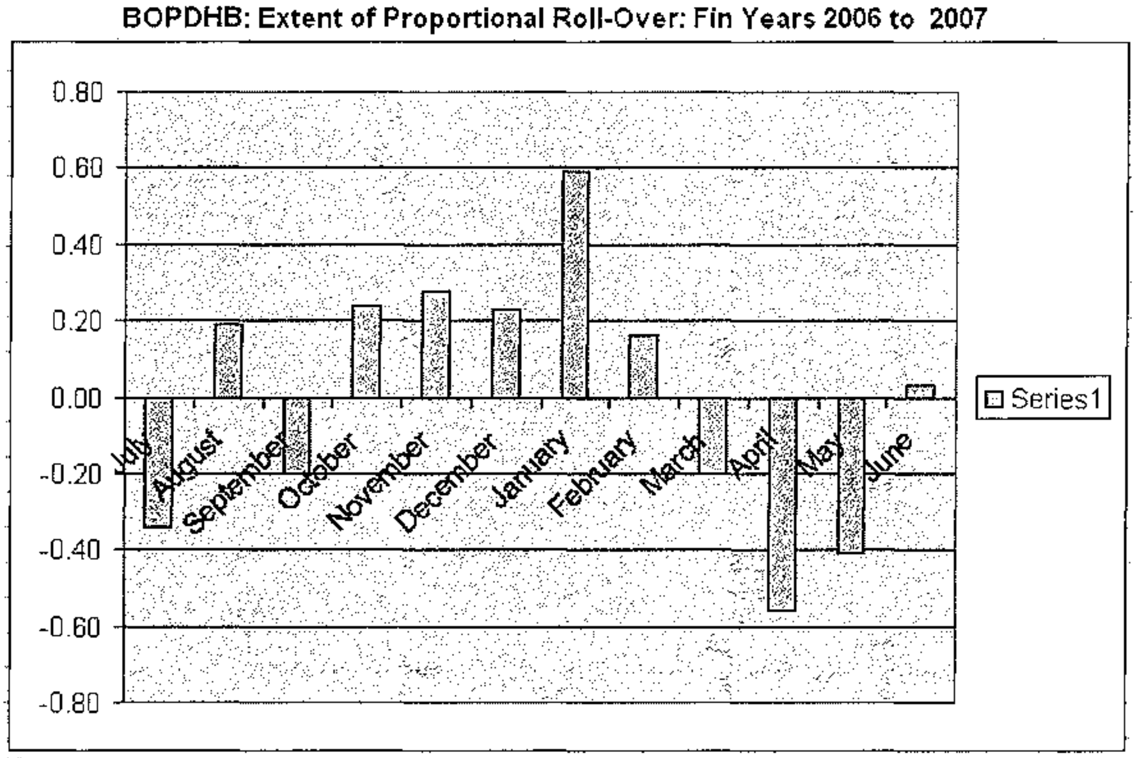
F7.1.1 Figure viz. Bar Chart derived from Table **T7.1.3** ED=OPO



F7.1.2 Figure viz. Bar Chart derived from Table **T7.1.3** ED=TGA



F7.1.3 Figure viz. Bar Chart derived from Table **T7.1.3** ED=WHK



F7.1.4 Figure viz. Bar Chart derived from Table **T7.1.3** ED=All three in BOP DHB

CUBES OUTCOMES – DEMAND AT CHRISTMAS AND NEW YEAR

This sub-section of the current chapter could just as well have been addressed under **Chapter 7.2** (where Per Day of Week (DOW) is played off against Month of Year (MOY)), but this chapter was considered marginally more appropriate since it does not dabble in Per-DOW – only Per-MOY.

Part of December and all of January – for reasons of school holidays and summer – lead to an escalation of visitors to holiday destinations around the country – especially so seaside resort centres. The Bay of Plenty – which includes Tauranga / Mt Maunganui and Whakatane / Ohope (Mt Maunganui and Ohope being the respective beach resort towns) – is one of New Zealand's prime destinations. An escalation in visitors requires increased services. Hospital services, especially ED, can expect an increase in demand for service – especially so between the dates December 24th through January 3rd inclusive.

The four histograms **C7.1.27 – C7.1.30** bear this out.

Hosp T shows a significant rise in demand for ED services over those days.

Hosp W shows an even more pronounced demand for ED services.

Hosp O has a more "erratic" profile but certain days still show high spikes.

And lastly, the BOP DHB region shows the same escalation over this date-range.

A few words from other researchers regarding mortality over Christmas periods: Researching cardiac mortality Phillips et al [2004] honed in on the holidays as a risk factor in death. Cardiac mortality was found to be highest during December and January. The high spikes (also referred to as "the twin holiday spikes") in mortality during those months are attributed more so to the Christmas / New Year holiday days than climatic factors. One of the explanations for these increases in mortality is patients' delays in seeking treatment until after the holidays. They also use the phrase "holiday effect" in their discussion. What adds a lot of weight to the Phillips et al [2004] research is that their investigation "trawled through" an ultra-large data set - i.e. 30 years worth of National Center (*sic*) for Health Statistics (which covers all US deaths).

In the UK Keatinge and Donaldson [2005] investigated holiday mortalities as a result of respiratory illness. They for example found that during December 19-24 daily deaths were above annual means, and more specifically; respiratory deaths were "up" by 49%. Admissions actually fell during those days (and one might imagine it being as a result of the already mentioned delays in seeking any help – until after the holidays – with dire consequences. While ED admissions actually fell sharply on Christmas Day, respiratory deaths rose by 5.9% above trend.
Gist of Chapter's Findings: Cf. condensed outcomes and commentary in **Ch 8**.

7.2 FINDINGS: Using FULL DS: PER SEASON – DEMAND PER DAY OF WEEK

RESULTS HELD IN APPENDIX

Cf. Pages **239 – 259**

7.2. <u>FINDINGS</u>: Using FULL DS: <u>PER SEASON – DEMAND PER DAY OF WEEK</u>

- **(Postulate2)** Per Season: To determine proportions of demand for ED services **per day of week**

7.2.1 Using FULL DS: FINDINGS

In this Chapter the focus moves to Per Day of Week patterns, if any. We will first look at Financial Year 2006's hospital profiles, followed by Financial Year 2007's profiles.

COMPARATIVE DOW AND MONTH OF YEAR ANALYSIS FOR FIN YR 2006

Firstly; the compounded visual picture of how the Days per Week (DOW) stack up across a spectrum of Month of Year (MOY) (with "Year" in Financial Year order of July through June inclusive) are portrayed in **C7.2.3** - which presents the graphs in **C7.2.5** + **C7.2.7** + **C7.2.9** + **C7.2.11** + **C7.2.13** + **C7.2.15** + **C7.2.17** respectively.

That is for Hosp T.

Conversely; the compounded "visual" picture of how the Days per Week (DOW) / Month of Year (MOY) (with "Year" in Financial Year order of July through June inclusive) are portrayed in **C7.2.4** - which presents the graphs in **C7.2.6** + **C7.2.8** + **C7.2.10** + **C7.2.12** + **C7.2.14** + **C7.2.16** + **C7.2.18** respectively.

That is for Hosp W.

The reader will notice that the calibration of "compounded" Hosp T (viz. **C7.2.3**) is much higher than that of "compounded" Hosp W (viz. **C7.2.4**), but viewed as two separately compounded graphs the two compounded graphs can be compared as if "on par".

Looking at the two compounded graphs one can see that compounded Hosp T has three going on four prominent peaks, but with "Mount Cook" still marginally dominant.

By comparison the profile of compounded Hosp W has "Mount Cook" clearly dominating the "skyline".

Hosp W's more pronounced "Mount Cook" outcome is part explained by the greater proportional and seasonal influx of holiday–makers in late December and January of every year, and it being more visible in Whakatane and vicinity with its comparatively small population base to that of Tauranga and vicinity.

That concludes the compounded overview of Hosp T versus Hosp W for Fin Year 2006.

To compare the individual Sunday to Saturday "skylines" for Hosp T versus Hosp W one has to compare these two apiece, viz. Hosp T versus Hosp W for Sunday, then Hosp T versus Hosp W for Monday, ... and so forth up to Hosp T versus Hosp W for Saturday. That is seven comparisons in all.

In order to do this visual comparison the graph of Hosp W for Monday has to be superimposed onto the graph of Hosp T for Monday, ... and so forth a total of seven times.

Take note that unlike what is the case with the sets of compounded Hosp T and compounded Hosp W (presented on different "canvasses" but to the same scale) range "skylines" discussed on the previous page, the graphs being compared here appear on the *same* canvas. The fact that these graphs emanate from dissimilar population bases therefore results in Tauranga and the Western BOP always dominating the "skyline", with Whakatane and the Eastern BOP always being the much lower and closer "range" in the foreground.

That should not hamper visual inspection, though, since the contours of the two "skylines" can still be compared, notwithstanding their difference in "altitude". Henceforth; after visually comparing the seven Hosp T versus Hosp W "range" profiles (cf. **C7.2.19/20/21/22/23/24/25**) the author's impressions are recorded in the following table.

T7.2.1 HOSP T & HOSP W – FIN YEAR 2006 – PROFILES COMPARED

DOW		**Similar or Not**	**Comments**
Sunday		Similar	
Monday		Somewhat Similar	Hosp W peaks not as emphatic
Tuesday		Somewhat Similar	Hosp W peaks not as emphatic
Wednesday		Somewhat Similar	Hosp W peaks not as emphatic
Thursday		Somewhat Similar	Hosp W peaks not as emphatic
Friday		Somewhat Similar	Hosp W peaks not as emphatic
Saturday		Similar	

Having established quite similar, but still different (Hosp T having multiple high "peaks" compared with Hosp W's pronounced "Mount Cook") profiles one can venture somewhat further, hoping to establish a clearer and more specific profile. Towards this end the author decided to utilize the precisely measured "elevations" recorded in the two Cube Pivot Tables **C7.2.1** and **C7.2.2**.

It was decided to map the four highest "elevations" onto a By DOW / By MOY "grid", and to rank these 1 though 4 (with "1" identifying a highest peak, "2" a second highest and so forth) for the twelve months JULY 2005 through JUNE 2006. The respective Hosp T and Hosp W ranked profiles appear as follows:

T7.2.2 ED HOSP T BY DOW & MONTH OF FIN YEAR 2006

DOW	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
Sun	2 $			3		4	1			2 $		
Mon		3		4			1				2	
Tue		3			2		1				4	
Wed		1			2				4		3	
Thu		4				3			2			1
Fri			4			1			2			3
Sat	2					1				3		4

($ Same frequency)

T7.2.3 ED HOSP W BY DOW & MONTH OF FIN YEAR 2006

DOW	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
Sun	4			2			1			3		
Mon		2		3			1				4	
Tue					2	4	1				3	
Wed		4			2	3			1			
Thu					4	1	3					2
Fri			4			1			3			2
Sat	3					1				2	4	

Inspecting the foregoing two sets of comparative tables does show quite a resemblance between the two ED Departments.

Some of the most obvious features of the first (Hosp T) set – viz. DOW – are:

- December and January dominate
- January dominates Sunday, Monday and Tuesday
- December dominates Friday and Saturday

The second (Hosp W) set shows up a similar pattern, i.e.:

- December and January dominate
- January dominates Sunday, Monday and Tuesday
- December dominates Thursday, Friday and Saturday

In other words:
Notwithstanding the different profiles for the compounded graphs, the seven per day of week (DOW) / per month of year (MOY) profiles are fairly alike.

That poses the question: Are these profiles a one off or might they hold for other years as well? As a result another year's DOW / MOY was profiled. Cf. next p.

COMPARATIVE DOW AND MONTH OF YEAR ANALYSIS FOR FIN YR 2007

Yet again, firstly; the compounded "picture" of how the Day of Week (DOW) "stacks up" across a spectrum of Month of Year (with "Year" in Financial Year order of July through June inclusive).

The respective compounded "visual" Day of Week (DOW) / Month of Year (MOY) profiles are **C7.2.28** and **C7.2.29** respectively.

Yet again the graphs appear rather alike

Months January and December remain the most prominent feature of the compounded graph for ED Whakatane, but not so for ED Tauranga. Both "Mount Tasman" and "Mount Dampier" eclipse "Mount Cook" – not by much – but these peaks are "taller". In other words, 2007's compounded "landscape" is somewhat different from that of 2006's.

Subsequently, when comparing the "skyline profiles" of Hosp T versus Hosp W (cf. **C7.2.30/31/32/33/34/35/36**) – and to do so in the order Sunday through Saturday, the following similarities are found:

T7.2.4 HOSP T & HOSP W – FIN YEAR 2007 – PROFILES COMPARED

DOW		**Similar or Not**	**Comments**
Sunday		Similar	
Monday		Somewhat Similar	Hosp W peaks not as emphatic
Tuesday		Somewhat Similar	Hosp W peaks not as emphatic
Wednesday		Somewhat Similar	Hosp W peaks not as emphatic
Thursday		Similar	
Friday		Somewhat Similar	Hosp W peaks not as emphatic
Saturday		Somewhat Similar	Hosp W peaks not as emphatic

Yet again; if the four highest peaks are now mapped (based on frequencies of **C7.2.26** & **C7.2.27**) from highest "altitude" to 4th highest "altitude ("1" identifying a highest peak, "2" a second highest and so forth) for the twelve months JULY 2006 through JUNE 2007 then Hosp T and Hosp W appear as follows:

T7.2.5 ED HOSP T BY DOW & MONTH OF FIN YEAR 2007

DOW	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
Sun	1			4		3				2		
Mon	2			4			1			3		
Tue		2		3			4				1	
Wed		1			2		4				3	
Thu		3			4				2		1	
Fri			4			3			2			1
Sat	2		4			3			1			

T7.2.6 ED HOSP W BY DOW & MONTH OF FIN YEAR 2007

DOW	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
Sun				4		1				2		3
Mon	3						1			2		4
Tue		3				4	1				2	
Wed		3		4			1				2	
Thu		2				4			3		1	
Fri			2			3		4 $	1			4 $
Sat			1			4			2			3

($ Same frequency)

Inspecting the foregoing two sets of comparative tables (Hosp T versus Hosp W) does NOT show as much of a resemblance as did 2006's two outcomes, and as for the most obvious features of each of the foregoing tables:

Some of the most obvious features of the first (Hosp T) set are:

- December and January does NOT dominate as it did in 2006
- In fact – January only dominates on Mondays
- May is the most dominant – i.e. dominating on Tuesdays and Thursdays

The second (Hosp W) set shows a pattern more reminiscent of its 2006 pattern:

- December and January still dominate but only on four of the seven days
- January dominates Mondays, Tuesdays and Wednesdays
- December dominates Sundays
- The right-hand side of the profile does show more activity than in 2006

In other words: Hosp W's DOW / MOY profiles remain quite similar across Fin Years 2006 & 2007, but not so Hosp T's profiles, "Mount Cook" having lost its pre-eminence.

Gist of Chapter's Findings: Cf. condensed outcomes and commentary in **Ch 8**.

7.3 FINDINGS: Using FULL DS: PER DAY OF WEEK – DEMAND PER TIME OF DAY

RESULTS HELD IN APPENDIX

Cf. Pages **260 – 289**

7.3 FINDINGS: Using FULL DS: PER DAY OF WEEK – DEMAND PER TIME OF DAY

- **(Postulate3)** Per Day of Week: To determine proportions of demand for ED services **per time of day**

7.3.1 Using FULL DS: FINDINGS

The main thrust of this chapter is to determine demand per hour of the day (i.e. the 24 distinct "rounded down" hourly timeslots a day) per day of the week – Sunday through Saturday.

There is great potential for proliferation here, so the author had to make some judgement calls – to settle upon a few middle of the road – but still representative groups for graphical representation.

The author also tapped into the approach followed by Downing and Wilson [2002] at the University of Birmingham (UK) in their study of the "...variations in attendance at accident and emergency departments..." across the West Midlands region of the NHS in the UK – especially so with comparative sets of graphs to follow in sections two and three further along.

SECTION ONE: SUNDAY THROUGH SATURDAY PER SELECTED / REPRESENTATIVE MONTHS FOR EACH SEASON

Cf. graphs **C7.3.2**, **C7.3.4**, **C7.3.6** and **C7.3.8**.

In line with the earlier decision to select one month per quarter to represent each of the four seasons, the author selected July, October, January and April to represent Winter, Spring, Summer and Autumn respectively.

January (i.e. "summer") shows the highest overall frequency (when compared with the other three "seasons"). That is the case for both hospitals, but for Hospital W the escalation in ED presentations is much more pronounced.

This may in part be due to the respective scales of the histograms. The two histograms for Hosp T are on a 0-300 (for 2006) and 0-250 (for 2007) calibration, whereas both histograms for Hosp W are based on a 0-140 calibration (i.e. the same for 2006 and 2007).

Another reason could be that the much smaller Whakatane regional population is a whole lot more susceptible to surges in population during holiday seasons – and the influx of holiday-makers much more visible.

SECTION TWO: OVERVIEW OF SUNDAY THROUGH SATURDAY FOR A WHOLE FINANCIAL YEAR PER HOSPITAL

Downing and Wilson [2002] plotted ED presentations across the whole West Midlands NHS region in the UK for a whole "financial" year April 1st 1999 until March 31st 2000. Their research shows Monday as the highest demand day of the week, with midday – i.e. around 12 noon on Mondays showing the highest presentations for the whole year. Their second-highest demand days would appear to be Fridays and surprisingly enough - Wednesdays!

Two fundamental differences in presentation between the current and their (Downing and Wilson's [2002]) graphical presentations are:
Our region / district, while possibly comparable in size to theirs, is sparsely populated by comparison. While the author does not have regional population-aggregates for the various regions of the UK, the West Midlands will probably have several million residents. By comparison the BOP DHB region has a current population of less than 200,000 people. Census 2006 put the BOP District HB population at 194,892 on the night of December 7th 2006. That was the night of the 2006 NZ Census (although it will have increased by a few thousand since). This is the population figure the author regards as the most accurate and authoritative – it in effect has the "inside lane" / overrides all other projections or earlier Census figures – such as Census 2001's. For mentioned Census 2006 BOP DHB regional population statistics cf. **Chapter 13.4 APPENDIX D8**.

So much so for some high-performance-days-related outcomes from abroad, which are the high-performance days in the BOPDHB region? To answer this question Hosp T and subsequently Hosp W statistics were charted across three Financial Years' worth of Sunday through Saturday ED presentation frequencies – i.e. for Financial Years = 2005, 2006 and 2007.

Three Fin Years' Profiles for Hospital T

Cf. **C7.3.9**, **C7.3.10** and **C7.3.11**.

Interestingly enough Hospital T's graph also shows Monday's as the highest number of presentations day of the week (as was the case with the West Midlands NHS mentioned above), and that remains the case for each of the three Financial Years involved - i.e. Mondays showing highest demand for ED services. Furthermore; for Fin Year 2005 Tuesday and Wednesday appear as the 2nd and 3rd highest frequencies - for Fin Year 2006 Fridays and Sundays show the 2nd and 3rd highest frequencies – and lastly Fin Year 2007, where the 2nd and 3rd most frequent days happen to be Sunday and Tuesday. Also take note, in well nigh every Fin Years' case the weekend days of Friday through Monday are rather highly frequented.

Three Fin Years' Profiles for Hospital W

Cf. **C7.3.12**, **C7.3.13** and **C7.3.14**.

Now by way of further comparison the predominant per-day-of-week (per-DOW) profiles for Hospital W are also presented, and also for the Fin Years 2005, 2006 and 2007 – and in each case the per-DOW profiles appear as almost completely different. That is – the weekends (meaning Saturday & Sunday, with Friday and Monday as the two days immediately preceding and immediately following upon the weekend proper days of the week, stand out as very much higher frequented days within context.

In fact, Saturdays and Sundays appear even more prominent because of the midweek slump in ED demand in each of the three chosen Financial Years – the only exception being: Mondays for Fin Year 2007 edges out its preceding Sunday in a "photo-finish" – by the slightest of margins.

Possible Reasons for Difference between Hosp T and Hosp W

One might now muse as to why Hospital T and Hospital W show inherently different per day of week profiles.

A few of the reasons could be that:

1. Unlike what is the case with the Tauranga feeder area (where the much higher population base almost obscures the weekend influx of population), the Whakatane feeder area (with its much smaller population) shows the influx of visitors / holiday-makers / batch-owners on weekend as much more clear-cut and visible. The reasons for this are addressed later in the thesis – i.e. points 2, 3 & 4 below and **Chapters 10** and **11**.
2. It may have something to do with the *population mix* in each area. More about this at a later stage, but the reader can view the Census 2006 (and earlier) population statistics in **Chapter 13.4 APPENDICES D6, D7** & **D8**. Be aware that some of the statistics shown is for the BOP "province" proper. For the purposes of this thesis the author views the Statistics NZ Census 2006 population figures as authoritative and overriding the other sets of figures.
3. The difference in median Age between patients presenting at Hospital T's and Hospital W's Emergency Departments – i.e. a median difference of 4 to 5 years may also impact on the type of ED demand patterns. Cf. for example related discussion in **Chapter 12**.
4. The author also suspects that the per capita unemployment percentage is marginally higher in Whakatane than it is in Tauranga - but he does not have any corroboratory statistical data to support this inference.

SECTION THREE: OVERVIEWS FOR ONE DAY OF THE WEEK FOR VARIOUS AGE-GROUPS

The author then decided to select one day of the week where Hospital T and Hospital W show as comparable as possible a frequency – to do per-Age-group profiles – to in effect see if there is a difference between Hospitals T and W graphical profiles. The weekday chosen was **Tuesday**. That is, the Tuesday statistics used in this analysis form part of the statistics for the FULL Financial Year 2006. Yet again we use a lot less data than was used in the West Midlands exercise [Downing and Wilson, 2002], and we also do separate profiles for our two main Emergency Departments. Our profiles are thus more vulnerable / prone to reflecting temporary or one-off "aberrations" – when compared to West Midlands'. Their by-age-group-profiles present an average day of week graph.

Be that as it may, equivalent Hospital T versus Hospital W profiles appear in sets of two, one below the other on the same page (**C7.3.24 – C7.3.41**) – and can be viewed in **Chapter 13.1 APPENDIX A3** – but Hosp W profiles were subsequently super-imposed over that of Hosp T (**C7.3.15 – C7.3.23)** – to improve visual comparison.
That way one can visually inspect the profiles on the same "canvas". See table **T7.3.1** on the next page for the current author's impressions and keep in mind that Hosp W's graph should appear "within" that of Hosp T in that it has a much lower population base, and is thus expected to have a lower ED throughput. Also a reminder that one is only looking at one Fin Year's **TUESDAYS**. Time constraints precluded doing likewise for the other six days of the week as well.

Incidentally, concerning the table presented on the next page (**T7.3.1**) the age group profiles are rather similar to Downing and Wilson's [2002]. In both investigations the older per age group profiles for example show that very prominent late morning / midday peak, then tapers off steadily, albeit more acutely over the next about 12 hours. On the other hand Downing and Wilson's [2002] charting of the 5-14 year-olds and the 15-24 year-olds show that familiar "plateau", which, once reached, maintains itself for the better part of the following 12 hours. Under column "Similarities" of table **T7.3.1** the age-groups 5-14, 15-19, and 20-24 show the same plateau-effect [Downing and Wilson, 2002]. Looked at in retrospect (and with the knowledge of hindsight) this plateau-effect was a type of "early warning device" of things to come – as will become apparent in the closing chapters of this thesis, viz. as the thesis unfolds.

T7.3.1 Hosp T & W Comparison of ED Presentations for 2006 – Tuesdays only

Age Group		**Similarities**	**Discrepancies**	**Similar or Not ##**
Under 1 yr		Both show high frequencies around lunchtime and from about 3 until 9 pm	Hosp T shows higher frequency at lunchtime	Quite dissimilar
1 – 4 yrs		Both show a gradual escalation from about 7 am peaking around 7 / 8 pm	Hosp W shows a lot more activity, even challenging Hosp T for the "high ground" between 4 & 9 pm	Somewhat dissimilar
5 – 14 yrs		Both show an escalation and then continuous high frequencies between 9 am and 9 pm	Minimal	Similar
15 – 19 yrs		An escalation and then high frequencies between 9 am and 9 pm	One difference concerns the high spike around 4 pm with no "reciprocal" spike by Hosp W	Somewhat dissimilar
20 – 24 yrs **(overlap)**		Escalation and then continuous high frequencies for about 12 hours. Incidentally: comparing C7.3.32 with C7.3.34 is jagged versus smoother. Reason? Over-lapped but wider range.	12 hours of high frequency from about 10 am - 10 pm (Hosp T), and 8 am – 8 pm (Hosp W) AND Hosp W shows a significant drop between 3 & 5 pm	Somewhat dissimilar
20 – 39 yrs **(overlap)**		Steep escalation in demand from 7 am and then a gradual decline until 10 pm	Minimal	Similar
40 – 64 yrs		Steep escalation in demand from 10 am and then a gradual decline until 10 pm	Minimal	Similar
65 – 84 yrs		Steep escalation at about 10 am and then a gradual decline towards 10 pm	Minimal	Similar
85 and Over		Steep escalation around 9 am	Hosp T shows a gradual drop towards 9 pm, but Hosp W drops away immediately after the mighty "spike" at 9 am	Dissimilar but may be explained by Hosp T's per capita larger population of retirees

The foregoing might create the impression that the age-grouped profiles comparison between Hosp T's ED and Hosp W's ED are more similar than dissimilar, and that would be a fair assessment, until one factors in the following:

- If one now uses the Census 2006 population stats for the Tauranga as well as Whakatane Districts – i.e. 145,704 and 40,221 respectively (cf. **Chapter 13.4 APPENDIX D8** and table **T7.6.1** in **Chapter 7.6** further ahead), then dividing the latter into the former results in a **factor** of **3.62**. Hosp T thus serves a population three and two thirds times the size of Hosp W's. Inversely put – dividing the 40,221 by 145,704 shows Hosp W as serving a population only **28%** (27.6% rounded) – viz. just over a quarter that of Hosp T. Now look at Table **T7.3.1** in the next paragraph.

The following simplistic derivation based upon the hour with the highest respective Tuesday (yes, we are still only using Tuesday statistics in this comparative study) frequencies recorded for each of the nine profiled age-groups result in Hosp T versus Hosp W presenting the following picture:

T7.3.1 Hosp T & W Comparison of ED Presentations for 2006 – Tuesdays only

Age Group		Hospital T Highest frequency	Hospital W Highest frequency	Proportion Hosp W of Hosp T
Under 1 yr		14	9	64 %
1 – 4 yrs		27	24	89 %
5 – 14 yrs		44	32	73 %
15 – 19 yrs		43	18	42 %
20 – 24 yrs (overlap)		28	13	46 %
20 – 39 yrs (overlap)		82	45	55 %
40 – 64 yrs		82	58	71 %
65 – 84 yrs		85	47	55 %
85 and Over		21	10	48 %

Hosp W shows between double and four times the activity its **28%** of Hosp T's capacity would suggest! There are various potential reasons for this extra high demand on ED services, still to be addressed, one of which being that Whakatane and region have **fewer GP's (per capita)** than Tauranga. Patients are as a result more reliant upon Hosp W's ED. Lack of GPs would be part of a greater social and economic circumstance, of course. That will suffice for now.

Gist of Chapter's Findings: Cf. condensed outcomes and commentary in **Ch 8**.

7.4 FINDINGS: Using FULL DS: PER SEASON – PREVALENCE OF TRIAGE PER DAY OF WEEK

RESULTS HELD IN APPENDIX

Cf. Pages **290 – 312**

7.4 FINDINGS: Using FULL DS: PER SEASON – PREVALENCE OF TRIAGE RATINGS PER DAY OF WEEK

- **(Postulate4)** Per Season: To determine prevalence of various **Triage** / "urgency" ratings **per Day of Week**

7.4.1 Using FULL DS: FINDINGS

TRIAGE: PER FINANCIAL YEAR RESULTS

The Age aggregate difference has already been highlighted in **Chapter 7.1**; honing in on Triage in this section highlights yet another inconsistency between Hosp T and Hosp W.

But first, what does Triage involve and how does it prioritize patients being presented at ED Reception?

Triage prioritization assigns an urgency-level classification to each presentation. Hence: Those with the highest urgency classification will receive attention ahead of ones with lower urgency / prioritization / triage.

A five point priority system is used, namely:

T7.4.1 Triage Urgency Classifications and Expected Response Time per Triage

Triage / Priority	Urgency Level	How soon treated
1	RESUSCITATION	Immediate
2	EMERGENCY	Within 10 minutes
3	URGENT	Within 30 minutes
4	SEMI-URGENT	Within 60 minutes
5	NON-URGENT	Within 2 hours

Concerning Box Plots **S7.4.1** and **S7.4.2**:

An initial investigation revealed Tauranga and Whakatane to be different on average Triage rating, namely the average for TGA being about **3.34** and WHK about **3.70** – and since Triage is an ordinal variable the respective Medians are Triage = 3 and Triage = 4 – see the bold line (viz. "band") within each of the Box Plots (SAS-obtained Box Plots **S7.4.1** and **S7.4.2**) in the associated Results (**Chapter 13.1 APPENDIX A4**).

These box plots were generated from the full sets of data for Hospitals T and W for Financial Year 2006. Apart from the quite different Triage averages (**3.34** versus **3.70**) the two associated histograms show a marked difference. While the variance of the first shows a vaguely normal / bell shaped distribution, the second definitely does not.

The fact that these histograms reflect the distribution of five possible Triage levels probably negates the usage of Standard Deviation (**SD**) as a good indicator of the significance of the two measurements – but the two SDs are **0.83** and **0.64** respectively, none the less. Both measurements are thus well within the 2.5 or less "rule of thumb" [Berry and Linoff, 1997, p.105] cut-off for insignificant statistical deviation – which is "good". For mentioned rule of thumb cf. **Chapter 13.4 APPENDIX D2**.

Symmetry and normal distribution is also quantified by the respective values for Skewness and Kurtosis for each of the hospitals, namely:

- Hosp **T**: Skewness = **0.0023** and Kurtosis = **-0.2115** versus
- Hosp **W**: Skewness = **-0.3878** and Kurtosis = **0.3934**

Hospital T is thus skewed right whereas Hospital W is skewed left, and while neither hospital's histogram reflects anywhere near a normal bell-shaped curve, Hosp T shows a marginally more normal curve than does Hosp W – the latter being "off-centre" with a long tail to its left and almost no tail to its right. Hospital T very clearly peaks for Triage = 3, while Hosp W peaks on Triage = 4 - as the "bands" on the two box plots also indicate – a significant difference between the two distributions.

Having established that the two hospitals in question are quite different concerning Triage – one can still investigate seasonal demand patterns for each hospital. Cf. **C7.4.1**, **C7.4.3** and **C7.4.5**.

Starting with Tauranga Hospital (**C7.4.1**) and glossing over its statistical figures, some of the obvious / standout characteristics are:

- Triage classifications = **3** (i.e. considered URGENT) predominates, along with Triage = **4** (SEMI-URGENT) in clear second position.
- There is especially high activity around July and August. May and June is also fairly high, as is December and January.

Concerning highest activity days of the week, Sundays and Mondays appear to be the most demanding on ED services.

Whakatane Hospital (**C7.4.3**) annual per-month frequency pattern is clearly dominated by January, with December also significantly higher than the remaining ten months of the year – suggestive of a very visible peak holiday season rise in population. The holiday impact is much more visible in Whakatane (with its much smaller resident population) than is the case with Tauranga (with its much larger resident population).

Take Note: The third ED Department in the BOP District – namely OPOTIKI (**C7.4.5**) (abbreviation used in OLAP Cubes is OPO) is also presented – to account for the 3% presentations not reflected in the Hosp T and Hosp W presentation frequencies.

And lastly, the "All Site" (**C7.4.6**) statistics reflect the December / January and Sunday / Monday predominance for the BOP District.

TRIAGE: PER MONTH RESULTS – GRAPHICALLY ILLUSTRATED

Further concerning Triage; while the two Box Plots highlighted the significant inter-hospital Triage discrepancy for the FULL Fin Year 2006, the question may be asked: Does this pattern hold over the individual twelve months comprising this Fin Year? The answer is: Yes it does.

This is clearly evident from the two Per Month Histograms **C7.4.2** & **C7.4.4** – derived from Cubes / Cube Pivot Tables **C7.4.1** & **C7.4.3**. Triage 3 dominates the "skyline" of the former, and Triage 4 that of the latter.

The compounded (the seven days of the week stacked one upon the other) histogram of Hospital T clearly centres on URGENT (viz. Triage = **3**), with SEMI-URGENT at times approaching (but still not quite reaching) parity, while SEMI-URGENT dominates for Hospital W, with URGENT almost never reaching even half the compounded height of SEMI-URGENT (viz. Triage = **4**).

These graphical "visuals" of the Hosp T versus Hosp W obviously derive from the actual month-specific per-hospital aggregates, and are most informative.

TRIAGE: WEIGHTED REWORK OF RESULTS

The following table shows the transcribed (from Cube tables **C7.4.7** and **C7.4.8**) month by month average Triage outcomes of a weighted rework of the data, and the comparison of these monthly stats for Hosp T with that of Hosp W.

T7.4.2 Fin Year 2006 Hosp T and W – Condensed Average Triages Per-Month (Transcribed from **C7.5.7** and **C7.5.8**)

FIN YEAR 2006	TGA	WHK
JUL 2005	**3.27**	**3.60**
AUG 2005	**3.27**	**3.60**
SEP 2005	**3.30**	**3.66**
OCT 2005	**3.30**	**3.68**
NOV 2005	**3.30**	**3.67**
DEC 2005	**3.35**	**3.70**
JAN 2006	**3.40**	**3.78**
FEB 2006	**3.37**	**3.73**
MAR 2006	**3.39**	**3.70**
APR 2006	**3.35**	**3.74**
MAY 2006	**3.32**	**3.74**
JUN 2006	**3.37**	**3.74**

For each of the twelve months comprising Financial Year 2006 Hosp T consistently shows lower average Triage than Hosp W, and by quite a significant margin. Put another way: Hosp T handles many more URGENT (viz. Triage = **3**) cases than does Hosp W, whereas the average Triage grading in Hosp W is SEMI-URGENT (viz. Triage = **4**).

DAY OF WEEK: PER FINANCIAL YEAR RESULTS – GRAPHICALLY ILLUSTRATED

DOW did of course form part of the discussion of **Chapter 7.2** (which deals with PER SEASON – DEMAND PER DAY OF WEEK), but in that case the author tried to establish a Per Hospital "profile" on a Per Month of Year / Per Day of Week grid. The reader is reminded that this was not altogether successful across two Fin Years. While Hosp W showed a repeating profile, Hosp T did not.

In this chapter the author therefore decided to stand back a little further "from the trees" in order to "see the forest" – i.e. to look at this phenomenon within the context of FULL Fin Years. In fact, it was decided to compare the three most recent completed Fin Years – 2005, 2006 and 2007. It was also decided to profile all three Hospitals' Emergency Departments, separately, as well as the whole BOP DHB "District" – the latter to illustrate the district's average profile.

This "standing back" approach proved much more successful where DOW is concerned.

<u>First and Overriding Impression</u>:
Each ED has its own unique and very distinctive profile / "footprint" – as graphically presented in **C7.4.9**, **C7.4.10**, **C7.4.11** and **C7.4.12**.

<u>ED Specific Impressions</u>:

TAURANGA ED:	Sunday / Monday columns a bit more prominent but the rest rather flat
WHAKATANE ED:	Sunday and Monday / Saturday "bookends" prominent with an overall deeply concaved appearance
OPOTIKE ED:	Sunday / Saturday "bookends" absolute colossus dwarfing the other five days of the week
DHB District's ED:	Sunday and Monday / Saturday somewhat prominent with an overall concaved appearance

<u>Overall Impressions and Derivations</u>:

- Each ED has its own unique and very distinctive profile or "footprint" – already mentioned
- These profiles repeat themselves every year
- Three of them (Hosp T, Hosp W and DHB District) show growth per annum
- This growth is very marginal for Hosp W and The District
- This growth is very visible for Hosp T
- Of the four profiles Hosp W ED most closely resembles The Average as represented by The District, but even these two are visibly different

This sub-section thus clearly identifies unique Per Annum profiles per Hospital ED, and more clearly confirms the graphs of SECTION TWO of **Chapter 7.3.1.**

TRIAGE PER DAY OF WEEK: PER FINANCIAL YEAR RESULTS – GRAPHICALLY ILLUSTRATED

An additional parameter was brought to bear on the previous set of four profiles, namely Triage Classification.

And still "standing back" in order to "see the forest and not the trees":

First and Overriding Impression:
Four distinct Triage Level per Day of the Week profiles, each with its own unique and very distinctive "footprint", result. Cf. Cubes **C7.4.13**, **C7.4.14**, **C7.4.15** and **C7.4.16**

ED Specific Impressions:

TAURANGA ED: Triage=**3** (viz. URGENT) dominates the "city skyline" and there is also a strong showing of Triage=**2** (viz. EMERGENCY). Monday is the marginally dominating DOW.

WHAKATANE ED: Triage=**4** (viz. SEMI-URGENT) dominates this "city skyline" with Sunday (especially) and Saturday the dominant DOW – very markedly so.

OPOTIKE ED: Sunday and Saturday (especially) dominates absolutely but there's a gradual shift from Triage=**5** (viz. NON-URGENT) dominating (for Fin Year=2005) to Triage=**4** (viz. SEMI-URGENT) dominating (for Fin Year=2007).

DHB District's ED: Sunday dominates, and yet again there is a shift, but unlike what was the case with OPOTIKI the shift is in the opposite direction, namely from Triage=3 (viz. URGENT) to Triage=**4** (viz. SEMI-URGENT). In other words, the BOP DHB as a region has shown a marginal shift over the most recent completed Financial Years.

Overall Impressions and Derivations:
- Each ED has its own unique and very distinctive profile or "footprint" – already mentioned
- These profiles repeat themselves every year for individual Fin Years
- However, the BOP DHB "district" (as well as OPOTIKI) does show shifts
- Three EDs (Hosp T, Hosp W and DHB District) show growth per annum
- This growth is very marginal for Hosp W and The District
- This growth is very visible for Hosp T, particularly so for Triage=**4**

This sub-section thus clearly identifies unique Per Annum profiles per Hospital ED, and a slow BOP DHB regional shift in predominant Urgency level from Triage=**3** to Triage=**4** – i.e. from URGENT to SEMI-URGENT. It will be interesting to see whether this trend continued at the conclusion of Fin Year=2008.

Gist of Chapter's Findings: Cf. condensed outcomes and commentary in **Ch 8**.

7.5 FINDINGS: Using FULL DS: PER DAY OF WEEK – PREVALENCE OF TRIAGE RATINGS PER TIME OF DAY

RESULTS HELD IN APPENDIX

Cf. Pages **313 – 323**

7.5 FINDINGS: Using FULL DS: PER DAY OF WEEK – PREVALENCE OF TRIAGE RATINGS PER TIME OF DAY

- **(Postulate5)** Per Day of Week: To determine prevalence of various **Triage** / "urgency" ratings **per Time of Day**

7.5.1 Using FULL DS: FINDINGS

The main emphasis on this occasion was on per Time of Day fluctuations, and to compare Hosp T and Hosp W in the light of Time of Day. Day of Week is also emphasized in **Chapter 9.5** – but for TGA only. Both Day of Week and Time of Day are thus addressed across **Chapters 7.5** & **9.5**.

Therefore, with respect to Time of Day, the following has been established – and then compared across three Financial Years – in order to see if there's parallel results and consistency between the two ED departments – or not.

While Hosp O's ED presentations are also reflected it is not used in the comparative study of the three Financial Years' worth of Cube outcomes (cf. **C7.5.1**, **C7.5.2** & **C7.5.3**). ED presentations at Hosp O are simply too few to engender confidence in its statistical results. Hosp T and Hosp W, though, are compared. These statistics are based on summated Full Financial Year figures.
In each case the proportions are calculated for each of the four or five Triage classifications recorded per Hour of Day – i.e. 24 sets of results - per Fin Year.

Why "... four or five ..."? Because Hosp W might not have had any "resuscitations" recorded for a certain Hour of the Day (Hosp O, incidentally, has many such gaps in its recorded presentations).

The most illuminating of these findings are that in each and every case, i.e. for each of **72 hour** per hour sets of data (i.e. **24 hrs x 3** Fin Years of summated presentations) Hosp T outperforms Hosp W in both of the highest emergency / most critical Triage categories (Triage = **1** or **2** – viz. "RESUSCITATION" and "EMERGENCY" respectively) – by factors of 2, 3, 4 and even more! (Given that Hosp W may under certain circumstances have sent some of its (Whakatane and Area) patients directly to Hosp T.) The reader is reminded yet again that these proportions are computed against each hospital's ED department's own presentations for that particular per hour set of data.

In the case of Triage = **3** ("URGENT") Hosp T almost always outperforms Hosp W, but seldom by more than a factor of 2. This is especially so in the case of the waking hours of the day – in fact always the case during mentioned "waking hours" (from about 8 AM until 10 PM at night, actually), but during the small hours of the morning – between about 11 PM & 7 AM Hosp W sometimes pips Hosp T for highest proportion.

With regard Triage = **4** ("SEMI-URGENT") in almost every instance of the possible 72 sets of per hour summated presentations Hosp W outperforms Hosp T – for obvious reasons in that having "lost" out to Hosp T 72 times for each of Triage = **1** and also for Triage = **2**, and having mostly lost out to Hosp T in most cases for Triage = **3** – it had two large proportions in the remaining Triage classifications, i.e. Triage = **4** and **5** ("SEMI-URGENT" and "NON-URGENT" respectively) – and so it does.

Put in tabular form the picture which emerges thus looks as follows:

T7.5.1 FULL Fin Years 2005, 2006 & 2007 - Hosp T & W Triages Compared
(Transcribed from Cubes **C7.5.1**, **C7.5.2** and **C7.5.3**)

Triage / Priority	Urgency Level	ED Dept of Hosp which dominates
1	RESUSCITATION	**Hosp T** in all 72 per-hour cases
2	EMERGENCY	**Hosp T** in all 72 per-hour cases
3	URGENT	**Hosp T** in almost all 72 per-hour cases
4	SEMI-URGENT	***Hosp W*** in almost all 72 per-hour cases
5	NON-URGENT	**Hosp T** and ***Hosp W*** share "honours"

In other words, Hosp T and Hosp W occupy "inverse opposites" with the most serious and critical being dominated by Hosp T and the least serious and critical by Hosp W. This could be indicative of the two inherently different communities they serve, namely on average younger versus on average older, ethnic population mix, and so forth.

Gist of Chapter's Findings: Cf. condensed outcomes and commentary in **Ch 8**.

This sub-topic is explored a little further at a later stage – i.e. in both **Chapter 9.5** and **Chapter 11.1**.

7.6 FINDINGS: Using FULL DS: PER ANNUM – DEMAND OVER SEVERAL FINANCIAL YEARS

RESULTS HELD IN APPENDIX

Cf. Pages **324 – 330**

7.6 FINDINGS: Using FULL DS: PER ANNUM – DEMAND OVER SEVERAL FINANCIAL YEARS

- **(Postulate6)** Per Annum: To determine comparative per annum demand over several "Financial Years" – to see if there is a trend "for better or worse" over the years

7.6.1 Using FULL DS: FINDINGS

This chapter focuses on the growth in demand since 1999 inclusive.

Reminder concerning the Financial Year used in the Cubes:
A financial year comprises a period from July 1st of one year to June 30th of the following year – and is identified by the year in which it concludes. Therefore, the 2006 Financial Year starts on July 1st 2005 and concludes on June 30th 2006.
Cf. the partly drilled-down example (**C3.1.1**) presented earlier.

CUBES RESULTS

These include that of

- The District i.e. with Site = All Site(s) Cf. **C7.6.1** & **C7.6.2**
- Hospital T i.e. Tauranga ED Cf. **C7.6.3** & **C7.6.4**
- Hospital W i.e. Whakatane ED Cf. **C7.6.5** & **C7.6.6**
- Hospital O i.e. Opotiki ED Cf. **C7.6.7** & **C7.6.8**

CUBE RESULTS FOR FULL FINANCIAL YEARS SINCE 1999

In **Chapter 5.2** the author already alluded to the inherent differences between **Hospitals** T and **W**.

Concerning Presentations

Looking at the **All Sites** related statistics shows an annual growth in demand - Always upwards and onwards.

The **Hosp T** presentations show some reversal in presentation aggregates around the financial years 2003, 2004 and 2005, as does **Hosp W** presentation aggregates for financial years 2004 and 2006 – viz. shows the equivalent drop in presentation numbers. **Hosp O** peaked in 2005 but has since dropped in presentation aggregates for two successive years – i.e. down in fin year 2006 and a further drop in fin year 2007.

Concerning Admissions

Admissions represent a subset of presentations. In other words, it concerns the number of ED patients who are triaged and, depending on the triage-outcome, subsequently admitted to hospital.

As can be seen in the **All Sites** table about **33%** of all triaged presentations are admitted to one of the three hospitals, for example to Inpatients.

The three hospitals, however, show different admission percentages, namely: Where the annual average for **Hosp T** averages around **35%** of presentations being admitted, the equivalent admission percentages for **Hosp W** is about **29%**, and for **Hosp O** it is less than **1%**!

The reader should be made aware of the following "local knowledge", though – that **Hosp O** would have most (if not all) of its (considered) more "serious" presentations transferred to **Hosp W** forthwith, and **Hosp W** will do likewise regarding a small number of their presentations for whom it would be considered prudent to have them admitted to the largest and best equipped hospital in the BOP – **Hosp T**.

CUBE RESULTS WITH % ANNUAL GROWTH

For Growth Percentages cf. rightmost columns of **C7.6.1/3/5/7** for **The District**, **Hosp T**, **Hosp W** and **Hosp O** respectively.

The reader is again reminded that while the commonly used term for per year growth – viz. annual growth – is used that within the context of this investigation it is in fact per financial year growth. It matters not because all that has happened is that this investigative journey started on a 1st of July in stead of a 1st of January. Christmas and New Year's Eve thus fall in the middle of the financial year and not at the very end of it.

Now, concerning the annual growth for the **DHB District** (**C7.6.1**) as a whole there is a steady growth in demand for ED Services. As can be seen on the applicable pivot table (**C7.6.1**) the growth, while showing an initial 6%+ growth for each of the early years 1999 and 2000, it then almost settled into **an approximate 2% annual growth** in demand across the region – but for 2004 when it grew by a mere 0.37%.

The situation appears more in a state of flux when looked at per ED department. **Hospital T** (**C7.6.3**) mimics the District's pattern most closely with an initial 9%+ growth for 2000 when compared with 1999 - at the inception of Data Warehouse-based recorded ED history in the BOP. It then also settles into **an average annual growth of between 2% & 3%** - but yet again with a slump in 2003 & 2004 – where growth was calculated to have been -0.17% & -3.30% respectively.

In the case of **Hospital W** (**C7.6.5**) the fluctuations in demand is much more erratic. 2001 is calculated to have spiked at an incredible 11%+ - with the years 2003/4/5/6/7 oscillating at approximately 5%/-2%/3%/-1%/4% respectively. Therefore: No steady pattern – but with **an overall approximate growth of 2%.**

Hospital O (**C7.6.7**) was added for good measure but its recorded statistical data only dates back to 2003 – and the evidence would suggest only a few months' worth of ED stats were recorded for that year. The reader will notice that the author indicated as such by "striking through" the percentage growth of 2004 when compared with 2003 - and the pattern since indicative of **negative growth.**

A few comments about those slumps in demand for ED services around 2003 / 2004 - give or take a year: The author suspects that the slumps may well have been bad weather (during school holiday seasons) related - in part, anyway. The act of God near destruction of Matata (close to Whakatane) and major slips and damaged infrastructure elsewhere in the region, including Tauranga, may have contributed to a slump in holiday tourism during those couple of years – with ED presentation statistics for the period a mere manifestation of its impact.

DEMOGRAPHIC INFORMATION – TO DATE

The comparative population sizes were a known quantity before the advent of this research – and were not expected to be an issue here. However, the proportionate usage per ED was not expected to be so significant. The author is of the opinion that these differences were (and are) driven by socio-economic circumstance as well as certain other "drivers", for example the availability of GPs, more so than any other causal factor.

BOP Population Statistics

Chapter 13.4 APPENDICES D6, **D7**, **D8** and **D9** contain an assortment of demographic facts and figures, which makes interesting reading.

For the purpose of this thesis, however, **APPENDIX D8** is considered the "last word" in demographic information for the BOP DHB District in question. It is also the most recent and most up to date of such statistical information.

It relates the BOP DHB population statistics as recorded by **Statistics New Zealand** on **Census** night **2006** – i.e. on the night of **December 7th 2006**.

The statistics two pages along speaks for itself. Cf. the condensed and reworked / enhanced table **T.7.6.1**.

For example: By dividing 40,221 into 145,704 and 8,967 into 40,221 one finds that the Western sub-region of the BOP DHB has **3.62** times the population of the Eastern sub-region, and the Eastern sub-region **4.48** times the population of the North-Eastern sub-region.

That is - The comparative population bases of the three regions:
Populations: Eastern BOP divided into Western BOP: **factor** = approximately **3.5**
Populations: Nor-East BOP divided into Eastern BOP: **factor** = approximately **4.5**

One might therefore have thought that Hosp T would (or should) have about three and a half times the ED presentations to that of Hosp W, which in itself would (or should) also have about four and a half times the ED presentations of Hosp O.

This of course turned out NOT to be the case.

BOP District HB Emergency Departments and Respective Sub "Districts"

As far as an inter-Hospital comparative analysis is concerned the "composite" Cube **C7.6.9** (a "composite" of the essence of Cubes **C7.6.1/3/5/7**) brings together the Attendance, Admission and Admission Proportion trends of the three regional hospitals as well as that of the district as a whole.

Concerning the second last row of statistics of **C7.6.9**:

The first of these stats was computed by determining the percentage growth from "first" completed Fin Year (1999) to that of the last completed Fin Year (2007), and finds that a higher Population Growth area (viz. **Western BOP**) shows a **lower** Growth in **ED Attendances (about 22%)** than a lower Population Growth area (viz. **Eastern BOP**) which shows a **higher ED Attendance (about 30%)**!

Hosp O stats, while supplied, are not considered in this particular comparison.

The next statistic presented in **C7.6.9** is the growth in Admissions since the "first" completed Fin Year (1999) to that of the last completed Fin Year (2007), In this case the inverse of the Attendance Growth pattern manifested itself. . So **Western BOP** shows a **25% Admissions Growth** compared with **Eastern BOP** with a **22% Admissions growth.**

One would have expected the Attendance and Admissions statistics to be in "lockstep", but that is NOT the case. Precisely the opposite occurred.

Concerning the last row of statistics of **C7.6.9**:

These statistics represent the Admission Proportion Average of its preceding nine annual Averages. The **Western BOP / Hosp T Average of Averages (35%)** versus the **Eastern BOP / Hosp W Average of Averages (29%)** are yet again out of step with what Attendance Aggregates would suggest.

However, the latter may have been influenced in part by such factors as:

- Worst cases being transferred from Hosp W ED to Hosp T ED as a matter of course – and for the sake of prudence, and that
- While both Hosp T and Hosp W are classified as "secondary health" institutions Hosp T ED does have more capacity and does cater for a wider range of operations.

The author will address some of these issues again in the latter chapters of the thesis.

Using the **Chapter 13.4 APPENDIX D8** Census 2006 statistics the following sub-district stats were derived:

T7.6.1 Condensed Table derived from Statistics NZ Census 2006 Stats

Sub-District	Maori	% Maori	Non-Maori	Maori & Non-Maori Total
Western BOP District	6,930	**16%** (16.47)	35,145	42,075
TAURANGA City	16,575	**16%** (15.99)	87,054	103,629
TGA City & WBOP Total	**23,505**	**16%** (16.13)	**122,199**	**145,704**
WHAKATANE District	13,200	**40%** (39.64)	20,094	33,294
KAWARAU District	4,056	**59%** (58.55)	2,871	6,927
WHK & KAW / EBOP Total	**17,256**	**43%** (42.90)	**22,965**	**40,221**
OPOTIKI District	4,875	**54%** (54.36)	4,092	8,967
OPO/NEBOP Total	**4,875**	**54%** (54.36)	**4,092**	**8,967**
BOP DHB Grand Total	**45,636**	**23%** (23.41)	**149,256**	**194,892**

Legend: WBOP = Western BOP EBOP = Eastern BOP NEBOP = North EBOP

It is for example also "retrospectively" employed in "SECTION 2" & "SECTION 3" of **Chapter 7.3.1**.

Maori Population Component per Sub-District

Time constraints did not allow for the proper investigation of various potentially related factors, including Ethnic population mix, but the author is of the opinion that it does exert some "peripheral" influence on demand for ED services.

It warrants a mention on a couple of occasions during the course of this study, and is given some thought in **Chapter 11** (PERIPHERAL OUTCOMES).

In closing, looking at the population proportion percentages (cf. condensed Table **T7.6.1** on the previous page) take note how the Maori proportion increases within the BOP DHB region – from **16%** (Tauranga District) to **43%** (Whakatane District) to **54%** (Opotiki District). Also take note that it is the Kawarau "District" (which for ED purposes resort under the auspices of the wider Hosp W ED District) that shows the highest Maori population component at **59%** - i.e. "outperforming" Opotiki District (at **54%**) by **5%**!

Not surprisingly, the Maori population proportion increases the further east and north-east one moves towards Eastland.

DEMOGRAPHIC INFORMATION – PROJECTED

Chapter 13.4 APPENDIX D9 contains two transcribed population projections. Derived and reworked from the second of these (cf. sub-section **D9.2** of **APPENDIX D9**) is the table (**T7.6.2**) and associated histogram on the following page. Take Note: These are Statistics NZ produced population projections.

The Tauranga City population was / is predicted to grow by 50% over the 25 year period concerned (viz. 2001 until 2026), and the Western BOP District by 45%.

On the other hand, the Whakatane population was / is expected to merely remain at its current level, Opotiki to show minimal growth, and Kawarau to effectively go into terminal decline, shedding a quarter of its “current” (that is – its 2001) population.

The anticipated between 2% and 3% per annum increase in demand for ED services / ED presentations in the BOP DHB “district”, as mentioned in the ANNUAL GROWTH sub-section a few pages earlier, will for the main part be driven by this population dynamic.

The same applies to the Western BOP to a lesser degree.

In other words: growth in BOP DHB regional population lies ”west”, not “east “.

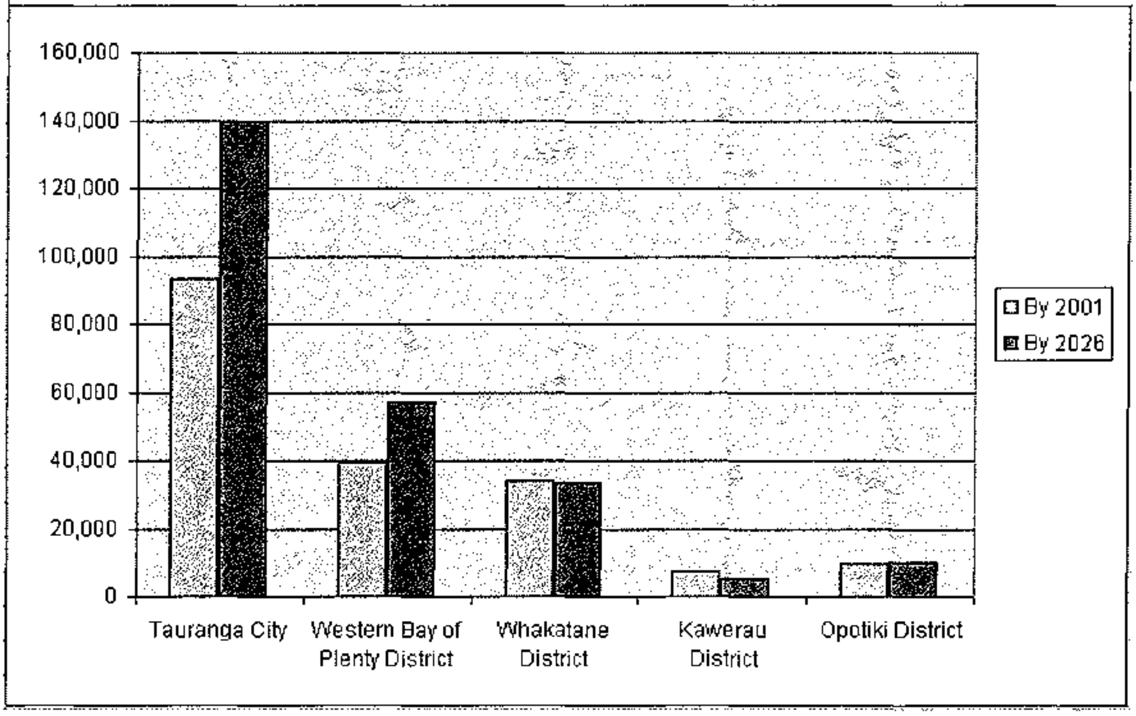
<u>**Gist of Chapter’s Findings**</u>: Cf. condensed outcomes and commentary in **Ch 8**.

This matter will yet again be raised in **Chapter 12** – where the author will address Tauranga-specific growth – and the potential implications thereof on ED services in the immediate region.

T7.6.2 Condensed Table derived from Statistics NZ Census 2006 Stats

TRANSCRIBED Projected Resident Population Change 2001-2026
REWORKED for BOP DHB
As at 30th June

Area	Projected	Population	Change	2001-2026
BOP DHB Area	**By 2001**	**By 2026**	**Number**	**Percent**
Tauranga City	93,300	139,800	46,600	50
Western Bay of Plenty District	39,300	57,000	17,800	45
Whakatane District	34,000	33,600	-400	-1
Kawerau District	7,300	5,300	-1,900	-27
Opotiki District	9,500	10,100	600	6



8. DISCUSSION: Using FULL DS: HOSP T VERSUS HOSP W

DISCUSSION:
Using FULL DS:
HOSP T VS HOSP W

A
STUDY IN
DIFFERENCE

8. DISCUSSION: Using FULL DS: HOSP T VS HOSP W USING FULL DATA SETS

8.1 CONDENSED FINDINGS: Using FULL DS

Introduction

Chapter 8 condenses all of the foregoing from "mega" **Chapter 7** into **Table T8.1**. These are Inter-Emergency Department / Inter-Hospital **DIFFERENCES** established and elaborated upon in **Chapter 7.1** to **Chapter 7.6** inclusive.

Cf. next page.

The reader is referred back to **Chapter 5.2** and reminded that the main body of this thesis concerns a study in **DIFFERENCE** followed by a study in **SIMILARITY**.

The former (viz. an Inter-ED / Inter-Hosp study in **DIFFERENCE**) was conducted against the "backdrop" of FULL Data Sets (comparing Hosp T ED and Hosp W ED), be it for a Month or for a Financial Year at a time. The latter (viz. an Intra-ED / Intra-Hosp study in **SIMILARITY**) was conducted against the "backdrop" of PARTITIONED Data Sets (comparing TGA ED of one Fin Year with TGA ED of another Fin Year), be it for a Month or a FULL Fin Year at a time.

Another big difference between these two studies is that while the former (**DIFFERENCE**) applied mostly OLAP CUBES-generated information (with a sprinkling of SAS-generated Box Plots), the latter (**SIMILARITY**) applied mostly SAS EM-generated (i.e. Data Mined) information (with a lesser component of CUBES-generated Excel Pivot Tables).

Yet a third difference between the former and the latter: The PARTITIONED outcomes of the latter were generated in order to either prove or disprove the earlier Hosp T outcomes from the Comparative study of Hosp T versus Hosp W. While it is therefore Hosp T focussed (or rather TGA focussed – TGA being the mnemonic predominantly used in **Chapters 9** and **10**) there is the occasional attempt at confirmation of some Hosp W (or rather WHK) statistic.

A fourth difference is the overriding emphasis on CLUSTERING in the study in **SIMILARITY**. These Clusters are then ranked from highest frequency in descending order – and an ED Presentation Flow Diagram created to visually portray some of the Trends which may manifest itself.

Chapter 8 (i.e. this chapter) addresses "mega" **Chapter 7**'s (i.e. the previous chapter) study in **DIFFERENCE**.

T8.1 Condensed Outcomes of a Study in DIFFERENCE Hosp T versus Hosp W

Chapter	**Quality**	**Hospital T**	**Hospital W**	**Where discussed**
	(1)			
Ch 7.1	Average Age	39 yrs	35 yrs	**pp.76-86**
	(2)			
	% Admissions	36%	31%	**ditto**
	(3)			
Ch 7.2	Per DOW "Mountain" Range Profile	"Mt Tasman" "Mt Cook" & "Mt Dampier"	"Mt Cook" prominent	**pp.87-92**
	(4)			
Ch 7.3	Per Age Group Profile	Fairly similar but much lower per capita usage	Fairly similar but much higher per capita usage	**pp.93-99**
	(5)			
	Per Week Profile	Peaks on Mondays & slight mid-week drop	Peaks on Sundays & very pronounced mid-week drop	**ditto**
	(6)			
	P/Age Group P/TOD Profile	Similar to HW but inter-Age Pr differ	Similar to HT but frequency lower	**ditto**
	(7)			
Ch 7.4	Average Triage	Consistently around 3.3	Consistently around 3.7	**pp.100-106**
	(8)			
	Triage Mode	Consistently 3 viz. URGENT	Consistently 4 viz. SEMI-URGENT	**ditto**
	(9)			
	Per DOW Profile	Distinctive Hosp T P/W footprint	Distinctive Hosp W P/ W footprint	**ditto**
	(10)			
	Triage p/DOW	Distinctive Profile	Also Distinctive Pf	**ditto**
	(11)			
Ch 7.5	Triage	Totally dominates Triage 1 & 2	Almost completely dominates Tri = 4	**pp.107-109**
	(12)			
	Triage (cont'd)	Dominates Tri = 3 & 50/50 on Tri = 5	50/50 on Tri = 5	**ditto**
	(13)			
Ch 7.6	Demand over years	Trend upwards	Trend also creeping upwards	**pp.110-119**
	(14)			
	Statistics NZ	Escalation in pop.	Stagnation	**ditto**

Condensed Outcomes of Study in DIFFERENCE

The preceding Table (**T8.1**) relates the inter-hospital discrepancies which manifested themselves in the preceding **Chapters 7.1 - 7.6**. While one or two of these discrepancies may turn out to be very Hosp T and Hosp W specific, most would very likely recur in other similarly circumstanced sub-regional "pockets" of New Zealand. So much so that the author believes a subset of these "parameters" are likely to consistently recur.
The focus therefore shifts onto the identification of those parameters which are likely to be "universal" (within a New Zealand context, at any rate).

The ones bound to be **Hosp T versus Hosp W specific** are:
- The four to five year gap in average Age
- Higher Admission % for Hosp T
- "Mountain" Range profiles which differ
- Per-Age-Group profiles may be quite similar but per-capita-presentations differ significantly
- Per-Week-Profiles (viz. DOW Profiles) which differ
- Average Triage (and in this case) Mode different
- Domination of Triage 1 and 2 versus the domination of Triage 4

Some of the foregoing – or derivations thereof – are likely to be **"universal" in a NZ context**. In the author's estimation these include:
- An Age-gap (between two hospitals' average ages) where the socio-economic population-base of one hospital is rather different from the other
- Range Profiles location / season-driven: Depending on location of a hospital seasonal spikes may occur at different times of the year (for example: Queenstown is likely to spike particularly high during winter months; Whakatane to spike highest in summer months)
- Average Triage classifications also more likely to lean towards Triage = 4 (SEMI-URGENT) with more depressed social-economic regions / districts

While some of the immediately foregoing bullet-points obviously emanate from a seasonal collective, some of the remainder are indicative / suggestive of another "collective" - just below the "radar".

A sit-up-and-take-notice finding by Cakmak et al [2005] about seasonal and / or "socio-demographic" (as they put it) circumstances illustrates the point. These author's [Ibid] investigation into the affect of pollens on hospitalization statistics appear to indicate that younger males and less educated families are more susceptible to asthma!

Socio-Economic circumstance was first alluded to at the closing of **Chapter 7.3**. It is that other collective which along with Seasonality impacts upon Demand for ED Services. Fortunately the Ministry of Health (MOH) already have a system whereby which Socio-Economic circumstance can be factored in. Cf. next page.

Socio-Economic circumstance and the Ministry of Health's Social Deprivation Index

Firstly; the Deprivation Index does not measure deprivation of individuals, but regional areas. That is: "The Social Deprivation Index is a measure of socio-economic status calculated for small geographic areas" [Statistics NZ, 2006]. Furthermore; it calculates / quantifies and eventually aggregates nine weighted variables, from highest weighting (for "Income") to lowest weighting (for "Owned Home"). For a list of the nine cf. **APPENDIX D11** of **Chapter 13.4**.

One may therefore also classify the inter-hospital discrepancies as either emanating from socio-economic and / or seasonal influences.

Henceforth:

- Socio-Economically induced outcomes: **1,4,5,7,8,9,10,11,12,13** & **14**
- Seasonally induced outcomes: **2,3,4,6,7,10,11,12** & **13**

This can also be represented as follows:

PROCESSES WHICH INFLUENCE ED DEMAND

Socio-Economically induced outcomes
1, 4, 5, 7, 8, 9,10, 11, 12, 13 & 14

Regional Socio-economic characteristics can (and do) influence Demand for ED Services. This "process" box implies some sort of algorithmic content which establishes the extent of the impact.
The Deprivation Index would be the obvious candidate.

Seasonally induced outcomes:
2, 3, 4, 6, 7, 10, 11, 12 & 13

Seasonal fluctuations can (and do) influence Demand for ED Services. This "process" box implies some sort of algorithmic content which establishes the extent of the impact.

Flowchart 4: Two Flowchart process boxes

Probable "Rule(s) of Thumb" relating to mentioned two process boxes

Socio-Economic (S-E) circumstances leaning towards "bad" = higher ED Demand
AND / OR
Seasonally induced escalation in regional Population = higher ED Demand still

"Bad" S-E circumstances + Seasonal "high" = compounded / highest ED Demand

8.2 CLOSING COMMENTS: Using FULL DS

The above processes influence ED Demand and Overcrowding. It involves a great deal more than merely the fourteen points raised in condensed table **T8.1**. Cf. the rest of the related discussion in Section **8.1**.

The causes and solutions are in fact multidimensional – to be addressed in more detail in **Chapter 12**.

9. FINDINGS: TGA USING PARTITIONED DATA SETS (I.E. TRAINING, VALIDATION & TEST) VS SOME WHK

FINDINGS:
TGA
USING PARTITIONED
DATA SETS

A
STUDY IN
SIMILARITY

9.1 FINDINGS: Using PART DS: PER SEASON – DEMAND OVER 12 MONTHS

RESULTS HELD IN APPENDIX

Cf. Pages **332 - 353**

9. FINDINGS: TGA USING PARTITIONED DATA SETS (I.E. TRAINING, VALIDATION & TEST) VS SOME WHK

- **(Postulate1)** Per Season: To determine seasonal demand over 12 month periods running from July to June (inclusive).

9.1 FINDINGS: Using PART DS: PER SEASON – DEMAND OVER 12 MONTHS

9.1.1 Using PART DS: FINDINGS

In **Chapter 7.1** it came to light that a discrepancy exists between the mean ages for TGA and WHK. This was one of several discrepancies found to define each hospital's ED population.

Based on the initial discovery of this Age discrepancy the question arose as to whether this discrepancy was a mere temporary aberration, or whether the pattern would hold?

The randomly partitioned Data Sets were useful to this end. That is: If the discrepant pattern held across a number of partitioned Data Sets then that should be a confirmation.

Since the emphasis has effectively shifted to Tauranga Hospital, the first two tables (**T9.1.1** and **T9.1.2**) compare only various TGA partitioned Data Sets, to be followed by a TGA and WHK (**T9.1.3**) comparison of three partitioned DS apiece for one Fin Year.

The first table (**T9.1.1**) compares two July's statistics, and the average approximations for **TGA** are:

- A **Mean Age** of about **39** years of age
- A **1st Quartile** indicative of the ages **zero** (i.e. babies) **to 17** year olds comprising the 1st 25% of records – viz. 25% of ED presentations
- A **2nd Quartile** comprising **0 - 36** years of age representing half the ED presentations – and by implication 36 – 100 odd years old patients making up the remaining 50% - 36 is thus the Median, and
- A **3rd Quartile** showing **0 – 63** years of age comprising 75% of ED presentations.

The second table (**T9.1.2**) uses much larger Data Sets, in fact, Data Sets of about 12 times the number of records used in the first table. As a result the various columnar statistics for **TGA** show a bit more conformity, with:

- Five of the six Ages being **39** – or, **if rounding up** were to be applied, an average age of about 39.7 (in other words an average Age of closer to **40** years of age)
- Four of the six Q1's being 17 (i.e. **Q1** = **0** – **17**)
- Five of the six Q2's being 36 (i.e. **Q2** = **0** – **36**) and
- Four of the six Q3's being 63 (i.e. **Q3** = **0** – **63**).

The third table (**T9.1.3**) compares statistics for Tauranga Hospital ED with that of Whakatane Hospital ED. The following differences yet again hold true – or rather, are confirmed by the partitioned Data Sets. That is, when **comparing TGA with WHK** the comparative approximations are:

- Mean Age: TGA = **39** versus WHK = **35** (or **if rounding** were applied - **40** versus **35**)
- Quartile 1: TGA = **17** versus WHK = **14**
- Quartile 2: TGA = **36** versus WHK = **31** and
- Quartile 3: TGA = **63** versus WHK = **56**.

A reminder that in **Chapter 7** FULL (as in non-partitioned) Data Sets were used, whereas in this chapter PARTITIONED DS apply – or to be more precise; any particular "related" set of partitioned Data Sets (viz. TRN, VAL & TST) used in this chapter are the partitioned sub-sets of a FULL set used earlier on.

In other words: The comparative partitioned DS statistics immediately above are a confirmation of the earlier findings for the FULL DS (viz. **39.74**, **17**, **36** & **63**) in **Chapter 7.1.2**.

Incidentally also take note the marginally larger Data Set frequencies (viz. sizes) for JULY 2005 versus JULY 2006, and likewise FIN YEAR 2006 versus FIN YEAR 2007 – indicative of annual growth in demand for ED services.

Also keep in mind that JULY 2005 is the first of twelve months comprising FIN YEAR 2006, and similarly JULY 2006 is the first of twelve months comprising FIN YEAR 2007 - a Financial Year running from July 1st of one year until June 30th of the next – viz. FIN YEAR 2006 = JULY 1st 2005 to JUNE 30th 2006. (Cf. **Ch 3.1**).

Lastly, regarding Data Set sizes of the various TRN, VAL and TST (viz. Training, Validation and Test Data Set sizes) are the 40%, 30% & 30% Data Sets which together comprise the total number of records in a specific population, be it a population size of one month's worth of ED presentations at a particular hospital, or one year's worth of ED presentations at a hospital.

T9.1.1 TGA – JULY 2005 & JULY 2006 - Variable: Age - Some Box Plot Output

ED Dept	Year & Month	Data Set	Nr Recs.	Mean	Q1 (25%)	Q2 (50%)	Q3 (75%)
TGA	**JUL2005**	**TRN**	**1,144**	**39.01**	**16**	**35**	**63**
		VAL	**858**	**40.12**	**17**	**36**	**64**
		TST	**857**	**39.38**	**15**	**36**	**64**
TGA	**JUL2006**	**TRN**	**1,238**	**39.77**	**17**	**36**	**62**
		VAL	**929**	**38.28**	**17**	**34**	**62**
		TST	**928**	**38.91**	**16**	**35**	**64**

T9.1.2 TGA – FIN YEARS 2006 & 2007 - Variable: Age - Some Box Plot Output

ED Dept	Year & Month	Data Set	Nr Recs.	Mean	Q1 (25%)	Q2 (50%)	Q3 (75%)
TGA	**FYr2006**	**TRN**	**14,098**	**39.67**	**17**	**36**	**64**
		VAL	**10,573**	**38.74**	**16**	**35**	**61**
		TST	**10,573**	**39.76**	**17**	**36**	**63**
TGA	**FYr2007**	**TRN**	**14,478**	**39.83**	**18**	**36**	**63**
		VAL	**10,859**	**39.68**	**17**	**36**	**63**
		TST	**10,858**	**39.70**	**17**	**36**	**63**

T9.1.3 TGA & WHK – FIN YEARS 2006 - Variable: Age - Some Box Plot Output

ED Dept	Year & Month	Data Set	Nr Recs.	Mean	Q1 (25%)	Q2 (50%)	Q3 (75%)
TGA	**FYr2006**	**TRN**	**14,098**	**39.67**	**17**	**36**	**64**
		VAL	**10,573**	**38.74**	**16**	**35**	**61**
		TST	**10,573**	**39.76**	**17**	**36**	**63**
WHK	**FYr2006**	**TRN**	**7,221**	**35.53**	**14**	**32**	**56**
		VAL	**5,416**	**35.32**	**13**	**31**	**57**
		TST	**5,416**	**35.20**	**14**	**31**	**56**

CUBES OUTCOMES – TGA ONLY – DEMAND AT CHRISTMAS AND NEW YR

As was confirmed in **Chapter 7.1** the end of year holiday season (end of 2005 / beginning of 2006) did lead to an escalation in demand for ED services across the Bay of Plenty. This was especially evident between the dates of December 24th through January 3rd - and somewhat beyond.

While the earlier investigation looked at Hospitals T, W & O, as well as the whole BOP District (viz. Hosp T / W / O together) – and all of which for Financial Year 2006 only, on this occasion TGA alone is investigated across three Fin Years, namely 2005, 2006 and 2007.

The results are contained in the three histograms **C9.1.1/2/3**.

The same familiar pattern of closely cluttered high ED demand days is found across the board.

Interestingly enough, the "star performers" / highest ED presentation days for each of these years were:

For Fin Year 2005: A "tie" between 27/12/2004 and 04/01/2005 with almost 130 ED presentations apiece
For Fin Year 2006: 04/01/2006 with close to 140 ED presentations
For Fin Year 2007: 01/01/2007 with almost 150 ED presentations

These days were also the highest ED demand days for the respective years.

It is probably coincidental, but still intriguing that January 4th appears twice amongst these select few, and January 1st only once – albeit it as the "all time" highest ED demand day - to date.

As far as staff planning for the New Year's Eve roll-over period goes it would thus appear that in the case of two of the three years represented in histograms **C9.1.1/2/3** the highest demand days per respective year fell outside of (viz. before and / or after) those few highest staffed days. In this regard the reader is referred back to **Chapter 2.1.1**, as well as the planned staffing roster levels reproduced in **Chapter 13.4 APPENDIX D4**. Naturally, staff shortages and other logistical matters dictate – and the potentially erratic nature of ED presentations is yet again illustrated by this short sojourn into a more day-specific investigation of demand for ED services.

That concludes this chapter. The next chapter (**Ch 9.2**) puts some emphasis on the Per Day of Week component as manifested through the Data Mining of the now familiar partitioned Data Sets.

Gist of Chapter's Findings: Cf. condensed outcomes and commentary - **Ch 10**.

9.2 FINDINGS: Using PART DS: PER SEASON – DEMAND PER DAY OF WEEK

RESULTS HELD IN APPENDIX

Cf. Pages **354 - 392**

9.2. FINDINGS: Using PART DS: PER SEASON – DEMAND PER DAY OF WEEK

- **(Postulate2)** Per Season: To determine proportions of demand for ED services **per day of week**

9.2.1 Using PART DS: FINDINGS

In the equivalent **Chapter 7.2** the Emergency Departments of Hosp T and Hosp W were explored, and also compared. To recap in one or two sentences: while the compounded per Week graphs of the two Departments differed – i.e. the "Mount Tasman, Mount Cook and Mount Dampier" profile versus the "Mount Cook" profile of Hosp T and Hosp W respectively - the per DOW profiles were rather alike. In both cases FULL Data Sets were analysed.

In this Chapter the emphasis shifts to an analysis of TGA Partitioned Data Sets. However, the chapter concludes with two Fin Years' worth of Cluster Profiles presented off FULL Data Sets.

To start with, though, some comments about the partitioning of the original full data sets into partitioned Data Sets.

DATA MINING OUTCOMES – TRAINING, VALIDATION & TEST DS FOR TGA

In the pages to follow the following sets of data are investigated, namely:

1. Data Mining outcomes (viz. Clustering results) for the partitioned Data Sets of JULY 2005 and JULY 2006, followed by the
2. DM outcomes for the partitioned DS for Fin Years 2006 and 2007, and lastly the
3. DM outcomes for FULL DS (viz. non-partitioned) 2006 and 2007.

In the **case** of **1** six DS are investigated – i.e. TRN, VAL and TST Data Sets for JULY 2005 as well as Data Sets TRN, VAL and TST for JULY 2006.

In the **case** of **2** six DS are yet again investigated – i.e. the TRN, VAL and TST for FIN YEAR 2006 as well as TRN, VAL and TST for FIN YEAR 2007.

And lastly (in the **case** of **3**) the two FULL DS for FIN YEARS 2006 and 2007 – to be used in a Cluster Profile exercise.

The outcome in each case was recorded in the tables to follow in the next couple of pages. Cf. Tables **T9.2.1 T9.2.2** and **T9.2.3.**

<u>Case 1</u> (cf. Tables of **T9.2.1**)

Tables based on SAS output: **S9.2.1 - S9.2.24**

Partitioned JULY <u>2005</u>

Predominant Clusters Data Mined and generated for JULY <u>2005</u>:
- "Infants": generated 3 times – a "full house"
- "Teens": generated twice – viz. 2 out of three times
- "Twenty-something": generated 3 times – another "full house"
- "Thirty-something": generated twice
- "Fifty-something": generated once
- "Sixty-something": generated once

Partitioned JULY 2006

Predominant Clusters Data Mined and generated for JULY 2006:
- "Infants": generated 3 times – a "full house"
- "Teens": generated 3 times – also a "full house"
- "Twenty-something": generated twice – viz. 2 out of three times
- "Thirty-something": 3 times – another "full house"
- "Forty-something": generated once

Partitioned JULY <u>2005</u> and Partitioned JULY 2006

The joint outcome for the two "sets" of twelve clustered outcomes each is:
- "Infants": generated 6 times – a "full house"
- "Teens": generated 5 times – viz. 5 from six – almost a "full house"
- "Twenty-something": generated 5 times – almost a "full house"
- "Thirty-something": generated 5 times – yet again almost a "full house"
- "Forty-something": generated once
- "Fifty-something": generated once
- "Sixty-something": generated once

General impressions concerning Case 1

It is "all over the park" – so to speak. Seventy and over do not feature, and a likely reason for this may be that numbers-wise they just cannot compete against the younger ED patient age-group clusters.

The "Highest" to "4th Highest" Frequency Clusters do not all follow the same ordinal pattern – for example the ordinal outcome of the four highest frequency clusters of the first DS (viz. TRN) for Partitioned JULY <u>2005</u> is: "Twenty-something", then "Infants", then "Thirty-something" and lastly "Sixty-something".

<u>Case 2</u> (cf. Tables of **T9.2.2**)

Tables based on SAS output: **S9.2.25 - S9.2.48**

Partitioned FIN YEAR <u>2006</u>

Predominant Clusters Data Mined and generated for Partitioned FIN YEAR <u>2006</u>:

- "Infants": generated 3 times – a "full house"
- "Teens": generated 3 times – viz. another "full house"
- "Twenty-something": generated 3 times – yet another "full house"
- "Thirty-something": generated once – viz. 1 from potential three times
- "Forty-something": generated twice

Partitioned FIN YEAR 2007

Predominant Clusters Data Mined and generated for Partitioned FIN YEAR 2007:

- "Infants": generated 3 times – a "full house"
- "Teens": generated 3 times – also a "full house"
- "Twenty-something": generated 3 times – viz. yet another "full house"
- "Forty-something": also generated 3 times – and yet another "full house"

Partitioned FIN YEAR <u>2006</u> and Partitioned FIN YEAR 2007

The joint outcome for the two "sets" of twelve clustered outcomes each is:

- "Infants": generated 6 times – a "full house"
- "Teens": generated 6 times – also a "full house"
- "Twenty-something": generated 6 times – viz. yet another "full house"
- "Thirty-something": generated once – viz. 1 from potential six times
- "Forty-something": also generated 5 times – viz. 5 from six times

General impressions concerning Case 2

The age-group clusters are "gelling" much more so; are more clear-cut. The likely reason for this is that the much larger Data Sets of Case 2 counters potential anomalies emanating from small Data Sets. With the larger DS a clearer picture is starting to emerge.

The "Highest" to "4th Highest" Frequency Clusters do not all follow the same ordinal pattern – for example the ordinal outcome of the four highest frequency clusters of the first DS (viz. TRN) for Partitioned FIN YEAR <u>2006</u> is: "Twenty-something", then "Thirty-something", then "Infants and lastly "Teens".

<u>Case 3</u> (cf. Tables of **T9.2.3**)

Tables based on SAS output: **S9.2.49 - S9.2.52** & **S9.2.55 - S9.2.58**

Full FIN YEAR <u>2006</u>

Predominant Clusters Data Mined and generated for Full FIN YEAR <u>2006</u> – and in the following order from "Highest" to "4th Highest" Frequency Clusters:
- "Teens"
- "Twenty-something"
- "Forty-something"
- "Infants"

Full FIN YEAR 2007

Predominant Clusters Data Mined and generated for Full FIN YEAR 2007 – and in the following order from "Highest" to "4th Highest" Frequency Clusters:
- "Teens"
- "Twenty-something"
- "Infants"
- "Forty-something"

Full FIN YEAR <u>2006</u> and Full FIN YEAR 2007

Predominant Clusters Data Mined and generated for Full FIN YEAR <u>2006</u> and Full FIN YEAR 2007 – and in the following order from "Highest" to "4th Highest" Frequency Clusters of the former:
- "Teens" – generated twice – viz. 2 from potential two – i.e. a "full house"
- "Twenty-something" – generated twice – viz. 2 from potential two
- "Forty-something" – generated twice – thus 2 from two
- "Infants" – generated twice – and thus also 2 from two

General impressions concerning Case 3

The age-group clusters are now a whole lot more clear-cut. The very likely reason for this is that the even bigger Data Sets than that used in Case 2 makes outcomes ever more succinct than before.

Now, finally, by switching the "3rd Highest Freq" and "4th Highest Freq" of Full FIN YEAR <u>2006</u> (there's a less than 2% difference between their frequencies) the four highest frequency clusters of the Data Sets for Full FIN YEAR <u>2006</u> and Full FIN YEAR 2007 is: "Teens", then "Twenty-something", then "Infants", and lastly "Forty-something".

CLUSTER PROFILES

To conclude this section, 3-Dimensional profiles of these last two Data Mined Full Data Sets are shown. In each case all eight clusters are first displayed, followed by the four highest frequency clusters. Cf. SAS produced Cluster Profiles **S9.2.53** and **S9.2.54** as well as Cluster Profiles **S9.2.59** and **S9.2.60** respectively.

In the case of the former the four highest frequency clusters are 3, 4, 7 & 8.
In the case of the latter the four highest frequency clusters are 3, 6, 7 & 8.

Or to put these clusters in their "highest" to "4th highest" frequency order:
For the TGA Full DS for Financial Year 2006: Clusters 8, 7, 3 & 4, and
For the TGA Full DS for Financial Year 2007: Clusters 6, 8, 7 & 3.

Incidentally, the "switch" (see comment in middle of table **T9.2.3**) is for the purpose of alignment, and allowed within the context of the thesis, as will become evident a bit further along.

These four highest frequency cluster profiles clearly show how the lower age groups dominate. These "islands" of age groups are scattered around the top half of the scalar "divide". The over Fifties age groups just do not feature. The highest age group that featured across the discussions of Cases 1, 2 & 3 in the foregoing pages was the "Sixty-something" group – and only once – as was the case with the "Fifty-something" group – yet again once only.

A combination of factors no doubt "collude" to bring this about, but notwithstanding that the really high age groups (of Eighty+) cannot numerically match (i.e. "compete" with) that of younger age groups. However, since we do live in an aging society – one would (or might) have expected some representation (from the Fifties, Sixties and Seventies amongst the four highest frequency groups.

Regional population base differences no doubt manifest itself in higher / lower per age group demand for ED services. The author suspects that WHK ED presentations will lean even more so in the direction of the younger age groups than has been demonstrated in the TGA outcomes above – the reason being that WHK has been statistically proven to have a lower average age by four going on five years. The reader is for example reminded of comparative findings concerning quartiles for TGA (viz. Hosp T ED) and WHK (viz. Hosp W ED) in **Chapter 9.1** in this regard. Anyway, it does not lend itself to a simplistic / single-issue causal explanation – more likely a combination of causal factors.

T9.2.1 DATA MINING RESULTS – T, V & T DS for TGA - JULY 2005 & 2006

TGA JULY 2005 – TRAINING DATA SET Tot no of records in DS: 1,144

Partitioned Data Set	Highest Frequency	2nd Highest Frequency	3rd Highest Frequency	4th Highest Frequency
Cluster No	**Cluster2**	**Cluster 6**	**Cluster 8**	**Cluster 4**
Frequency	**207**	**176**	**153**	**148**
Age in Years	**23**	**3.01**	**37**	**65**
% Male	**54%**	**49%**	**55%**	**47%**

TGA JULY 2005 – VALIDATION DATA SET Tot no of records in DS: 858

Partitioned Data Set	Highest Frequency	2nd Highest Frequency	3rd Highest Frequency	4th Highest Frequency
Cluster No	**Cluster 2**	**Cluster 1**	**Cluster 5**	**Cluster 3**
Frequency	**142**	**138**	**116**	**112**
Age in Years	**25**	**3.08**	**14**	**38**
% Male	**53%**	**56%**	**59%**	**50%**

TGA JULY 2005 – TEST DATA SET Tot no of records in DS: 857

Partitioned Data Set	Highest Frequency	2nd Highest Frequency	3rd Highest Frequency	4th Highest Frequency
Cluster No	**Cluster 7**	**Cluster 8**	**Cluster 4**	**Cluster 5**
Frequency	**148**	**129**	**124**	**119**
Age in Years	**2.38**	**26**	**52**	**14**
% Male	**63%**	**54%**	**50%**	**58%**

TGA JULY 2006 – TRAINING DATA SET Tot no of records in DS: 1,238

Partitioned Data Set	Highest Frequency	2nd Highest Frequency	3rd Highest Frequency	4th Highest Frequency
Cluster No	**Cluster 6**	**Cluster 8**	**Cluster 2**	**Cluster 7**
Frequency	**199**	**196**	**186**	**172**
Age in Years	**2.32**	**38**	**25**	**15**
% Male	**58%**	**53%**	**51%**	**48%**

TGA JULY 2006 – VALIDATION DATA SET Tot no of records in DS: 929

Partitioned Data Set	Highest Frequency	2nd Highest Frequency	3rd Highest Frequency	4th Highest Frequency
Cluster No	**Cluster 7**	**Cluster 5**	**Cluster 6**	**Cluster 3**
Frequency	**153** (= next)	**153** (= prev)	**132**	**126**
Age in Years	**1.71**	**25**	**14**	**37**
% Male	**55%**	**57%**	**52%**	**50%**

TGA JULY 2006 – TEST DATA SET Tot no of records in DS: 928

Partitioned Data Set	Highest Frequency	2nd Highest Frequency	3rd Highest Frequency	4th Highest Frequency
Cluster No	**Cluster 3**	**Cluster 4**	**Cluster 6**	**Cluster 8**
Frequency	**178**	**168**	**151**	**114**
Age in Years	**2.48**	**17**	**30**	**44**
% Male	**49%**	**52%**	**54%**	**45%**

T9.2.2 DATA MINING RESULTS – T, V & T DS for TGA – FN YRS 2006 & 2007

TGA Fin Yr 2006 – TRAINING DATA SET Tot no of records in DS: 14,098

Partitioned Data Set	Highest Frequency	2nd Highest Frequency	3rd Highest Frequency	4th Highest Frequency
Cluster No	**Cluster 4**	**Cluster 7**	**Cluster 2**	**Cluster 5**
Frequency	**2,334**	**2,225**	**2,034**	**1,942**
Age in Years	**24**	**38**	**2.47**	**13**
% Male	**53%**	**53%**	**56%**	**55%**

TGA Fin Yr 2006 – VALIDATION DATA SET Tot no of records in DS: 10,573

Partitioned Data Set	Highest Frequency	2nd Highest Frequency	3rd Highest Frequency	4th Highest Frequency
Cluster No	**Cluster 8**	**Cluster 5**	**Cluster 4**	**Cluster 1**
Frequency	**1,998**	**1,790**	**1,755**	**1,612**
Age in Years	**16**	**29**	**3.11**	**44**
% Male	**54%**	**51%**	**56%**	**53%**

TGA Fin Yr 2006 – TEST DATA SET Tot no of records in DS: 10,573

Partitioned Data Set	Highest Frequency	2nd Highest Frequency	3rd Highest Frequency	4th Highest Frequency
Cluster No	**Cluster 5**	**Cluster 2**	**Cluster 1**	**Cluster 6**
Frequency	**2,061**	**1,735**	**1,559**	**1,498**
Age in Years	**16**	**29**	**2.93**	**43**
% Male	**52%**	**54%**	**58%**	**51%**

TGA Fin Yr 2007 – TRAINING DATA SET Tot no of records in DS: 14,478

Partitioned Data Set	Highest Frequency	2nd Highest Frequency	3rd Highest Frequency	4th Highest Frequency
Cluster No	**Cluster 2**	**Cluster 8**	**Cluster 4**	**Cluster 5**
Frequency	**2,713**	**2,293**	**2,239**	**1,977**
Age in Years	**15**	**41**	**27**	**2.90**
% Male	**52%**	**52%**	**51%**	**56%**

TGA Fin Yr 2007 – VALIDATION DATA SET Tot no of records in DS: 10,859

Partitioned Data Set	Highest Frequency	2nd Highest Frequency	3rd Highest Frequency	4th Highest Frequency
Cluster No	**Cluster 1**	**Cluster 8**	**Cluster 3**	**Cluster 2**
Frequency	**1,897**	**1,757**	**1,542**	**1,526**
Age in Years	**15**	**26**	**40**	**2.82**
% Male	**55%**	**49%**	**50%**	**56%**

TGA Fin Yr 2007 – TEST DATA SET Tot no of records in DS: 10,858

Partitioned Data Set	Highest Frequency	2nd Highest Frequency	3rd Highest Frequency	4th Highest Frequency
Cluster No	**Cluster 1**	**Cluster 4**	**Cluster 5**	**Cluster 3**
Frequency	**1,992**	**1,754**	**1,537**	**1,535**
Age in Years	**15**	**27**	**2.76**	**41**
% Male	**55%**	**51%**	**55%**	**53%**

T9.2.3 DATA MINING RESULTS – FULL DS for TGA - Fin Years 2006 & 2007

TGA Fin Yr 2006 – FULL DATA SET **Tot no of records in DS: 35,244**

Partitioned Data Set	Highest Frequency	2nd Highest Frequency	3rd Highest Frequency	4th Highest Frequency
Cluster No	**Cluster 8**	**Cluster 7**	**Cluster 3**	**Cluster 4**
Frequency	**5,833**	**5,816**	**5,479**	**5,383**
Age in Years	**15**	**27**	**41**	**2.83**
% Male	**53%**	**53%**	**53%**	**56%**

TGA Fin Yr 2007 – FULL DATA SET **Tot no of records in DS: 36,195**

Partitioned Data Set	Highest Frequency	2nd Highest Frequency	3rd Highest Frequency	4th Highest Frequency
Cluster No	**Cluster 6**	**Cluster 8**	**Cluster 7**	**Cluster 3**
Frequency	**6,939**	**5,611**	**5,378**	**5,126**
Age in Years	**16**	**28**	**3.22**	**42**
% Male	**53%**	**50%**	**56%**	**52%**

The difference between Clusters 3 & 4 frequencies for Fin Year 2006 is so marginal – in fact only 96 divided by divisor 5,479 – i.e. less than 2 % (1.75% - actually) between Cluster 3 & Cluster 4. If one should switch these two outcomes (viz. columns) the following picture would emerge:

TGA Fin Yr 2006 – FULL DATA SET **Tot no of records in DS: 35,244**

Partitioned Data Set	Highest Frequency	2nd Highest Frequency	3rd Highest Frequency	4th Highest Frequency
Cluster No	**Cluster 8**	**Cluster 7**	**Cluster 4**	**Cluster 3**
Frequency	**5,833**	**5,816**	**5,383**	**5,479**
Age in Years	**15**	**27**	**2.83**	**41**
% Male	**53%**	**53%**	**56%**	**53%**

TGA Fin Yr 2007 – FULL DATA SET **Tot no of records in DS: 36,195**

Partitioned Data Set	Highest Frequency	2nd Highest Frequency	3rd Highest Frequency	4th Highest Frequency
Cluster No	**Cluster 6**	**Cluster 8**	**Cluster 7**	**Cluster 3**
Frequency	**6,939**	**5,611**	**5,378**	**5,126**
Age in Years	**16**	**28**	**3.22**	**42**
% Male	**53%**	**50%**	**56%**	**52%**

DOW: INDIVIDUAL CLUSTER INPUT MEANS PLOTS FOR FIN YEAR 2006

This concerns the four individual Input Means Plots **S9.2.61/62/63/64** which comprise the "compound" Input Means Plot **S9.2.52**.

A little bit of value may be added by showing a single cluster per Input Means Plot, especially so where there is a great deal of "icon"-"overlap" on the shared canvas, graphically speaking.

The purple / blue coloured "box" (labelled _ALL_) represents the averages for a particular Data Set, and the other coloured boxes individual clusters concerned.

In the case of the first of the individual Input Means Plots (**S9.2.61**) one can thus make the following observations about Cluster 8:

- The average age of this cluster is way below the average age of the data set as a whole
- The Female proportion is marginally lower than the average Female proportion of the cluster
- As a result of the previous point the Male proportion will therefore be marginally higher than that of the average Male proportion for the whole data set
- The proportionally most prominent DOW (Day of the Week) is Sunday – which is slightly above the average for the whole data set
- The proportionally second most prominent DOW is Monday – which is precisely on "par" with the average for the data set as a whole
- The proportionally third most prominent DOW is Saturday - and slightly above the data set average at that
- Followed by what appears to be Tuesday, yet again proportionally speaking

Those (what appears to be very) marginal graphical differences can be quite significant, considering that where DOW is concerned its impact is actually spread / "diluted" across seven proportions – one per DOW – which together would comprise 100% of DOW proportions. Over and above that the width of the Normalised Mean "canvas" of the Input Means Plot is in reality determined by the lowest and highest of normalised means represented on the same canvas – which in this case is display-"variables" "Gender" and "Thursday".
The precise proportional breakdown for **T9.2.61** can thus be found in the Cluster Statistics contained in **S9.2.51** (**Cluster 8** - "Teens" / "Young Adults"):

Sundays	=	15.66%	Highest proportion
Mondays	=	15.08%	2nd highest proportion
Saturdays	=	14.58%	3rd highest proportion
Tuesdays	=	14.36%	4th highest proportion
Fridays	=	13.73%	5th highest proportion
Wednesdays	=	13.62%	6th highest proportion
Thursdays	=	12.92%	Lowest proportion

The above proportions summate to 100% (i.e. 99.94% "rounded").

By summating for example the top three highest ED presentation days – viz. Sundays, Mondays and Saturdays, one gets 45.32%, which goes a long way towards almost half the presentations of the week in a three day period. The true impact of these proportions obviously translate back into the number of presentations per day – and that can (and on occasion does) over-burden the ED system – especially so on those high proportion days.

The proportional breakdowns of the remaining three highest performers were:

The precise proportional breakdown for **T9.2.62** can be found in the Cluster Statistics contained in **S9.2.51** (**Cluster 7** - "Twenty-Something"):

Sundays	=	16.69%	Highest proportion
Mondays	=	15.62%	2nd highest proportion
Saturdays	=	14.18%	3rd highest proportion
Tuesdays	=	13.84%	4th highest proportion
Fridays	=	13.51%	5th highest proportion
Wednesdays	=	13.06%	Joint Lowest proportion
Thursdays	=	13.06%	Joint Lowest proportion

The precise proportional breakdown for **T9.2.63** can be found in the Cluster Statistics contained in **S9.2.51** (**Cluster 4** - "Infants"):

Sundays	=	16.60%	Highest proportion
Saturdays	=	14.21%	2nd highest proportion
Fridays	=	14.09%	3rd highest proportion
Wednesdays	=	13.96%	4th highest proportion
Thursdays	=	13.80%	5th highest proportion
Mondays	=	13.67%	6th highest proportion
Tuesdays	=	13.63%	Lowest proportion

The precise proportional breakdown for **T9.2.64** can be found in the Cluster Statistics contained in **S9.2.51** (**Cluster 3** - "Thirty- & Forty-Something"):

Mondays	=	15.55%	Highest proportion
Sundays	=	15.16%	2nd highest proportion
Fridays	=	14.07%	3rd highest proportion
Tuesdays	=	13.98%	4th highest proportion
Saturdays	=	13.87%	5th highest proportion
Wednesdays	=	13.81%	6th highest proportion
Thursdays	=	13.54%	Lowest proportion

These 2006 DOW outcomes were subsequently transcribed onto Table **T9.2.4** (two pages further along) – as was the 2007 DOW results to follow on the next page. Also, as became evident from earlier forays into analysis of the DOW component of the current research, it is better to "stand back" somewhat from "the trees" and to observe "the forest" rather than to get in amongst "the trees".

DOW: INDIVIDUAL CLUSTER INPUT MEANS PLOTS FOR FIN YEAR 2007

The proportional breakdown of the top performer was:

The precise proportional breakdown can thus be found in the Cluster Statistics contained in **S9.2.57** (**Cluster 6** - "Teens" / "Young Adults"):

Sundays	=	17.17%	Highest proportion
Saturdays	=	15.18%	2nd highest proportion
Mondays	=	15.16%	3rd highest proportion
Tuesdays	=	13.69%	4th highest proportion
Fridays	=	13.18%	5th highest proportion
Wednesdays	=	13.17%	6th highest proportion
Thursdays	=	12.42%	Lowest proportion

The proportional breakdowns of the remaining three highest performers were:

The precise proportional breakdown can be found in the Cluster Statistics contained in **S9.2.57** (**Cluster 8** - "Twenty-Something"):

Mondays	=	16.59%	Highest proportion
Sundays	=	16.25%	2nd highest proportion
Saturdays	=	14.07%	3rd highest proportion
Wednesdays	=	13.74%	4th highest proportion
Tuesdays	=	13.25%	5th highest proportion
Fridays	=	13.09%	6th highest proportion
Thursdays	=	12.97%	Lowest proportion

The precise proportional breakdown can be found in the Cluster Statistics contained in **S9.2.57** (**Cluster 7** - "Infants"):

Sundays	=	15.80%	Highest proportion
Saturdays	=	14.94%	2nd highest proportion
Mondays	=	14.61%	3rd highest proportion
Fridays	=	14.03%	4th highest proportion
Tuesdays	=	13.74%	5th highest proportion
Thursdays	=	13.59%	6th highest proportion
Wednesdays	=	13.25%	Lowest proportion

The precise proportional breakdown can be found in the Cluster Statistics contained in **S9.2.57** (**Cluster 3** - "Thirty- & Forty-Something"):

Mondays	=	15.70%	Highest proportion
Tuesdays	=	15.48%	2nd highest proportion
Sundays	=	15.06%	3rd highest proportion
Saturdays	=	13.75%	4th highest proportion
Wednesdays	=	13.55%	5th highest proportion
Fridays	=	13.22%	6th highest proportion
Thursdays	=	13.20%	Lowest proportion

T9.2.4 DM RESULTS – FULL DS for TGA – DOW – Fin Yrs 2006 and 2007

DOW Priority	DOW 2006	Prop 2006	DOW 2007	Prop 2007
Teens / Young Adults				
Highest	**Sunday**	15.66%	**Sunday**	17.17%
2nd Highest	**Monday**	15.08%	**Saturday**	15.18%
3rd Highest	**Saturday**	14.58%	**Monday**	15.16%
4th Highest	**Tuesday**	14.36%	**Tuesday**	13.69%
5th Highest	**Friday**	13.74%	**Friday**	13.18%
6th Highest	**Wednesday**	13.62%	**Wednesday**	13.17%
Lowest	**Thursday**	12.92%	**Thursday**	12.42%
Twenty-Something				
Highest	**Sunday**	16.69%	**Monday**	16.59%
2nd Highest	**Monday**	15.62%	**Sunday**	16.25%
3rd Highest	**Saturday**	14.18%	**Saturday**	14.07%
4th Highest	**Tuesday**	13.84%	**Wednesday**	13.74%
5th Highest	**Friday**	13.51%	**Tuesday**	13.25%
6th Highest	**Wednesday**	13.06%	**Friday**	13.09%
Lowest	**Thursday**	13.06%	**Thursday**	12.97%
Infants				
Highest	**Sunday**	16.60%	**Sunday**	15.80%
2nd Highest	**Saturday**	14.21%	**Saturday**	14.94%
3rd Highest	**Friday**	14.09%	**Monday**	14.61%
4th Highest	**Wednesday**	13.96%	**Friday**	14.03%
5th Highest	**Thursday**	13.80%	**Tuesday**	13.74%
6th Highest	**Monday**	13.67%	**Thursday**	13.59%
Lowest	**Tuesday**	13.63%	**Wednesday**	13.25%
Thirty- / Forty-Something				
Highest	**Monday**	15.55%	**Monday**	15.70%
2nd Highest	**Sunday**	15.16%	**Tuesday**	15.48%
3rd Highest	**Friday**	14.07%	**Sunday**	15.06%
4th Highest	**Tuesday**	13.98%	**Saturday**	13.75%
5th Highest	**Saturday**	13.87%	**Wednesday**	13.55%
6th Highest	**Wednesday**	13.81%	**Friday**	13.22%
Lowest	**Thursday**	13.54%	**Thursday**	13.20%

Colour-Code Legend: GREY=Highest BLUE=Middle YELLOW=Lowest

TOP FOUR CLUSTERS and DOW: ANALYSIS OF THE RESULTS FROM FIN YEARS 2006 and 2007

Table **T9.2.4** shows the transcribed results from mentioned two Financial Years.

The reader is also reminded that the top four clusters were determined via the process represented in the threefold tables **T9.2.1/2/3**.

The bringing together of these top four performers / clusters with their respective DOW proportional profiles is thus represented in **T9.2.4**. Subsequently a colour or shaded breakdown (depending on whether this copy of the thesis is colour or non-colour printed) was applied to more clearly show up the Top-, Middle- and Lowest-order days of the week. These "orders" relate to the highest frequency of ED presentation days – as became evident during the course of the current research. This "colour-coding" gives one a better visual representation of equivalent clusters across two Financial Years on the one hand, and inter-cluster profile similarities and differences on the other.

Inter-Cluster Comments re DOW – Equivalent Clusters - FY 2006 vs FY 2007:

Teens / Young Adults: Colour-code breakdown-wise they are identical, and even on a DOW basis only Saturday / Monday are trans-positioned.
Sunday is the most-frequented DOW.

Twenty-Something: Colour-code breakdown-wise these two have only one "contradiction" – so are almost identical. DOW-wise there are only two trans-positions.
Sunday and then Monday are the most-frequented.

Infants: This is more of a "mixed bag", although the top-order colour code almost rules supreme, that is but for Monday being out of kilter for FY 2006.
Nonetheless, Sunday is the most-frequented DOW.

Thirty / Forty-Something: Yet again a mixed bag, with the colour-codes all over the spectrum.
Sunday and then Monday are the most-frequented days for ED presentation.

Inter-Cluster Comments re DOW – Across Clusters – FY 2006 and / or FY 2007:

- Colour-coding-wise three of the top four clusters look alike, and four of the top six (with a fifth almost alike – having only one trans-position).
- Eight from all eight clusters have either Sunday or Monday as top DOW.
- Five from the above eight have Sunday as top / highest frequency cluster, leaving three of the eight as Monday.
- Five from the foregoing eight have Lowest-order Colour-code in its proper (and expected) positions of 6th and 7th highest (viz. 6th Highest and Lowest) frequency ED presentation days.

In closing regarding the findings of the current research; like Colour-coded profiles do appear more often than not, which supports the pre-empted notion that that would be the case. While not as clear-cut as the DOW findings of **Chapter 7.4** this is still a significant outcome.

With regard the prominence of Sunday and Monday; the prevalence of these two days are also commented upon by other researchers, in particular by Brillman et al [2005] and Downing and Wilson [2002]. Cf. the Literature Review.

In Downing and Wilson's case Monday is actually found to be the top DOW performer through the bank. It is visually portrayed in a number of attendances by day of week and hour of day chart, and also a per age group table which shows Monday as the proportionally most prominent day of the week in every age group [Downing and Wilson, 2002]. As has already been emphasised in the Study in DIFFERENCE, different hospitals / regions can (and very likely do) have their own unique "footprint". In the case of Downing and Wilson [2002] their statistics reflect the regional "footprint" of the West Midlands area in the UK over one financial year at the end of the 1990s.

Brillman et al's [2005] research addressed DOW prominence from a different vantage point, in that these researchers investigated the DOW differences between various chief complaints (denoted by the mnemonic "CC"). They [Brilman et al, 2005] state that: "Each CC category exhibited significant day-of-week differences", but that "For most categories … counts peaked on Monday".

In this chapter, i.e. **Chapter 9.2**, the current author investigated the DOW phenomenon from yet another angle, namely that of Triage rating and how these manifest itself on a DOW grid. In the following chapter (**Chapter 9.3**) Demand per Time of Day (TOD) is investigated rather more closely.

<u>Gist of Chapter's Findings</u>: Cf. condensed outcomes and commentary - **Ch 10**.

9.3 FINDINGS: Using PART DS: PER DAY OF WEEK – DEMAND PER TIME OF DAY

RESULTS HELD IN APPENDIX

Cf. Pages **393 - 409**

9.3 FINDINGS: Using PART DS: PER DAY OF WEEK – DEMAND PER TIME OF DAY

- **(Postulate3)** Per Day of Week: To determine proportions of demand for ED services **per time of day**

9.3.1 Using PART DS: FINDINGS

In **Chapter 7.3** Hosp T was compared with Hosp W – in order to establish what per time-of-day (TOD) pattern(s) might prevail. As a result one might consider marginally adjusting / reshuffling the number of staff per shift to be more closely aligned with the influx of patients over per time-of-year / season, per day-of-week (DOW) and per time-of-day (TOD) permutations. For reasons of simplicity one might concentrate only on per DOW and per TOD, regardless of per time-of-year / season – but for those highest escalation days around Christmas / New Year – staffing levels permitting – of course.

Visual inspection of superimposed charts (**C7.3.15 – C7.3.23** of **Chapter 7.3**) has already revealed how closely Hosp W's ED "mimics" that of Hosp T (cf. Table **T7.3.1**'s rightmost column) albeit at lower frequencies than is the case with Hosp T's ED - and given that Hosp T versus Hosp W requires more comparative investigation - one might want to assess how the same hospital performs "against itself" across two consecutive financial years. The next page contains the condensed results (in part subjectively and "qualitatively" adjudged by the author) of such a comparison – i.e. the comparison of consecutive Financial Years for TGA.

As far as the associated charts (generated from Cube-outcomes) are concerned, charts **C9.3.1** to **C9.3.9** are the nine superimposed charts based on the subsequent nine pairs of charts (i.e. one from an age-group's FULL Fin Year 2006 and another from the same age-group's FULL Fin Year 2007) – that is eighteen charts in all, viz. **C9.3.10** to **C9.3.27**. The latter eighteen cube-derived charts are therefore the "building blocks" upon which the first nine superimposed "products" are based.

In line with the earlier like investigation (cf. **Chapter 7.3**) it is only per hour frequencies for **TUESDAYS** which are compared – and the same age-group classification breakdown is used.

(Reminder: The age-group classifications are part-driven by how the ED CUBE was designed at the BOP DHB.)

T9.3.1 Hosp T - Comparison of ED Presentations for 2006 & 2007 – Tuesdays only

Age Group		Similarities	Discrepancies	Similar or Not ##
Under 1 yr		Similar overall pattern – i.e. escalation in demand 8am – 12 noon, then lull – then esc after 4 pm	2007 shows more activity after 6 pm	Similar
1 – 4 yrs		Similar overall pattern – with an escalation from 8 am and effectively right through to about midnight	Minimal	Similar
5 – 14 yrs		Both show an escalation from 9 am which lasts until 9 pm – when it drops off	Minimal	Similar
15 – 19 yrs		An escalation and then high frequencies between 9 am and 9 pm	Some of the spiking out of "sync" / alternate	Somewhat similar
20 – 24 yrs **(overlap)**		Escalation at 9 am and then continuous high frequencies for about 12 hours until 9 pm	Minimal	Similar
20 – 39 yrs **(overlap)**		Two years identical (probably because of large age group) – peaks 10 am – tapers off gradually	Almost identical	Virtually identical
40 – 64 yrs		Two years mimic one another – spikes around noon – then tapers off gradually between 2 pm & 10 pm	Almost identical	Virtually identical
65 – 84 yrs		Two years mimic one another – spikes around noon – then tapers off steeply between 2 pm & 10 pm	Almost identical	Virtually identical
85 and Over		Steep escalation around 9 am and through until about 6 / 7 pm but then drops off abruptly	Some difference in that 2007 shows bit more activity between 2 pm & 8 pm	Somewhat similar

As can be seen on the previous page the two Financial Years are very similar indeed. *Three* of the nine age groups were considered *virtually identical*, *four* as *similar*, leaving *two* as only *somewhat similar* – namely the 15-19 yrs and the 85 and Over groups.

The author would have expected the former (i.e. the 15-19 yrs group) to perhaps be a bit more alike – so that comes as a minor surprise. As for the latter (i.e. 85 and Over) - at least one of the reasons for it being only *somewhat similar* is that the 85 and Over group is not a large sub-group – and the smaller the group the greater the possibility for anomalies to occur.

By way of example, compare the two overlapping groups, viz. 20 – 24 years of age (**C9.3.5**) versus 20 – 39 years of age (**C9.3.6**) , and the reader will notice that while the overall trend of the former group is similar, the fluctuations of the two graphs are quite obvious, whereas within the larger group, i.e. the latter, the two graphs are much more in sync / less "jagged" / its contours "smoother" – and thus its "virtually identical" tag.

<u>Gist of Chapter's Findings</u>: Cf. condensed outcomes and commentary - **Ch 10**.

Time constraints and opportunity prevented the author from using a more "scientific" comparative technique, and from researching the other six days of the week. This would require a study in its own right. Visual inspection "on the same canvas", while not as "scientific" as certain other techniques, is nonetheless an acceptable technique. Cf. **Chapter 4.4** in this regard.

9.4 FINDINGS: Using PART DS: PER SEASON – PREVALENCE OF TRIAGE RATINGS PER DAY OF WEEK

RESULTS HELD IN APPENDIX

Cf. Pages **410 - 427**

9.4 FINDINGS: Using PART DS: PER SEASON - PREVALENCE OF TRIAGE RATINGS PER DAY OF WEEK

- **(Postulate4)** Per Season: To determine prevalence of various **Triage** / "urgency" ratings **per Day of Week**

9.4.1 Using PART DS: FINDINGS

Replicated in table **T9.4.1** two pages hence are some of the foremost statistical indicators concerning Triage – the detailed per-partitioned-DS statistics appearing in the second part of this chapter – i.e. in Section **9.4.2** (Using PART DS: SAS RESULTS).

For ease of use the Triage classification table – originally presented in **Chapter 7.4** – is replicated here.

The five point ED Priority system used is the following:
T7.4.1 Triage Urgency Classifications & Expected Response Time per Triage **$$**

Triage / Priority	Urgency Level	How soon treated
1	RESUSCITATION	Immediate
2	EMERGENCY	Within 10 minutes
3	URGENT	Within 30 minutes
4	SEMI-URGENT	Within 60 minutes
5	NON-URGENT	Within 2 hours

$$ Replicated from **Chapter 7.4**

Take note; it is of an ordinal nature – with Triage ratings of 5 through 1 indicative of least serious (viz. non-urgent) to most serious (viz. resuscitation) classification.

While Box Plotting is probably not the best or ideal manner of presenting these ordinal outcomes it none the less highlights some very clear-cut (and tell-tale) characteristics – especially so when comparing TGA Hospital's Triage profile with that WHK Hospital's.

But before one addresses the discrepant nature of TGA versus WHK, the reader will notice the conformity of the Box Plot statistics of the various TGA Data Sets – i.e. populations reflected in the **first two tables** within **T9.4.1**.

First table of **T9.4.1** based on box plots **S9.4.1/2/3** (viz. TRN, VAL and TST for **TGA JULY 2005**) and **S9.4.4/5/6** (viz. TRN, VAL and TST for **TGA JULY 2006**): The Mean, Quartile 1, Quartile 2 and Quartile 3 values conform when the partitioned outcomes are compared, i.e. an "average" (real number) mean of about 3.27, followed by the respective whole numbers 3, 3 and 4 for ED Triage for TGA for JULY 2005. The outcomes for the partitioned Data Sets for TGA for JULY 2006 are much the same. Of course, Quartiles 1 to 3 represent the first 25%, the first 50% (i.e. half) and the first 75% of data in a particular Data Set.

Second table of **T9.4.1** based on box plots **S9.4.7/8/9** (viz. TRN, VAL and TST for **TGA Fin Yr 2006**) and **S9.4.10/11/12** (viz. TRN, VAL and TST for **TGA Fin Yr 2007**): Regarding the second table (cf. next page) the results yet again hold true, and indeed confirms that of the First table.

Yet again time-constraints did not allow for further investigation hereof – but the "average" Mean (of average Means) for JULY 2006 shows a marginal increase over that of JULY 2005, as does the "Average Mean (of average Means) for FIN YEAR 2007 over that of FIN YEAR 2006! The respective TGA averages are:

- **TGA JULY 2005** = **3.27** versus **TGA JULY 2006** = **3.34** and
- **TGA FIN YR 2006** = **3.33** versus **TGA FIN YR 2007** = **3.40**.

Third table of **T9.4.1** based on box plots **S9.4.7/8/9** (viz. TRN, VAL and TST for **TGA** Fin Yr 2006) and **S9.4.13/14/15** (viz. TRN, VAL and TST for **WHK** Fin Yr 2006): Now regarding the comparison of the Box Plot outcomes for TGA for FIN YR 2006 with that of WHK for the same 12 month period, viz. FIN YR 2006 are:

- **TGA**: Average Mean = **3.33**, Quartile 1 = **3**, Quartile 2 = **3**, Quartile 3 = **4**

Versus

- **WHK**: Average Mean = **3.69**, Quartile 1 = **3**, Quartile 2 = **4**, Quartile 3 = **4**

That is **TGA** Quartiles:

- **Q1** (viz. first **25%** of data) = Triage levels **1**, **2** or **3**
- **Q2** (viz. first **50%** of data) = Triage levels **1**, **2** or **3** and
- **Q3** (viz. first **75%** of data) = Triage levels **1**, **2**, **3** or **4**

Versus **WHK** Quartiles:

- **Q1** (viz. first **25%** of data) = Triage levels **1**, **2** or 3
- **Q2** (viz. first **50%** of data) = Triage levels **1**, **2**, **3** or **4** and
- **Q3** (viz. first **75%** of data) = Triage levels **1**, **2**, **3** or **4**

The partitioned outcomes presented in the foregoing paragraphs confirm the box plotted statistical findings relating to the FULL Data Sets / Fin Year statistics of both TGA and WHK, i.e. an approximate **3.3** versus a **3.7** for **TGA** and **WHK** respectively. This also holds sway in the weighted averages in the per month breakdown for both TGA and WHK, as presented in Section **7.4.3** of **Chapter 7.4** – viz. Cubes **C7.4.1** and **C7.4.3** as well as associated graphs / bar charts **C7.4.2** and **C7.4.4**.

A reminder that in **Chapter 7** FULL (as in non-partitioned) Data Sets were used, whereas in this chapter PARTITIONED DS apply. I.e.: Any particular related set of partitioned Data Sets (viz. TRN, VAL & TST) used in this chapter are the "sub-sets" of a FULL DS used earlier on. In other words: The comparative partitioned DS statistics immediately above are a confirmation of the earlier findings for the FULL DS (viz. **3.34**, **3**, **3** & **4**) in Section **7.4.2** (of **Chapter 7.4**).

Commentary on Findings continues 5 pages ahead.

T9.4.1 BOX PLOT OUTPUT – Various Data Sets - Fin Years 2006 & 2007

First Table:
TGA – JULY 2005 & JULY 2006 - Variable: Triage - Some Box Plot Output

ED Dept	Year & Month	Data Set	Nr Recs.	Mean	Q1 (25%)	Q2 (50%)	Q3 (75%)
TGA	**JUL2005**	TRN	1,144	3.31	3	3	4
		VAL	858	3.26	3	3	4
		TST	857	3.25	3	3	4
TGA	**JUL2006**	TRN	1,238	3.37	3	3	4
		VAL	929	3.34	3	3	4
		TST	928	3.33	3	3	4

Second Table:
TGA – FIN YEARS 2006 & 2007 - Variable: Triage - Some Box Plot Output

ED Dept	Year & Month	Data Set	Nr Recs.	Mean	Q1 (25%)	Q2 (50%)	Q3 (75%)
TGA	**FYr2006**	TRN	14,098	3.33	3	3	4
		VAL	10,573	3.34	3	3	4
		TST	10,573	3.34	3	3	4
TGA	**FYr2007**	TRN	14,478	3.41	3	3	4
		VAL	10,859	3.40	3	3	4
		TST	10,858	3.39	3	3	4

Third Table:
TGA & WHK – FIN YEARS 2006 - Variable: Triage - Some Box Plot Output

ED Dept	Year & Month	Data Set	Nr Recs.	Mean	Q1 (25%)	Q2 (50%)	Q3 (75%)
TGA	**FYr2006**	TRN	14,098	3.33	3	3	4
		VAL	10,573	3.34	3	3	4
		TST	10,573	3.34	3	3	4
WHK	**FYr2006**	TRN	7,221	3.70	3	4	4
		VAL	5,416	3.70	3	4	4
		TST	5,416	3.69	3	4	4

DOW: INDIVIDUAL CLUSTER INPUT MEANS PLOTS FOR FIN YEAR 2006 PART DS TRN

The proportional breakdown of the top performer was:

The precise proportional breakdown can thus be found in the Cluster Statistics contained in **S9.5.3** (**Cluster 5** - "Teens" / "Young Adults"):

Sundays	=	16.30%	Highest proportion
Saturdays	=	15.78%	2nd highest proportion
Fridays	=	14.66%	3rd highest proportion
Tuesdays	=	14.40%	4th highest proportion
Mondays	=	13.66%	5th highest proportion
Wednesdays	=	12.88%	6th highest proportion
Thursdays	=	12.28%	Lowest proportion

The proportional breakdowns of the remaining three highest performers were:

The precise proportional breakdown can be found in the Cluster Statistics contained in **S9.5.3** (**Cluster 4** - "Twenty-Something"):

Sundays	=	17.04%	Highest proportion
Mondays	=	15.22%	2nd highest proportion
Tuesdays	=	14.14%	3rd highest proportion
Saturdays	=	13.95%	4th highest proportion
Wednesdays	=	13.30%	5th highest proportion
Thursdays	=	13.58%	6th proportion
Fridays	=	12.74%	Lowest proportion

The precise proportional breakdown can be found in the Cluster Statistics contained in **S9.5.3** (**Cluster 2** - "Infants"):

Sundays	=	16.78%	Highest proportion
Thursdays	=	14.94%	2nd highest proportion
Mondays	=	14.29%	3rd highest proportion
Saturdays	=	14.20%	4th highest proportion
Wednesdays	=	13.51%	5th highest proportion
Fridays	=	13.42%	6th highest proportion
Tuesdays	=	12.82%	Lowest proportion

The precise proportional breakdown can be found in the Cluster Statistics contained in **S9.5.3** (**Cluster 7** - "Thirty- & Forty-Something"):

Sundays	=	15.98%	Highest proportion
Mondays	=	14.49%	2nd highest proportion
Thursdays	=	14.29%	3rd highest proportion
Saturdays	=	14.25%	4th highest proportion
Fridays	=	13.91%	5th highest proportion
Tuesdays	=	13.76%	6th highest proportion
Wednesdays	=	13.28%	Lowest proportion

DOW: INDIVIDUAL CLUSTER INPUT MEANS PLOTS FOR FIN YEAR 2007 PART DS TRN

The proportional breakdown of the top performer was:

The precise proportional breakdown can thus be found in the Cluster Statistics contained in **S9.5.15** (**Cluster 2** - "Teens" / "Young Adults"):

Sundays	=	16.62%	Highest proportion
Saturdays	=	15.17%	2nd highest proportion
Mondays	=	14.73%	3rd highest proportion
Tuesdays	=	14.01%	4th highest proportion
Fridays	=	13.80%	5th highest proportion
Wednesdays	=	12.98%	6th highest proportion
Thursdays	=	12.67%	Lowest proportion

The proportional breakdowns of the remaining three highest performers were:

The precise proportional breakdown can be found in the Cluster Statistics contained in **S9.5.15** (**Cluster 4** - "Twenty-Something"):

Mondays	=	17.02%	Highest proportion
Sundays	=	16.34%	2nd highest proportion
Saturdays	=	13.72%	3rd highest proportion
Wednesdays	=	13.67%	4th highest proportion
Thursdays	=	13.63%	5th highest proportion
Fridays	=	13.04%	6th highest proportion
Tuesdays	=	12.55%	Lowest proportion

The precise proportional breakdown can be found in the Cluster Statistics contained in **S9.5.15** (**Cluster 5** - "Infants"):

Mondays	=	15.83%	Highest proportion
Sundays	=	15.17%	2nd highest proportion
Saturdays	=	14.46%	3rd highest proportion
Thursdays	=	14.21%	4th highest proportion
Fridays	=	13.65%	5th highest proportion
Wednesdays	=	13.35%	6th highest proportion
Tuesdays	=	13.30%	Lowest proportion

The precise proportional breakdown can be found in the Cluster Statistics contained in **S9.5.15** (**Cluster 8** - "Thirty- & Forty-Something"):

Mondays	=	16.21%	Highest proportion
Tuesdays	=	15.93%	2nd highest proportion
Sundays	=	14.46%	3rd highest proportion
Saturdays	=	13.77%	4th highest proportion
Wednesdays	=	13.26%	5th highest proportion
Thursdays	=	13.21%	6th highest proportion
Fridays	=	13.12%	Lowest proportion

T9.4.2 DM RESULTS – PART DS TRN for TGA – DOW – Fin Yrs 2006 & 2007

	DOW Priority	DOW 2006 PART DS TRN	Prop 2006	DOW 2007 PART DS TRN	Prop 2007	
	Teens / Young Adults					
	Highest	**Sunday**	16.30%	**Sunday**	16.62%	
	2nd Highest	**Saturday**	15.78%	**Saturday**	15.17%	
	3rd Highest	**Friday**	14.66%	**Monday**	14.73%	
	4th Highest	**Tuesday**	14.40%	**Tuesday**	14.01%	
	5th Highest	**Monday**	13.66%	**Friday**	13.80%	
	6th Highest	**Wednesday**	12.88%	**Wednesday**	12.98%	
	Lowest	**Thursday**	12.28%	**Thursday**	12.67%	
	Twenty-Something					
	Highest	**Sunday**	17.04%	**Monday**	17.02%	
	2nd Highest	**Monday**	15.22%	**Sunday**	16.34%	
	3rd Highest	**Tuesday**	14.14%	**Saturday**	13.72%	
	4th Highest	**Saturday**	13.95%	**Wednesday**	13.67%	
	5th Highest	**Wednesday**	13.30%	**Thursday**	13.63%	
	6th Highest	**Thursday**	13.58%	**Friday**	13.04%	
	Lowest	**Friday**	12.74%	**Tuesday**	12.55%	
	Infants					
	Highest	**Sunday**	16.78%	**Monday**	15.83%	
	2nd Highest	**Thursday**	14.94%	**Sunday**	15.17%	
	3rd Highest	**Monday**	14.29%	**Saturday**	14.46%	
	4th Highest	**Saturday**	14.20%	**Thursday**	14.21%	
	5th Highest	**Wednesday**	13.51%	**Friday**	13.65%	
	6th Highest	**Friday**	13.42%	**Wednesday**	13.35%	
	Lowest	**Tuesday**	12.82%	**Tuesday**	13.30%	
	Thirty- / Forty-Something					
	Highest	**Sunday**	15.98%	**Monday**	16.21%	
	2nd Highest	**Monday**	14.49%	**Tuesday**	15.93%	
	3rd Highest	**Thursday**	14.29%	**Sunday**	14.46%	
	4th Highest	**Saturday**	14.25%	**Saturday**	13.77%	
	5th Highest	**Friday**	13.91%	**Wednesday**	13.26%	
	6th Highest	**Tuesday**	13.76%	**Thursday**	13.21%	
	Lowest	**Wednesday**	13.28%	**Friday**	13.12%	

Colour-Code Legend: GREY=Highest BLUE=Middle YELLOW=Lowest

Table **T9.4.2** (on previous page) shows the transcribed results from mentioned two PARTITIONED Data Sets – i.e. the two TRAINING Data Sets for Fin Years 2006 and 2007 respectively – cf. three pages and two pages previously. These "highest" to "lowest" proportions were based on the next chapter's Section **9.5.2**'s SAS Results **S9.5.3** and **S9.5.15** respectively. The reader is also reminded that the top four clusters were determined via the process represented in the fourfold tables **T9.5.1/2/3/4** - to be found in the next chapter (**Chapter 9.5**), incidentally.

The bringing together of these top four performers / clusters with their respective DOW proportional profiles is thus represented in **T9.4.2**. Subsequently a colour or shaded breakdown (depending on whether this copy of the thesis is colour or non-colour printed) was applied to more clearly show up the Top-, Middle- and Lowest-order days of the week. These "orders" relate to the highest frequency of ED presentation days – as became evident during the course of the current research. In other words – identical to the manner in which it was depicted in **Chapter 9.2**. This "colour-coding" thus yet again gave one a better visual representation of equivalent clusters across two Training (viz. TRN) Data Sets on the one hand, and inter-cluster profile similarities and differences on the other.

The author also decided to keep the following two sub-sections of Inter-Cluster Comment outlines the same – in order to better adjudge whether these partitioned / TRN Set Clusters resemble **Chapter 9.2**'s non-partitioned / FULL Fin Year Clusters.

<u>Inter-Cluster Comments re DOW – Equivalent Clusters – TRN Data Set of FY 2006 versus TRN Data Set of FY 2007</u>:

Teens / Young Adults: Colour-code breakdown-wise they are not identical, Monday 2006 being out of position DOW-wise.
Sunday is the most-frequented DOW.

Twenty-Something: Colour-code breakdown-wise these two are almost the same - as is the case on a DOW basis. But for the out-of-position Tuesday they would have been identical.
Sunday, then Monday are the most-frequented DOW.

Infants: This is more of a "mixed bag", although the top-order colour code almost rules supreme.
Nonetheless, Sunday and then Monday are the most-frequented DOW.

Thirty / Forty-Something: Yet again a mixed bag, with the colour-codes all over the spectrum.
Sunday and then Monday are the most-frequented days for ED presentation.

Inter-Cluster Comments re DOW – Across Clusters – TRN Data Set of FY 2006 and / or TRN Data Set of FY 2007:

- Colour-coding-wise only two of the top four clusters look alike, and only three of the top six.
- Eight from all eight clusters have either Sunday or Monday as top DOW.
- Five from the above eight have Sunday as top / highest frequency cluster, leaving three of the eight as Monday.
- Only two from the foregoing eight have Lowest-order Colour-code in its "proper" (and expected) positions of 6th and 7th highest (viz. 6th Highest and Lowest) frequency ED presentation days.

In closing; like Colour-coded profiles do appear to be marginally more prevalent – especially so if one look at it from a Top-order vantage point. That is; in seven of eight cases the Top-order colour code is found in the top four DOW positions. Therefore, while not as clear-cut as the DOW findings of **Chapter 7.4** this is still a significant outcome.

Comparison between the Inter-Cluster Colour-Coded findings of **Chapter 9.2** (regarding Table **T9.2.4**) and **Chapter 9.4** (regarding Table **T9.4.2**):

- The overall outcomes are quite similar, with the former's marginally better.
- Top Colour-Code dominates, i.e. Sunday, Monday and Saturday.
- Top performer consistently Sunday (mostly) or Monday – i.e. across all 16 Cluster occurrences across both mentioned tables.
- Three of the four Teens / Young Adults profiles are very alike – but one Monday lying in a 5th position spoils the overall outcome somewhat.
- Infants show the same "helter-skelter" outcomes – as one might expect of babies their immediate health needs are not DOW-determined.
- Both outcomes are not as clear-cut as that of **Chapter 7.4**, but both none the less significant.
- **Chapter 9.2**'s outcomes are more convincing than that of **Chapter 9.4**, but the former being based on FULL Data Sets and the latter on only TRN Data Sets would explain that – since more data has a "smoothing" effect.

Gist of Chapter's Findings: Cf. condensed outcomes and commentary - **Ch 10**. In the next chapter Triage (especially) and Time of Day will be the focus.

9.5 FINDINGS: Using PART DS: PER DAY OF WEEK – PREVALENCE OF TRIAGE RATINGS PER TIME OF DAY

RESULTS HELD IN APPENDIX

Cf. Pages **428 - 452**

9.5 FINDINGS: Using PART DS: PER DAY OF WEEK – PREVALENCE OF TRIAGE RATINGS PER TIME OF DAY

- **(Postulate5)** Per Day of Week: To determine prevalence of various **Triage** / "urgency" ratings **per Time of Day**

9.5.1 Using PART DS: FINDINGS

The reader is reminded that only TGA data applies.

Tables **T9.5.1** to **T9.5.4** contain the combined and "condensed" results of the Data Mined clusters' outcomes. The reader can view these results more closely, should s/he want to. They would notice for example that all clusters have Standard Deviations of about 1, give or take, which is well within the statistically "insignificant" limit of 2.5 (cf. **Chapter 13.4 APPENDIX D2**). In other words – it is perfectly alright to have confidence in / and to compare these clustered results.

The author selected certain appropriate statistics from these results and these outcomes are recorded in Tables **T9.5.1** and **T9.5.2** for the Financial Years 2006 and 2007 respectively – and for each of these years' broken down into the now familiar three partitioned Data Sets – Training, Validation and Test. The four highest frequency clusters per partitioned DS are recorded.

The next step (or rather "steps") in the process requires some realignment of clusters.

Specific actions concerning Table **T9.5.1** (viz. ALIGNED Phase 1):
(Cf. three pages ahead)
This concerns TGA Partitioned Data Sets for the Financial Year 2006.

The frequency difference between the 2nd and 3rd highest clusters of the Training Data Set is so minimal that the decision was made that for the sake of alignment these two outcomes may be swapped. Then, for the sake of even greater clarity, the Age, Triage and Gender stats are separately reproduced at the bottom of the table. Regarding Age, keep in mind that these are average ages per cluster – and that for example an average of 44 years of age represents patients who were in their Forties (and "spilling" over into those in their Thirties) at the time of these ED presentations. There is of course no such Triage rating / classification as for example a 3.61. What this in effect indicates is that the majority of members (of this particular cluster) had Triage classifications of 4 or 5 – and thus the leaning towards a 4 of the average Triage classification.

In the light of the above, here are some standout features of Table **T9.5.1** – also referred to as "ALIGNED Phase 1":

- Four age-groups dominate, and they are all in the under Fifty categories
- The highest frequency cluster belongs to the age group "Teens / Young Adults" who also happens to have the "highest" (viz. least urgent) Triage average – leaning towards Triage = 4 and the Male / Female percentages are roughly 54% Male and 46% Female
- The remaining three of the "top four frequency" clusters belong to the
  - Twenty-Something group who also has the "2nd highest" (viz. 2nd least urgent") Triage average with a Gender breakdown of about 53% M / 47% F
  - Infants group with the lowest Triage classification average (viz. most urgent) and absolutely dominated by a 57% M / 43 % F Gender breakdown
  - Thirty / Forty-Something group with a "2nd lowest" Triage classification (viz. 2nd most urgent) and marginally dominated by a 51% M / 49% F Gender breakdown
- Males dominate Gender in every one of the top four clusters

Specific actions concerning Table **T9.5.2** (viz. ALIGNED Phase 2):
(Cf. three pages ahead)
This concerns TGA Partitioned Data Sets for the Financial Year 2007.

Similar actions are now performed as was the case in "ALIGNMENT Phase 1", but the Clusters being swapped are the "3rd and 4th highest" ones of the Validation DS, and yet again Age, Triage and Gender stats are separately reproduced at the bottom of the table.

Here are some standout features of **Table 9.5.2** – also referred to as "ALIGNED Phase 2":

- Four age-groups dominate, and they are all in the under Fifty categories
- The highest frequency cluster belongs to the age group "Teens / Young Adults" with the "highest" (viz. least urgent) Triage average – also leaning towards Triage = 4 and the Male / Female breakdown yet again about 54% M / 46% F.
- The remaining three of the "top four frequency" clusters belong to the
  - Twenty-Something group who also has the "2nd highest" (viz. 2nd least urgent) Triage average but the Gender breakdown is about 50% M / 50% F.
  - Thirty / Forty-Something group with a "2nd lowest" Triage classification (viz. 2nd most urgent) and again marginally dominated by a 51% M / 49% F Gender breakdown
  - Infants group with lowest Triage classification average (viz. most urgent) and dominated by a 55% M / 45 % F Gender breakdown
- Males also dominate the top four clusters but slightly less emphatically

Specific actions concerning Table **T9.5.3** (viz. ALIGNED Phase 3):
(Cf. four pages ahead)
The previous two Tables (T**9.5.1** and **T9.5.2**) related the outcomes of in effect the

- 12 highest frequency / performing TGA clusters across three Partitioned Data Sets for Financial Year 2006, and also the
- 12 highest performing TGA clusters across three Partitioned Data Sets for Financial Year 2007

One thus has a total of 24 clustered outcomes to record on a single table, i.e. Table **T9.5.3**.

At closer scrutiny, yet again, it becomes obvious that with a little more alignment the picture may crystallize even further across 24 Data Mined cluster outcomes. In line with an earlier judgement call to do some swapping – because after all – if differences are only marginal and / or the emphasis is less so on an "ordinal" "highest" to "4th highest" frequencies – but more so on the four highest frequencies for TGA per Partitioned DS per Fin Year, then a clearer picture may emerge. Therefore, by swapping the rightmost two sets of clusters for Fin Year 2006 the "final" aligned table results.

<u>The "final" table – Table **T9.5.4** (viz. ALIGNED Phase 4)</u>:
(Cf. four pages ahead)
A very clear picture emerges indeed; a conformity which engenders confidence in the outcomes. It very clearly highlights the following:

- The consistently highest performing cluster is that of the age group "Teens / Young Adults" (and Take Note that "Teens / Young Adults" clusters are the only ones never swapped in "ALIGNMENTS 1, 2 & 3" and consistently outperforming the other lower-frequency (of the four highest frequency) clusters) – their cluster features being:
    - Their average age is 15 or 16
    - Their average Triage of about 3.62 being the "highest" (viz. least urgent classification) and
    - Their being Male-dominated (53% M / 47% F)

The next three of the four highest performing Data Mined clusters are:

- "Twenty-Something" with the "2nd highest" Triage classification (viz. 2nd least urgent) and about a 51% M / 49% F Gender split

- "Thirty / Forty-Something" with "2nd lowest" Triage classification (viz. "2nd most urgent) and a Gender breakdown of about 51% M / 49% F

- "Infants" with the "lowest" Triage classification (viz. highest urgency) - and a Male-domination of about 55% M / 45% F.

OR

Expressed In tabular form it would look as follows:

T9.5.5 Condensed Cluster Outcomes

Group	Average Age	Cluster Frequency	Gender		Triage Results of 4 highest frequencies	
			Male	Female	Average & Mode **$**	Urgency Rating
Teens / Young Ad	16	Highest of 4	53%	47%	Ave: **3.62** Mode: 4	Highest
Twenty-something	27	One of 2nd-4th	52%	48%	Ave: **3.58** Mode: 4	2nd Highest
Thirty / Forty-som	42	One of 2nd-4th	51%	49%	Ave: **3.43** Mode: 3	3rd Highest
Infants	3	One of 2nd-4th	56%	46%	Ave: **3.30** Mode: 3	4th Highest

$ Derived as a result of knowledge gained in **Chapter 9.4**

T9.5.1 DATA MINING OUTCOMES – For TGA - All of Financial Year 2006
ALIGNED Phase 1

TGA 2006 – TRAINING DATA SET   Tot no of records in DS: 14,098

Partitioned Data Set	Highest Frequency	2nd Highest Frequency	3rd Highest Frequency	4th Highest Frequency
Cluster No	**Cluster 5**	**Cluster 2**	**Cluster 4**	**Cluster 7**
Frequency	**2,312**	**2,168**	**2,135**	**2,077**
Age in Years	**15**	**28**	**26**	**40**
Triage Rating	**3.61**	**3.26**	**3.57**	**3.42**
% Male	**54%**	**56%**	**53%**	**54%**

TGA 2006 – VALIDATION DATA SET   Tot no of records in DS: 10,573

Partitioned Data Set	Highest Frequency	2nd Highest Frequency	3rd Highest Frequency	4th Highest Frequency
Cluster No	**Cluster 8**	**Cluster 5**	**Cluster 4**	**Cluster 1**
Frequency	**2,097**	**1,679**	**1,656**	**1,630**
Age in Years	**16**	**29**	**2.7**	**43**
Triage Rating	**3.63**	**3.55**	**3.24**	**3.37**
% Male	**54%**	**51%**	**56%**	**52%**

TGA 2006 – TEST DATA SET   Tot no of records in DS: 10,573

Partitioned Data Set	Highest Frequency	2nd Highest Frequency	3rd Highest Frequency	4th Highest Frequency
Cluster No	**Cluster 4**	**Cluster 2**	**Cluster 1**	**Cluster 6**
Frequency	**1,964**	**1,838**	**1,656**	**1,491**
Age in Years	**16**	**29**	**3.2**	**44**
Triage Rating	**3.61**	**3.53**	**3.25**	**3.38**
% Male	**52%**	**54%**	**58%**	**51%**

Take Note: TRAINING Clusters 2 and 4 frequencies are only 33 apart. If one should swap them then the outcomes are as follows:

For **TGA 2006's Age in Years:**

TRAINING	**15**	**26**	**28**	**40**
VALIDATION	**16**	**29**	**2.7**	**43**
TEST	**16**	**29**	**3.2**	**44**

For **TGA 2006's Triage Rating**:

TRAINING	**3.61**	**3.57**	**3.26**	**3.42**
VALIDATION	**3.63**	**3.55**	**3.24**	**3.37**
TEST	**3.61**	**3.53**	**3.25**	**3.38**

For **TGA 2006's % Male**:

TRAINING	**54%**	**53%**	**56%**	**51%**
VALIDATION	**54%**	**51%**	**56%**	**52%**
TEST	**52%**	**54%**	**58%**	**51%**

T9.5.2 DATA MINING OUTCOMES – For TGA - All of Financial Year 2007
ALIGNED Phase 2

TGA 2007 – TRAINING DATA SET Tot no of records in DS: 14,478

Partitioned Data Set	Highest Frequency	2nd Highest Frequency	3rd Highest Frequency	4th Highest Frequency
Cluster No	**Cluster 2**	**Cluster 4**	**Cluster 8**	**Cluster 5**
Frequency	**2,919**	**2,215**	**2,171**	**1,977**
Age in Years	**16**	**28**	**42**	**2.9**
Triage Rating	**3.66**	**3.59**	**3.45**	**3.34**
% Male	**51%**	**50%**	**51%**	**55%**

TGA 2007 – VALIDATION DATA SET Tot no of records in DS: 10,859

Partitioned Data Set	Highest Frequency	2nd Highest Frequency	3rd Highest Frequency	4th Highest Frequency
Cluster No	**Cluster 1**	**Cluster 8**	**Cluster 2**	**Cluster 3**
Frequency	**1,897**	**1,757**	**1,526**	**1,523**
Age in Years	**15**	**26**	**2.8**	**40**
Triage Rating	**3.63**	**3.64**	**3.37**	**3.48**
% Male	**54%**	**48%**	**55%**	**48%**

TGA 2007 – TEST DATA SET Tot no of records in DS: 10,858

Partitioned Data Set	Highest Frequency	2nd Highest Frequency	3rd Highest Frequency	4th Highest Frequency
Cluster No	**Cluster 1**	**Cluster 4**	**Cluster 3**	**Cluster 5**
Frequency	**1,810**	**1,806**	**1,569**	**1,537**
Age in Years	**15**	**26**	**40**	**2.7**
Triage Rating	**3.61**	**3.62**	**3.50**	**3.34**
% Male	**54%**	**53%**	**53%**	**55%**

Take Note: VALIDATION Clusters 2 and 3 frequencies are almost the same. If one should swap them then the outcomes are as follows:

For **TGA 2007's Age in Years**:

TRAINING	**16**	**28**	**42**	**2.9**
VALIDATION	**15**	**26**	**40**	**2.8**
TEST	**15**	**26**	**40**	**2.7**

For **TGA 2007's Triage Rating**:

TRAINING	**3.66**	**3.59**	**3.45**	**3.34**
VALIDATION	**3.63**	**3.64**	**3.48**	**3.37**
TEST	**3.61**	**3.62**	**3.50**	**3.34**

For **TGA 2007's % Male**:

TRAINING	**51%**	**50%**	**51%**	**55%**
VALIDATION	**54%**	**48%**	**48%**	**55%**
TEST	**54%**	**53%**	**53%**	**55%**

T9.5.3 DATA MINING OUTCOMES – For TGA - All of Financial Years 2006 and 2007
ALIGNED Phase 3

For **TGA 2006's Age in Years**:

TRAINING	15	26	2.8	40
VALIDATION	16	29	2.7	43
TEST	16	29	3.2	44

For **TGA 2007's Age in Years**:

TRAINING	16	28	42	2.9
VALIDATION	15	26	40	2.8
TEST	15	26	40	2.7

For **TGA 2006's Triage Rating**:

TRAINING	3.61	3.57	3.26	3.42
VALIDATION	3.63	3.55	3.24	3.37
TEST	3.61	3.53	3.25	3.38

For TGA **2007's Triage Rating**:

TRAINING	3.66	3.59	3.45	3.34
VALIDATION	3.63	3.64	3.48	3.37
TEST	3.61	3.62	3.50	3.34

For **TGA 2006's % Male**:

TRAINING	54%	53%	56%	51%
VALIDATION	54%	51%	56%	52%
TEST	52%	54%	58%	51%

For **TGA 2007's % Male**:

TRAINING	51%	50%	51%	55%
VALIDATION	54%	48%	48%	55%
TEST	54%	53%	53%	55%

Subsequently, if the rightmost two Clusters of 2006 are swapped as well (the frequency difference between them being marginal then one would have the following interesting picture emerge – see next page:

T9.5.4 DATA MINING OUTCOMES – For TGA - All of Financial Years 2006 and 2007
ALIGNED Phase 4

For **TGA 2006's Age in Years**:

TRAINING	**15**	**26**	**40**	**2.8**
VALIDATION	**16**	**29**	**43**	**2.7**
TEST	**16**	**29**	**44**	**3.2**

For **TGA 2007's Age in Years**:

TRAINING	**16**	**28**	**42**	**2.9**
VALIDATION	**15**	**26**	**40**	**2.8**
TEST	**15**	**26**	**40**	**2.7**

For **TGA 2006's Triage Rating**:

TRAINING	**3.61**	**3.57**	**3.42**	**3.26**
VALIDATION	**3.63**	**3.55**	**3.37**	**3.24**
TEST	**3.61**	**3.53**	**3.38**	**3.25**

For **TGA 2007's Triage Rating**:

TRAINING	**3.66**	**3.59**	**3.45**	**3.34**
VALIDATION	**3.63**	**3.64**	**3.48**	**3.37**
TEST	**3.61**	**3.62**	**3.50**	**3.34**

For **TGA 2006's % Male**:

TRAINING	**54%**	**53%**	**51%**	**56%**
VALIDATION	**54%**	**51%**	**52%**	**56%**
TEST	**52%**	**54%**	**51%**	**58%**

For **TGA 2007's % Male**:

TRAINING	**51%**	**50%**	**51%**	**55%**
VALIDATION	**54%**	**48%**	**48%**	**55%**
TEST	**54%**	**53%**	**53%**	**55%**

CUBES OUTCOMES

The reader is reminded that of the findings in **Chapter 7.5**, namely that Hosp T and Hosp W have "diametrically" opposite Triage classifications / profiles. Hosp T totally dominates Triage classifications = 1 and 2, and almost completely dominates Triage = 3, whereas Hosp W dominates only Triage classification = 4. As for Triage = 5 Hosp T and Hosp W share the honours.

Of course, in **Chapters 9.5** (viz. this chapter) the emphasis is on hospital TGA only. The previous analysis of clustered outcomes had already been most informative, but per hour-of-day (derived from per time-of-day (TOD)) "ebbs and flows" had not as yet been properly explored, so the following improvisation was deemed potentially useful. The Financial Years 2005, 2006 and 2007 were yet again the Data Sets utilized and plotted, and on this occasion it was approached as follows:
The OLAP Cubes derived outcomes per Triage classifications of 1 and 2 (viz. "Resuscitation" and "Emergency" respectively) were *combined* and its percentage of the total per hour-of-day ED presentations calculated. Cf. three Cube Pivot Tables **C9.5.4**, **C9.5.5** and **C9.5.6.** These per hour-of-day percentages were subsequently graphically plotted. The three respective and resultant graphs (viz. **C9.5.1**, **C9.5.2** and **C9.5.3**) appear in **Chapter 13.2 APPENDIX B5**.

Impressions
In all three cases the "small hours of the morning" are relatively quiet. Then from about 6 AM activity starts spiking upwards, and around 8 AM the 2nd and 3rd graphs spike to per-day highs of around 22% proportions for Triages 1 and 2 combined. The first of the three graphs also spikes – but not quite to a per-day high. The rest of the mid-morning hours then "roller-coasts" through until about 1 or 2 PM , when the 2nd highest proportional per-day spikes occur for Triages 1 and 2. Triage 1 and 2 activity then levels out at about 15% proportion, and then around about 10 PM there is a final spike before midnight.

This kind of pattern needs further investigation because it might impact on the level of expertise and experience one might prefer to have on duty at those critical times.

In other words; with joint Triages 1 and 2 plotting somewhat differently to that of all Triages combined – i.e. with most activity occurring between 8 and 12 AM - after which it seems to settle at a lower level and to hold that course through the night – the staff roster (for TGA) may require a minor correction / adjustment.

<u>**Gist of Chapter's Findings**</u>: Cf. condensed outcomes and commentary - **Ch 10**.

10. DISCUSSION: Using PART DS: TGA USING PARTITIONED DATA SETS (I.E. TRN, VAL & TST) VS SOME WHK

DISCUSSION:
TGA
USING PARTITIONED
DATA SETS

A
STUDY IN
SIMILARITY

10. DISCUSSION: Using PART DS: TGA USING PARTITIONED DATA SETS (I.E. TRAINING, VALIDATION & TEST) VS SOME WHK

10.1 CONDENSED FINDINGS: Using PART DS

Introduction

Chapter 10 condenses all of the foregoing from "mega" **Chapter 9** into **Table T10.1**. These are Intra-Emergency Department / Intra-Hospital **SIMILARITIES** established and elaborated upon in **Chapter 9.1** to **Chapter 9.5** inclusive.

Cf. next page.

The reader is referred back to **Chapter 5.2** and reminded that the main body of this thesis concerns a study in **DIFFERENCE** followed by a study in **SIMILARITY**.

The former (viz. an Inter-ED / Inter-Hosp study in **DIFFERENCE**) was conducted against the "backdrop" of FULL Data Sets (comparing Hosp T ED and Hosp W ED), be it for a Month or for a Financial Year at a time. The latter (viz. an Intra-ED / Intra-Hosp study in **SIMILARITY**) was conducted against the "backdrop" of PARTITIONED Data Sets (comparing a TGA ED partitioned DS of one Fin Year with a TGA ED partitioned DS of another Fin Year), be it for a Month or for a FULL Fin Year at a time.

Another big difference between these two studies is that while the former (**DIFFERENCE**) applies mostly OLAP CUBES-generated information (with a sprinkling of SAS-generated Box Plots), the latter (**SIMILARITY**) applies mostly SAS EM-generated (i.e. Data Mined) information (with a lesser component of CUBES-generated Excel Pivot Tables).

Yet a third difference between the former and the latter: The PARTITIONED outcomes of the latter were generated in order to either prove or disprove the earlier Hosp T outcomes of the Comparative study of Hosp T versus Hosp W. While it is therefore Hosp T focussed (or rather TGA focussed – TGA being the mnemonic predominantly used in **Chapters 9** and **10**) there is the occasional attempt at confirmation of some Hosp W (or rather WHK) statistic.

A fourth difference is the overriding emphasis on CLUSTERING in the study in **SIMILARITY**. These Clusters are then ranked from highest frequency in descending order – and an ED Presentation Flow Diagram created to visually portray some of the Trends which may manifest itself.

Chapter 10 (i.e. this chapter) addresses "mega" **Chapter 9**'s (i.e. the previous chapter) study in **SIMILARITY**.

Condensed Outcomes of Study in SIMILARITY

Cf. table **T10.1** on the next page for an "abbreviated" version of the outcomes of the study in **SIMILARITY**.

Not only did the study in **SIMILARITY** confirm several findings of the study in **DIFFERENCE** (as per the other "abbreviated" "chit" list of table **T8.1** – cf. **Chapter 8**), it also added additional information to further delineate and explain care of the Clusters generated via the Data Mining of Partitioned Data Sets.

Additional knowledge gained included:

a. Quartile information – TGA across Fin Years
b. Quartile information – TGA versus WHK (same Fin Year)
c. Clustered information – TGA across Fin Years
d. Ordinal Cluster information – TGA across Fin Years
e. Mean and Mode information – TGA across Fin Years and TGA versus WHK (same Fin Year)

SIMILARITIES regarding **Chapter 8**'s Comparison of Hosp T versus Hosp W include:

a. Average Age of TGA = 39 years
b. Average Age of WHK = 35 years
c. Triage Mean for TGA = 3.3 (i.e. "leaning" towards URGENT)
d. Triage Mean for WHK = 3.7 (i.e. "leaning" towards SEMI-URGENT)
e. DOW profiles for TGA very similar between Fin Years

SIMILARITIES regarding **Chapter 10**'s (viz. this chapter's) Clustered TGA Outcomes include:

a. Average TGA Age = 39 years – or when rounded "upward" Age = 40
b. Ordinal nature of TGA Clusters consistently place
    - Teens and Young Adults
    - 20-Something
    - Infants
    - 30- and 40-Something
c. Ordinal nature of TGA Clusters consistently place Cluster = Teens / Young Adults at top
d. TGA Triage Mean consistently = 3.3 (i.e. URGENT)
e. TGA Triage Mode consistently = 3
f. TGA DOW profiles similar across Fin Years
g. TGA Age Quartiles consistently at Q1 = 17, Q2 = 36 and Q3 = 63
h. TGA Triage Quartiles consistently at Q1 = 3, Q2 = 3 and Q3 = 4
i. Top Colour-Code fairly consistently = Sunday, Monday and Saturday
j. Very top Colour-Code consistently = Sunday or Monday

T10.1 Condensed Outcomes of the Studies in SIMILARITY (TGA only) & DIFFERENCE (versus some WHK)

Chapter	**Quality**	**TGA** **Comparing 2 or more yrs**	**WHK**	**Where discussed**
	(1)			
Ch 9.1	Average Age	Approx 39 yrs holds across various DS	35 yrs holds	**pp.128-132**
	(2)			
	Age Quartiles	Q1=17, Q2=36, Q3=63 viz. Q1=0-17, Q2=0-36, Q3=0-63	Q1=14 Q2=31 Q3=56	**ditto**
	(3)			
Ch 9.2	Four highest clusters	Teens & Young Adults, 20-Something, Infants, 30- & 40-Something	N/A	**pp.133-148**
	(4)			
	Top Colour-Code	Consistently Sun, Mon & Sat with Sun or Mon top each time	N/A	**ditto**
	(5)			
Ch 9.3	DOW profiles	Very similar between yrs	N/A	**pp.149-152**
	(6)			
	Per Age Group Per TOD Profile	Profiles similar but inter-Age Profiles differ	N/A	**ditto**
	(7)			
Ch 9.4	Triage modes	Very similar between yrs i.e. Mean=3.3 viz. Mode=3	Mean 3.7 Mode 4	**pp.153-161**
	(8)			
	Triage modes Quartiles	Q1=1-3 viz. 1,2 or 3 Q2=1-3 viz. 1,2 or 3 Q3=1-4 viz. 1,2,3 or 4	Q1=1-3 Q2=1-4 Q3=1-4	**ditto**
	(9)			
Ch 9.5	Four highest Clusters +	Teens & Young Adults, 20-Something, Infants, 30- & 40-Something	N/A	**pp.162-171**
	(10)			
	+ Triage	In above order: 3.6, 3.5, 3.4, 3.3	N/A	**ditto**
	(11)			
	Top Colour-Code	Consistently Sun, Mon & Sat with Sun or Mon top each time	N/A	**ditto**
	(12)			
	Triage + TOD	Tri 1&2 similar but > active AM	N/A	**ditto**

Dataflow Diagram / Decision Tree

The author subsequently (and retrospectively) constructed a decision tree (cf. two pages ahead) - based on some of the characteristics of the following two "abbreviated" tables / chit-lists and associated commentaries - namely:

- Table **8.1** etc. cf. **Chapter 8** and
- Table **10.1** etc. cf. previous two pages

Very important point: **Clustering** via Data Mining **not** being **a predictive tool**, the author had to construct a Decision Tree retrospectively.

To start with the regional Population Base feeds into the Hospital ED system.

The reader will also notice that the subsequent and overriding areas of input into the system from the first (viz. table **T8.1**) as well as second (viz. table **T10.1**) chit lists are the

- Socio-Economic and
- Seasonal components.

One or both of these are now applied and flow returned to just before ED Presentation.

These two components impact upon PRELOAD. Excessive PRELOAD, where Patients are received beyond the ability of an ED facility to cope with [Ardagh and Richardson, 2004], can "propagate" further down the line, contributing to OVERLOAD, and so forth.

With regard Seasonal impact on the system the current study only investigated seasonal demand, including national school holiday-related seasonal "spikes" (or "troughs"). Time and scope did not allow for investigation of other types of seasons, for example the impact of specific sports-related seasonality.

Having determined the PRELOAD situation at that point in time, each Patient reporting to ED Reception is now "assessed" - firstly by Age "category". Age was found to be a most important variable / determinant. Data Mined Cluster outcomes from **Chapters 9.2** and **9.5** clearly show that ED Presentations are "dominated" by the younger age-groups. The author, for the sake of simplicity, decided upon a naming convention which would best describe the eight categories (viz. Clusters) into which each Data Mining exercise "clustered" the ED Presentations of that particular Data Set – be it the Presentations for One Month or a Full Financial Year.

The four most prominent Clusters were all found to be less then 50 years of age – hence the decision box: "Age < 50" - i.e. Age less than 50 years of age?

Patients over 50 years of age are thus excluded from the remainder of the analysis. That is to say; over-50's Patients appear to be less "burdensome" / demanding on ED resources, as a per capita sub-group.

Now for Patients under 50 years of age the next step is to determine whether s/he belongs to the highest demand Age-group, namely whether s/he is a Teen / Young Adult. If that is the case then this Patient belongs to the Highest Demand / Lowest Urgency group.

If s/he is not in the Teen / Young Adult group then s/he would belong in one of the remaining 2nd to 4th placed groups.

The "first" of these is the 20-Something group, which would result in an ED Presentation being placed in the 2nd Highest Demand / 2nd Lowest Urgency group.

Beyond these first two are the 30- and 40-Something group, viz. also High Demand / but 2nd Highest Urgency group, and lastly (of the under 50's) there are the Infants, who are yet again High Demand / albeit Highest Urgency group.

The reader is reminded that the four under-50 ED presentations represent the four highest demand Clusters, which require most of the ED time at BOP DHB regional hospitals, and the four outcomes result in the following "ordinal" breakdown:

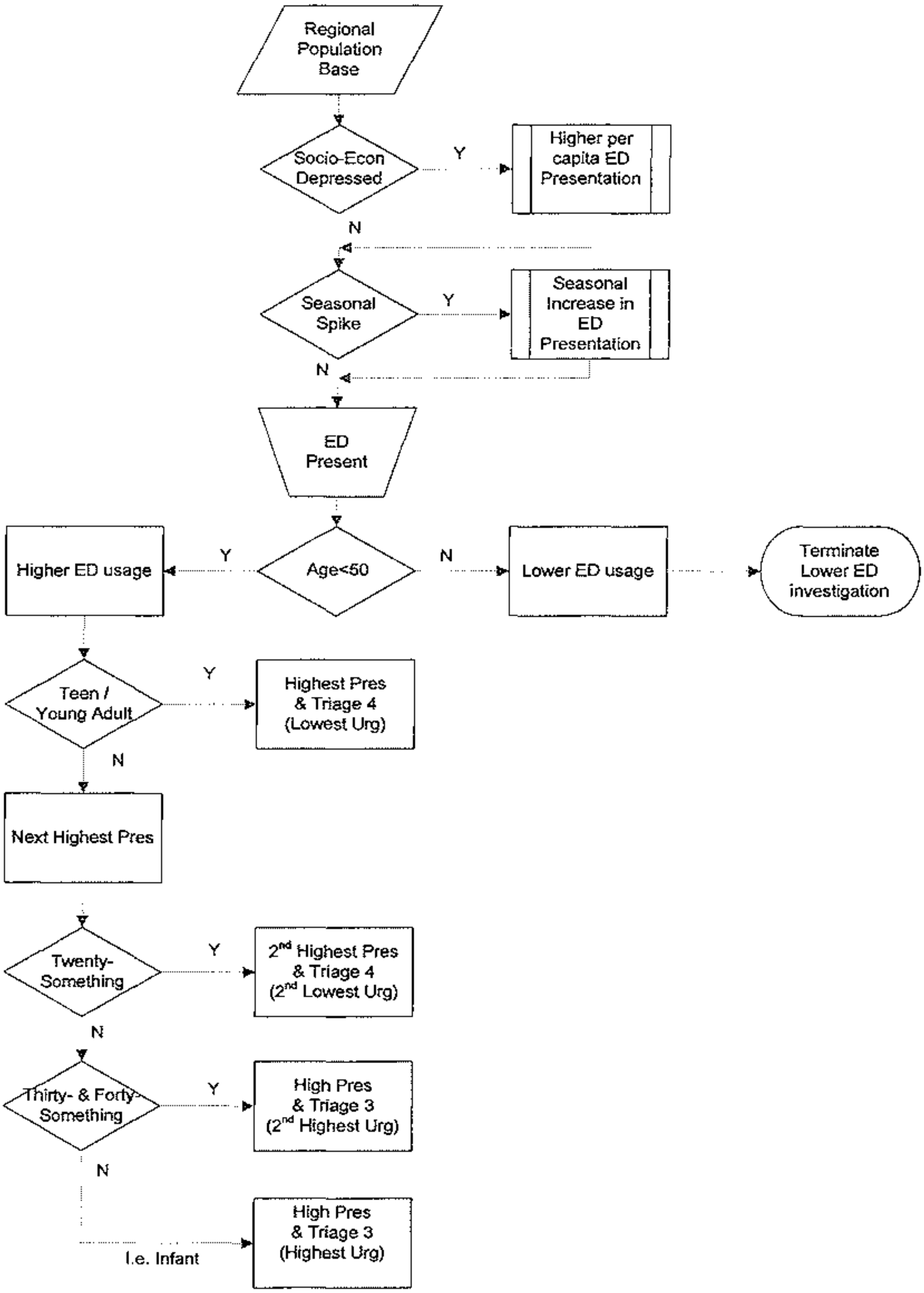
T10.2 Inverse World of Highest ED Demand

Cluster / Age Group	ED Demand Level	Triage Level	Urgency Level
Teens / Young Adults	Highest	4	Lowest
Twenty-Something	2nd Highest	4	2nd Lowest
Thirty- & Forty-Something	High	3	2nd Highest
Infants	High	3	Highest

Colour-Code Legend: GREY=Highest BLUE=Middle YELLOW=Lowest

Table **T10.2** speaks for it-self, and Colour-Coding the outcomes emphasises the situation.

PRESENTATION TREE



Flowchart 5: Base ED Presentation Decision Tree

"Universality" of the foregoing in a NZ context

In the author's estimation these include:

- Sunday, Monday and Saturday likely to be highest ED demand days
- DOW profiles will thus reflect the higher demand Sunday / Monday / Saturday threesome
- Socio-Economic circumstance will manifest itself in Average Age
- The Inverse World of Highest ED Demand will "kick in"
- The Quartile breakdown will be a by-product of Average Age – viz. lower Average Age equating to lower Quartile Age-bands / ranges
- The symmetric bell-shaped curve will remain the "impossible dream" because of the impact that babies on kurtosis and skew-ness (regarding terminology cf. Section **6.2.3**)
- The under-Fifties are likely to prevail as highest demand Age-Groups, but
- The Teens / Young Adults & Twenty-Something Groups likely to eclipse all others

10.2 CLOSING COMMENTS: Using PART DS

The above processes influence ED Demand and Overcrowding. It involves a great deal more than merely the twelve points raised in condensed table **T10.1**. Cf. the rest of the related discussion in Section **10.1**.

The causes and solutions are in fact multidimensional – to be addressed in more detail in **Chapter 12**.

The Data Mined Clustering results of **T10.2** therefore show that Highest Demand + Lowest Urgency "rule the roost", whereas the Lowest Demand + Highest Urgency make up the rear "action" of the top four tiers in this Inverse World of ED Demand / "Urgency".

That, over and above the potential spikes in Demand emanating from Socio-Economic and / or High Seasonal population influxes (cf. "Probable 'Rule(s) of Thumb' ..." sub-section within Section **8.1** in this regard), all add up to Demand for ED Services overtaxing an ED – every so often. This can, and unfortunately does happen with the inevitability of the proverbial "Murphy's Law" – that is: "if things can go wrong, they will".

Chapter 11 explores some Peripheral Variables, in effect variables the author would have further explored through Data Mining, but for which time and scope limitations did not allow. At any rate, the Decision Tree of **Flowchart 5** will be further extended subsequent to some analysis of these Peripheral Variables.

Then, in **Chapter 12**, the Condensed Outcomes of **Chapters 8** and **10**, as well as the Peripheral Outcomes of **Chapter 11**, will be brought together for a final "collaboration".

11. FINDINGS: PERIPHERAL VARIABLES BRIEFLY ADDRESSED

FINDINGS: PERIPHERAL VARIABLES BRIEFLY ADDRESSED

STUDIES IN **DIFFERENCE** AND **SIMILARITY**

11. FINDINGS: Peripheral Variables: BRIEFLY ADDRESSED

The peripheral variables to follow, anticipated to have some bearing on Demand for ED Services, ought to have been scoped in and Data Mined (DM) as well – but time and circumstance did not allow for such a more in-depth investigation.

However, it was decided to include the three variables in question none the less, but to make these investigations brief and via OLAP Cubes only.

Any detailed investigation and Data Mining is therefore left for another researcher / another day.

The three peripheral variables short-listed by the current author are:

- Ethnicity
- Referrals and
- Injury

11.1 FINDINGS: Peripheral: ETHNICITY

RESULTS HELD IN APPENDIX

Cf. Pages **454 - 457**

11.1 FINDINGS: Peripheral: ETHNICITY

11.1.1 Peripheral: FINDINGS

Ethnic usage proportions are very evident in the histograms **S11.1.1**, **S11.1.2**, **S11.1.3** and **S11.1.4**, as well as the Cube results of **C11.1.1** and **C11.1.2**.

The proportional representation in ED statistics is quite evident – and especially so when considering the ethnic proportions of the population-base from which ED presentations emanate. For example; TGA with an approximately 16% Maori population has a more proportional representation than is the case with WHK where an approximately 40% Maori population almost reach parity with the "European" component of the population-base.

This outcome may result more so from the Socio-Economic well-being of the respective TGA and WHK population-bases. On the other hand, if ethnicity is determined to be a factor then certain other ethnic minorities may also shed some further light on the matter, for example whether some mostly "well to do" minorities show a propensity towards using the DHB ED when visiting a GP would have been more appropriate.

Question put another way: While growth in population-base will lead to increased demand for ED service, does the changing demographic of certain areas / suburbs result in an out-of-proportion increase or drop in demand for service?

Gist of Chapter's Findings: Cf. Condensed outcomes and commentary-**Ch11.4**.

11.2 FINDINGS: Peripheral: REFERRALS

RESULTS HELD IN APPENDIX

Cf. Pages **458 - 461**

11.2 FINDINGS: Peripheral: REFERRALS

11.2.1 Peripheral: FINDINGS

As the Cube-derived statistics show (cf. **C11.2.1/2/3**) there exists a wide range of referral "sources". Availability of General Practitioners and the utilization of such GP services are more so under investigation in this sub-section, because that can also have a bearing on ED workloads. As a result the proportional percentages were calculated for each of TGA, WHK and OPO for three Fin Yrs.

When "averaged" and rounded the averages for GP referrals for three Financial Years per ED the outcomes were as follows:

- TGA **21%** of ED presentations emanated from GP referrals
- WHK **15%** of ED presentations emanated from GP referrals
- OPO **11%** of ED presentations emanated from GP referrals

Or put another way regarding ED presentations emanating from GP referrals:

- TGA Approximately **1 in 5** emanated from GP referrals
- WHK Approximately **1 in 7** emanated from GP referrals
- OPO Approximately **1 in 10** emanated from GP referrals

In other words – there is a distinct difference between regions regarding the proportion of ED referrals emanating from GPs.

As far as Self referrals are concerned, when "averaged" and rounded the averages for three Financial Years per ED the outcomes were the inverse of that of GP referrals, namely:

- TGA **72%** of ED presentations emanated from Self referrals, viz. **7 in 10**
- WHK **80%** of ED presentations emanated from Self referrals, viz. **8 in 10**
- OPO **87%** of ED presentations emanated from Self referrals, viz. **9 in 10**

And most interestingly; when Self referrals itself were further explored WHK and OPO were found to be diametrically opposite to TGA regarding the SELF and SELF / FAMILY (viz. "whanau" visiting ED together) type Self referrals.

T11.2.1 Referral Averages / Proportions for Three Fin Years' Outcomes

Hosp	GP Referrals	SELF Referrals (SR)	SELF Of SR	SELF / FAMILY Of SR
TGA	**21%**	**72%**	**72%**	**<1%**
WHK	**15%**	**80%**	**17%**	**63%**
OPO	**11%**	**87%**	**<1%**	**87%**

Colour-Code Legend: GREY=Highest BLUE=Middle YELLOW=Lowest

I.e.; there's a whole range of "diametric opposites" evident from the above table.

Gist of Chapter's Findings: Cf. Condensed outcomes and commentary-**Ch11.4**.

11.3 FINDINGS: Peripheral: INJURIES

RESULTS HELD IN APPENDIX

Cf. Pages **462 - 470**

11.3 FINDINGS: Peripheral: INJURIES

11.3.1 Peripheral: FINDINGS

Or more appropriately put – the "dichotomy" of:

- Injury or
- Non Injury Illness

This brief discussion is based on Cube results **C11.3.1**, **C11.3.2**, **C11.3.3** and **C11.3.4**.

As can be seen (at closer scrutiny of these Cubes) there are two further categories – viz. "Did Not Wait" and "Deceased".

Category "Did not wait" concerns those individuals who presented themselves but then in effect "discharged" themselves by not waiting for Triage and beyond. The ED therefore does not know whether it was injury or non injury related.

And category "Deceased" speaks for itself.

However, both of these's "numbers" are so small that these options are insignificant in the present discussion.

Furthermore - Take Note: Some of the outcomes can also be disregarded outright because the age-group population-base is just too small – in effect verging on insignificant. Therefore, if a 100% Injury-proportion is recorded for the age-group 100-104 years of age, and only 1 ED presentation is recorded, then one can safely disregard the 100% statistic – be it for Injury or Non-Injury.

What the author wanted to emphasize, though, is twofold, namely:

- Differences in Injury-proportions between Age-groups and
- Differences between equivalent Age-groups for Males and Females

The derived / condensed table two pages hence compares the respective MALE and FEMALE proportional statistics per five-year-groups. Each statistic shows what proportion (viz. what percentage) of ED presentations emanated from injury. These statistics are the average of three Financial Years' worth of averages. The reader will notice that a couple of MALE averages were considered anomalies (probably "distorted" as a result of too few presentations per five-year category) and are thus ignored in the discussion. Cf. footnote to mentioned condensed table.

A closer scrutiny of the Comparative Injury Table (**T11.3.1**) shows up the following:

Similarities and Differences for MALE and FEMALE

- PEDIATRIC MALES and FEMALES show similar Injury proportions
- PEDIATRIC MALES and FEMALES also show the same high proportionality between the ages of 5 – 14 years
- ADULT MALES show vastly higher Injury proportions than does ADULT FEMALES
- ELDERLY FEMALES would appear to have slightly higher Injury proportions when compared to ELDERLY MALES
- While ADULT FEMALES show a marginally higher propensity for Injury-related ED presentations when compared with ELDERLY FEMALES it is nothing like the 5-14 years "spikes" of PEDIATRIC FEMALES
- In comparison to this ADULT MALES show continuous high "spikes" for the ADULT MALE age range of 15-49 – with the highest spike being that for the ADULT MALE age group 15-19

Comparison between TGA and WHK

- In the cases of both MALES and FEMALES there is parity between the results of TGA and WHK for ELDERLY statistics
- Now comparing the ADULT and PEDIATRIC (with the exclusion of the Under 1 year "sub" age-group) five year age groups it becomes evident that in the cases of both MALE and FEMALE WHK "outperforms" TGA
- In case of TGA: (***13 age-groups*** *= all Adult & Paediatric except Under-1*)
  - MALES average for 13 age-groups is 46% (600 / 13 = 46.15)
  - FEMALES average for 13 age-groups is 29% (386 / 13 = 29.69)
- In case of WHK: (***13 age-groups*** *= … ditto above …*)
  - MALES average for 13 age-groups is 51% (670 / 13 = 51.53)
  - FEMALES average for 13 age-groups is 34% (450 / 13 = 34.61)
- WHK MALES thus 10% more likely to present at ED for reasons of Injury (5 / 46 * 100 = 10.86)
- WHK FEMALES thus 17% more likely to present at ED for reasons of Injury (5 / 29 * 100 = 17.24)

T11.3.1 Condensed Table: Proportion of ED Presentations resulting from Injury

COMPARATIVE INJURY TABLE #		**MALE**		**FEMALE**	
		TGA	**WHK**	**TGA**	**WHK**
		%	%	%	%
PAEDIATRIC	Under 1 year	**6**	**6**	**6**	**6**
	01-04 years	**23**	**33**	**23**	**31**
	05-09 years	**64**	**72**	**52**	**60**
	10-14 years	**45**	**53**	**41**	**53**
ADULT	15-19 years	**67**	**70**	**32**	**34**
	20-24 years	**62**	**65**	**25**	**30**
	25-29 years	**56**	**64**	**25**	**31**
	30-34 years	**56**	**57**	**26**	**35**
	35-39 years	**49**	**60**	**27**	**35**
	40-44 years	**48**	**54**	**30**	**31**
	45-49 years	**41**	**47**	**28**	**33**
	50-54 years	**37**	**40**	**27**	**28**
	55-59 years	**31**	**30**	**27**	**26**
	60-64 years	**21**	**25**	**23**	**23**
ELDERLY	65-69 years	**20**	**22**	**21**	**17**
	70-74 years	**15**	**19**	**19**	**18**
	75-79 years	**15**	**15**	**22**	**22**
	80-84 years	**14**	**16**	**21**	**22**
	85-89 years	**14**	**17**	**22**	**23**
	90-94 years	**20**	**16**	**31**	**30**
	95-99 years **$**	**23**	**51**	**31**	**27**
	100-104 years **$**	**63**	**none**	**17**	**16**

Percentages: no rounding – decimals ignored - only whole number shown
$ These “Male” stats are anomalous and therefore “ignored” in the discussion

Gist of Chapter’s Findings: Cf. Condensed outcomes and commentary-**Ch11.4.**

11.4 CONDENSED FINDINGS: Peripheral Variables

11.4 CONDENSED FINDINGS: Peripheral Variables

This discussion follows on from the "suspended" discussion (relating to **Flowchart 5**) of **Chapter 10**, and is followed by the Condensed Peripheral Outcomes table **T11.4.1**.

Flowchart 6 (cf. two pages hence) is an enhanced "rehash" of **Flowchart 5** (cf. **Chapter 10**) with Injury- and gender-of-injured-related detail brought to bear.

It is also enhanced with a Referral process box to factor in the incidence of Higher Self-referral. High Self-referral appears closely associated with "low" regional Socio-Economic status – determined to be at the high end of the Ministry of Health's Deprivation Index "enumeration".

While the author does not believe Ethnicity of itself has any causal effect upon per capita ED Presentations, Maori proportions are rather high in the more "depressed" regions – and it is therefore implicitly included in the "Higher per capita ED Presentation" process box. More specifically put; it is the Socio-Economic circumstance, not the Maori-ness, which results in lower GP / higher Self referral.

T11.4.1 Condensed Peripheral Outcomes of Studies in DIFFERENCE and SIMILARITY

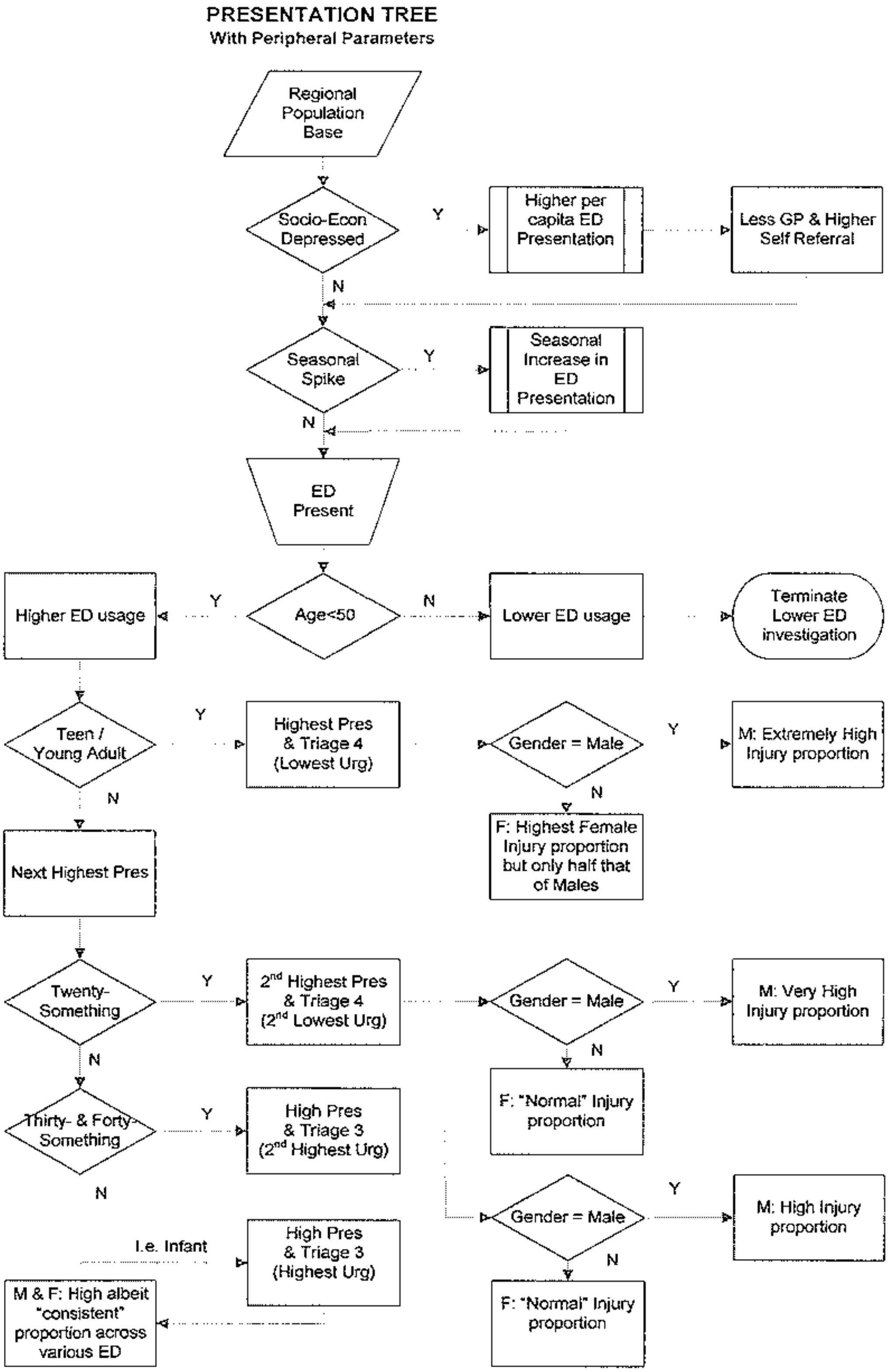
Chapter	**Quality**	**Hospital T**	**Hospital W**	**Where discussed**
	(1)			
Ch 11.1	Ethnicity	16% Maori	40% Maori	**pp.183-184**
	(2)			
Ch 11.2	% GP Referral	21%	15% (OPO 11%)	**pp.185-186**
	(3)			
	% Self Referral	72%	80% (OPO 87%)	**ditto**
	(4)			
Ch 11.3	Injury Proportions Paediatric & Adult	Highest for P 5-14 yrs & A 15-49 yrs	Same as TGA	**pp.187-190**
	(5)			
	Injury Gender	Adult M much > than F	Same as TGA	**ditto**
	(6)			
	M Injury Proportions	1^{st}: T & Y Ad 2^{nd}: 20-Some 3^{rd}: 30-&40-S	Same as TGA	**ditto**

"Universality" of foregoing in a NZ context

Likely characteristics of Demand for ED services in more Socio-Economically "depressed" areas.

In the author's estimation these include:

- GP Referral percentages are likely to be lower – with GP-availability per capita exacerbating the situation
- Self-Referrals thus higher
- Highest ED Demand likely to lean even more so towards Teens / Young Adults & Twenty-Something Groups with compromised Socio-Economic circumstance
- Injury proportions higher yet again with compromised Socio-Economic circumstance
- Males – especially young Males – likely to dominate Teens / Young Adults & Twenty-Something results and
- Teens / Young Adults & Twenty-Something Males also likely to dominate Injury-related ED presentations



Flowchart 6: Extended ED Presentation Decision Tree

12. CONCLUSIONS AND FURTHER RESEARCH

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12.1 ASSEMBLY OF CONDENSED OUTCOMES

12.1.1 CONDENSED OUTCOMES: TGA AND WHK SPECIFIC

The core of the foregoing research involved the studies in **DIFFERENCE** and **SIMILARITY** (first mentioned in **Chapter 5.2**), followed by the chapter on PERIPHERAL Outcomes.

The gist of the Outcomes of "condensed" **Chapters 8** and **10**, as well as that pertaining to Peripheral Outcomes (viz. **Chapter 11**) are:

A Study in **DIFFERENCE**:

Hosp T versus Hosp W highlighted significant **DIFFERENCES** in Average Age, proportion Admissions, Average Triage rating, Per DOW ED presentation "footprint", Quartile breakdown, Per Week profile, Seasonal highs and lows, Demand for ED services, and Per Capita Usage.

A Study in **SIMILARITY**:

Hosp TGA compared across various Months or Financial Years highlighted significant **SIMILARITIES** in Average Age, proportion of Admissions, Average Triage rating, Per DOW profiles, Quartile breakdown, Sunday and Monday being highest ED Presentation days of the week, Teens and Young Adults consistently being the highest Demand group, with Twenty-Something, Thirty- and Forty-Something, and Infants being the four top "performance" groups, in other words - the under-50's comprising the highest demand groups.

Some PERIPHERAL Variables – Studies in **DIFFERENCE** and **SIMILARITY**:

Injury proportions being consistently higher for Males than Females, higher Self-referrals "endemic" to more Socio-Economically "depressed" regions, and higher "family" referral proportions in lock-step with higher regional Maori population proportions.

For the respective Condensed Outcomes and associated "Overview" / Discussion of the each of the foregoing three "Studies", refer back to the following sub-sections:

- Sub-section **Condensed Outcomes of Study in DIFFERENCE**
  In Section **8.1** within **Chapter 8**
- Sub-section **Condensed Outcomes of Study in SIMMILARITY**
  In Section **10.1** within **Chapter 10**
- Sub-section **Condensed Outcomes of Peripheral Studies**
  (In DIFFERENCE & SIMILARITY)
  In Section **11.4** within **Chapter 11**

12.1.2 CONDENSED OUTCOMES: UNIVERSALLY (HOSPITALS ACROSS NZ)

This sub-section includes some of the ponderings relating to the **universality** of FINDINGS. The term "universally" is used synonymously with "nationally" within the context of certain "pockets" of discussion in this thesis, i.e. within:

- Section **8.1**
- Section **10.1**
- Section **11.4**

Within **Chapters 8**, **10** and **11** respectively - cf. referential information at the bottom of the previous page.

And now, here is the gist of mentioned "pockets" of discussion re universality:

- Hospital location part-explains potential for higher holiday-seasonal spikes in Demand for ED services
- The impact of high-seasonal spikes in ED presentation are bound to be more visible in smaller centres close to prime holiday destinations
- More "depressed" Socio-Economic circumstance is likely to manifest itself in lower Average Age of ED patients at time of presentation
- With as a result the Quartile breakdown in such areas likely to have lower Age-bands per Quartile of total presentations – with the "ceilings" of the first three Quartiles likely to be significantly lower than would be the case in more affluent areas
- GP Referral percentages are likely to be lower in more "depressed" areas – especially so where compromised by lower per capita GP-availability
- Resulting in higher proportions of Self-Referral
- And with a higher likelihood of Average Triage classification leaning more towards Triage = 4 (SEMI-URGENT) (especially so in the case of "Secondary" Health institutions / hospitals)
- With the likelihood of the Inverse World of high demand / low urgency "kicking in" – thus exacerbating the situation with even higher Demand for ED services
- The Sunday / Monday / Saturday as highest demand days is likely to hold true nationwide
- But with the Sunday / Monday / Saturday "book-ends" to be more pronounced and the overall DOW "footprint" thus likely to be progressively more "concave" in more Socio-Economically "depressed" areas
- Unlike the "book-ends" being only marginally higher (than the midweek days of the week) in Socio-Economically affluent areas – and its DOW "footprint" thus having more of a "flat" graphical appearance
- As far as Age-Group-related clusters of usage go more depressed Socio-Economic circumstance will in all likelihood result in even more dominant proportions of "Teens / Young Adult" and "Twenty-Something" ED Demand
- With an associated proportional increase in Injury-related presentations
- Of especially the Male, but also the Female "demographic".

12.2 ORIGINAL SIX QUESTIONS / GOALS REVISITED

The six Questions / Goals originally posited in **Ch 3.1** are replicated below:

- Per Season: To determine seasonal demand over 12 month periods running from July to June (inclusive)

  Gist of Outcomes: **Yes**, demand did fluctuate over twelve month periods, spiking highest during school holiday seasons. Furthermore, different hospitals / regions produced somewhat different "range" profiles.

  Some Supporting Outcomes: Table **T8.1** (**3**)

- Per Season: To determine proportions of demand for ED services per day of week

  Gist of Outcomes: **Yes**, certain days of the week did show higher frequencies. Weekend days are generally high performance days, with Sunday and Monday often spiking highest.

  Some Supporting Outcomes: Table **T8.1** (**5**) (**9**)
  Table **T10.1** (**4**) (**11**)

- Per Day of Week: To determine proportions of demand for ED services per time of day

  Gist of Outcomes: **Yes**, generally speaking there are the very quiet late-night and small hours of the morning, but then ED presentations escalate, then slowly start tapering off until sometime in the evening when it drops down to the late-night low. However, the different Age groups do have different profiles.

  Some Supporting Outcomes: Table **T8.1** (**6**)
  Table **T10.1** (**6**)

- Per Season: To determine prevalence of various Triage / "urgency" ratings per Day of Week

  Gist of Outcomes: **Not wholly conclusive**, but certain Days of the Week show higher Triage "urgency" pre-eminence, and incidentally, on average Hosp T handles more urgent and Hosp W less urgent Triages.

  Some Supporting Outcomes: Table **T8.1** (**10**)
  Some Related Outcomes: Table **T8.1** (**8**) (**11**)
  Table **T10.1** (**10**)

- Per Day of Week: To determine prevalence of various Triage / "urgency" ratings per Time of Day

  Gist of Outcomes: **Inconclusive**, in the sense that the combined proportion of Triages 1 and 2 appears evenly spread regardless of DOW and TOD, but there is a "hint" of a bit more Triages 1 and 2 activity around mid-morning.

Some Supporting Outcomes:	Table **T10.1** (**12**)
Some Related Outcomes:	Table **T10.1** (**3**) (**4**)
	Table **T11.4.1** (**3**)

- Per Annum: To determine comparative per annum demand over several "Financial Years" – to see if there is a trend "for better or worse" over the years

  Gist of Outcomes: **Yes,** there is a trend, but it unfortunately appears to be leaning towards the "worst". Not only is it upwards with growing regional populations but also for "stagnated" regional populations – such as that of the Eastern Bay of Plenty.

Some Supporting Outcomes:	Table **T8.1** (**13**) (**14**)
Some Related Outcomes:	Table **T11.4.1** (**3**) (**6**)

In other words, as far as the original Six Goals are concerned there were:

- **Four** conclusive outcomes,
- **One** not wholly conclusive, and
- **One** inconclusive.

Seasonal Demand for ED Services can thus be considered a problem in the sense that it can (and does) over-burden the system at certain times of the year.

Such **Seasonality in Demand can thus cause operational difficulties.**

And to conclude this sub-section; many of the as-yet-not-utilized "Qualities" of the three condensed tables deal with core issues relating to **Demand for ED Services.** Without having a reasonable "handle" on / understanding of what comprises **Demand ...** one can not fully appreciate the **Seasonal Demand ...** "appendage". The forays into non-seasonal aspects contained in the study were thus both justified and essential to establishing a "base camp" (I.e. **Demand...**) from which to make an assault on the higher "peaks" of high **Seasonal Demand** ...

12.3 SOLUTIONS TO ED OVERCROWDING / OVERLOAD

Under **Chapter 2.1** (DEMARCATION and BACKGROUND) the research was demarcated as involving only the electronic / computerised tracking of Patients through the ED system, more specifically from presentation (at ED Reception) to where they'd been triaged and their visits classified as emanating from injury or not.

In other words, it is all about LOAD and OVERLOAD, and about the extent of the OVERLOAD, and not about how to manage the situation. That part of the "equation" is for the Health Professionals to work out and work through. They are the experts and qualified to do so. The author has also abided by the demarcated scope of the research, with few exceptions - exceptions which included the odd anecdotal comment about possible reasons for certain idiosyncrasies, and presenting some extrapolated information about anticipated future sub-regional population demographics.

Solutions – General Comments

In the light of the above demarcation "rule" a whole chapter on "Solutions to ED Overcrowding" is out of place. However, on this occasion it is justified (even necessary) that one steps outside the demarcated area of research, albeit only briefly, in order to get a glimpse of "what lies beyond".

It concerns PRELOAD, OVERLOAD and AFTERLOAD, first mentioned in Section **2.1.1** – but on this occasion within the context of potential Solutions to Overcrowding.

Now before very briefly presenting some of their Solutions (Suggestions, more like) the following points should be made [Ardagh and Richardson, 2004]:

- Solutions to ED overcrowding are multidimensional – but by addressing these dimensions in concert incremental benefit can be achieved, and
- Many of the Solutions to the overcrowding lie outside the jurisdiction of the ED

Solutions regarding PRELOAD

1. Appointment of GP liaison officers to function as a link between ED and the Community, to stream-line communication and develop clinical pathways
2. Augmentation of community after-hours facilities, such as access to X-rays, ultrasound, blood tests and even observation beds
3. Use of Hospital in Home options for conditions such as pneumonia
4. Instigation of a project to address frequent ED attendees
5. Education of the local community so that they know when and under what circumstances to access ED

Solutions regarding LOAD / Intrinsic Capacity

1. Employment of senior medical staff to provide supervision of other medical staff and to develop processes and protocols for the efficient management of patients in ED
2. Employment of more nurses / extra nurses on shifts to allow for an efficient process of Triage etc.
3. The use of rapid assessment processes for patients with injuries and illnesses that are minor and easily dealt with
4. Development of guidelines and care pathways so that common conditions can be managed with maximum efficiency
5. Development of a project team, including ED and Inpatient Medical and Surgical teams to examine the utility of an adjacent unit where patients may be "worked up" by Inpatient teams after referral from ED

Solutions regarding AFTERLOAD

1. Provision of observation beds so that ED patients can be observed for a number of hours for conditions such as minor head injury and drug overdose rather than to be admitted to Inpatient beds
2. Establishing a project team to look at Patient flow in the hospital and to examine the utility of day-of-surgery admissions, discharge lounges and weekend ward rounds
3. Employment of Social Workers to provide seven-day-a-week coverage in ED to maximise the ability of staff to discharge patients back to the community in a safe and appropriate manner

Ardagh and Richardson [2004] make the point that "This is only an illustrative list. A different one may be compiled for a different hospital depending on perceived needs ... and perceived benefits of each of the possible solutions."

Incidentally, concerning the point made under **LOAD.3** above:
Of the studies mentioned in the Literature Review (cf. Section **2.4.2**) is that of Hardern et al [2003] who investigated Rapid Diagnosis and Treatment.

At closer scrutiny there's a common "theme" evident in most of the above three sets of Solutions. It is explicitly evident in **PRELOAD.1/2/3/4/5**, in **LOAD.3** and in **AFTERLOAD.1**, but also implicitly evident in some of the complement, i.e. **LOAD.4** and **AFTERLOAD.2/3**. It is that of a system overburdened by repeat "offenders", and the most prominent of these "offenders" are the Teens and Young Adults "group" as well as the Twenty-Something "group" – and especially so the young Male component. This point was very lucidly demonstrated in **Chapters 9.2** and **9.5**, and somewhat extended in for ex. **Chapters 11.3** and **11.4** – and subsequently reflected in for example **Flowchart 6** in **Chapter 11.4**.
Take Note: The two sub-sections to follow (viz. Section **12.4/5**) relate to the first two bullet-points under **Most Critical Further Research** under Section **12.7**.

12.4 THE TEENS / YOUNG ADULT / TWENTY-SOMETHING CONUNDRUM

Introductory notes towards envisaged research tagged as critical – cf. Section **12.7**:
These Young Males are obviously not the only ones who overtax the system disproportionately, but the preceding research (as reflected in for example **Flowcharts 5** and **6**) has identified these groups as the principle cause of overloading the system with on average low urgency ED presentations. One has to start somewhere in trying to lessen the burden – to allow ED to deal with more "deserving" presentations – not waste valuable time with "serial ED presenters" of *minor* cuts and bruises.

Too often the "formula" appears to be: Youth + Alcohol = Indiscretion = ED Presentation. Whomever takes up the *baton* and does a more in depth investigation regarding the Teens / Young Adult / Twenty-something conundrum might consider the following authors' thought-provoking insights into the kind of culture which "drives" the anti-social behaviour which seems to represent a major chunk of the Teens / Young Adult / Twenty-something demographic:

1. Francis Gilbert: His book "Yob Nation" [2006] and some of his many articles relating to Education are very appropriate and most informative.
2. Theodore Dalrymple (pseudonym for Anthony Daniels): A vastly-experienced psychiatrist in the British NHS and acclaimed author who, incidentally, toured NZ on speaking engagements in October of 2006.

Consider the following quote from Gilbert's "Yob Nation" [Gilbert, 2006, p.198] (bold print the current author's) regarding youth, alcohol and eventually ED presentation: "It is very difficult to estimate the **crimes committed by drunks**. Less than a quarter of **violent offences** that result in treatment at **Accident and Emergency** departments are known to police". In other words, ED more often than not has to pick up the slack.
Now, concerning the three bold-printed excerpts in the previous paragraph – in the current author's opinion the two conundrums (Youth & Alcohol) of this Section and the next (i.e. Sections **12.4** and **12.5**) can not be investigated in isolation – but must be researched *together*. The DM / Clustering exercise first alerted the current author to the societal impact inherent to this *liaison* - that was around late 2007 / early 2008 (which has since become a conviction). Then, almost on cue, about four months later the following lead article appeared in The Dominion Post on April 11th, 2008: "Drunken youths flood into hospital", and its opening line: "A six-fold increase in the number of drunken youths admitted to Wellington Hospital has forced doctors to become alcohol councillors", and concludes with "...the sorts of patients that come in half-cut are coming in at the busiest time as well...".

In closing, a reminder (cf. Ardagh and Richardson [2004]) that any solution is bound to be

- Multidimensional and that
- It lies outside of ED itself.

12.5 THE ALCOHOL AND SUBSTANCE ABUSE CONUNDRUM

Envisaged research yet again tagged as critical – cf. Section **12.7**:

Alcohol abuse appears to feature rather prominently in the immediately preceding sub-section regarding Teens / Young Adults – i.e. where high testosterone "meets" high alcohol consumption – often culminating in ED presentation.

The current author's investigation into injury / non-injury statistics did not include an alcohol consumption component (the latter not being recorded on the BOP DHB ED Database). However; in a study (cf. Humphrey et al [2003]) done at an Auckland ED in December of 2000 (and based on a random sample of injured ED patients over a three week period of that December 2000) 170 of a total of 273 injured patients consented to participating in the study (although only 166 of mentioned 170 actually completed the questionnaire). A very small sample indeed, unfortunately. Nevertheless, some of the findings are eerily familiar.

These included:

- Males represented two thirds of all the injuries presented and
- Two thirds of these injuries were experienced by the under-30s group.

BAC (Blood Alcohol Concentration) was obtained from breath samples, and based on this parameter and answers to the questionnaire regarding alcohol consumption the following transpired:

- Violence was found to be the cause of 17% of the injury cases and
- Alcohol was involved (victim and / or perpetrator) in 79% of cases.

Some further outcomes from the Auckland study included:

- Cuts and bruises being the most common alcohol-related injuries and
- Cuts, bruises and sprains the most common non-alcohol-related injuries.

Cuts? Bruises? Sprains?
That is subliminal "code" for "low urgency" Triage classification (i.e. Triages 4 & 5) – which also corroborates with the BOP DHB ED findings produced by the current author. The "premise" thus holds, namely that of the Teens / Young Adults / Twenty-Something groups (i.e. the so-called "under 30's" of the Auckland study) are a principal contributor to ED overload. It (viz. the Auckland study) also bears out the same "double-the-numbers" Male versus Female (Males: two thirds and Females: a third) comparison in injury statistics – cf. table **T11.3.1** of the current research. Take note, however, the "arrival" on the scene of a new breed of hard-drinking females, sometimes referred to as "ladettes" [Gilbert, 2006, p. 177].

To conclude concerning the Auckland study: A 166 Data Set of a 3-week-duration study, while helpful, is just too "light-weight". A more comprehensive investigation is needed, but the Auckland study would be a very good place to start.

12.6 CLOSING THOUGHTS

In the preceding two pages the author temporarily granted himself a bit of free reign to explore, but it remains only a brief attempt at explaining why Teens and Young Males are extolling disproportionate demand on ED services. It needs to be explored in much more detail as a matter of some urgency.

Naturally, applying some of the Solutions presented by Ardagh and Richardson [2004], as well as other solutions, are very important.

As the situations stands TAURANGA ED already apply some of the Ardagh / Richardson Solutions, namely:

T12.5.1 TAURANGA ED Solutions Status

Solutions regarding		Involves	Used at TGA ED?	Additional Comments
PRELOAD	**1**	GP liaison officers	**Yes**	Limited usage
	2	Augmentation	No	
	3	Hospital In Home	**Yes**	Limited usage
	4	Frequent Flyer Users	**Yes**	Limited usage
	5	Community Education	**Yes**	Limited
LOAD	**1**	Senior Medical staff	No	Applied for but No
	2	More Nurses	No	Applied for but No
	3	Rapid Assessment	**One EOY**	Temporarily used
	4	Care Pathways	**Yes**	Some pathways
	5	Adjacent Unit	No	
AFTERLOAD	**1**	Observation Beds	**Yes**	Used (4 beds)
	2	Patient Flow	**Yes**	Ongoing
	3	Social Workers	**Yes**	SW (X 2)

Legend: **EOY** = End Of Year **SW** = Social Worker

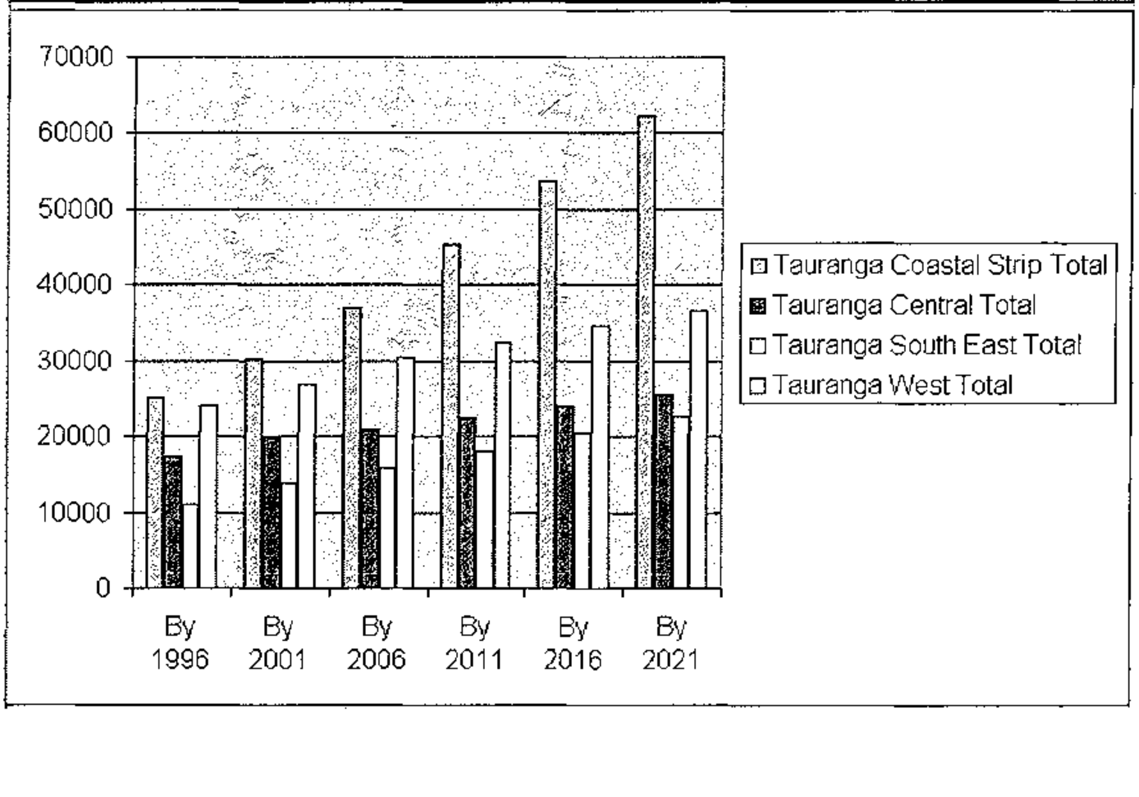
As far as the BOP DHB region is concerned, there is yet another issue worthy of a brief mention. The western part of the region is growing at a phenomenal pace, and while upgrading and extending current facilities is all good and well, and necessary, there may come a time when a bold decision will have to be made – i.e. to consider investing in another regional hospital (with ED facilities) to lighten the future load – especially so at high seasonal times.

Table **T12.5.2** (cf. below) is a reworked "rendition" of Tauranga District Council statistics and it gives a rather clear indication approximately where such a future site for a new facility might be. The Te Puki side of Tauranga, i.e. the Tauranga Coastal Strip is the obvious choice, somewhere in the Papamoa area more specifically. It may also allow some capacity for diverting ambulances at overload times at either of such Tauranga facilities. The current author does not know whether such a possibility has ever been mooted – but it is worthy of a mention – and in the very long run it is bound to happen. Regional operational functionality will still be administered from the BOPDHB HQ at Tauranga Hospital – as would be Information Management services.

T12.5.2 Condensed Table derived from TAURANGA District Council Stats

TRANSCRIBED "Table 2": Population Projections
REWORKED for FOUR MAIN AREAS of TAURANGA

Area Unit	By 1996	By 2001	By 2006	By 2011	By 2016	By 2021
Tauranga Coastal Strip Total	**25168**	**30111**	**37053**	**45265**	**53737**	**62209**
Tauranga Central Total	**17494**	**19859**	**20893**	**22435**	**23976**	**25518**
Tauranga South East Total	**11037**	**13772**	**15915**	**18140**	**20366**	**22591**
Tauranga West Total	**24028**	**26954**	**30439**	**32450**	**34462**	**36473**
District Total	**77727**	**90696**	**104300**	**118290**	**132541**	**146791**



12.7 FURTHER RESEARCH

Statistical Modelling

Limitations to Current Research and Modelling

In retrospect, in light of the outcomes of the present thesis; what a pity two or three anti-social behaviour related bits of information were not available in the electronic "trail" of ED presentations.

It would have come in most handy.

Improved Future Research and Modelling

It is the current author's opinion that anti-social behaviour precedes ED presentation more often than some might care to know – especially so regarding the demographic identified in Section **12.4** above.

The sort of "indicators" which it may be beneficial to record (at ED presentation) in order to enable better understanding - and as a result hopefully improved responsiveness – may include:

- Likely-hood of intoxication at time of presentation
- Level of Intoxication at time of presentation
- And so forth...

At any rate – with ED workload already at times stretched the current author would be at pains not to add unnecessarily to mentioned workload – so just the barest of essentials should suffice. It would for example be marvellous if one could have actual BAC levels recorded as well – but that would require yet another action to be performed by an already taxed system – which should be avoided.

Incidentally; an anti-social behaviour related bill is being proposed in NZ. It addresses ASBOs (mnemonic for "Anti Social Behaviour orders") – introduced in Britain in 1998 [NZ Herald, 2 May 2008].

The NZ Government has a guarded view on ASBOs, but in time it may well have to reconsider. At any rate; Rotorua District Council is keen to "trial" a slightly improvised version of ASBOs - starting sometime soon [NZ Herald, 2 May 2008].

Of course, anti-social behaviour can be indulged in by any Age group (or Gender) – but it is much more prevalent amongst under-Thirty year old Males – viz. the Teens / Young Adult and Twenty-Something groups identified during the course of the investigation.

Most Critical Further Research

It should (and in the case of the foregoing *two conundrums* - cf. Sections **12.4** and **12.5**, *must*) include:

- The role and impact of Teens / Young Adults as well as Twenty-Something demand for ED services – i.e. the **teen / young adult as well as twenty-something conundrum** exposed and possible solutions explored. ##

  Cf. sub-section **Chapter 12.4** "above" by way of "introduction".

- The role and impact of alcohol / substance abuse on demand for ED services – i.e. the **alcohol and substance abuse conundrum** exposed and possible solutions explored. ##

  Cf. sub-section **Chapter 12.5** "above" by way of "introduction".

- And: The two conundrums of **Chapters 12.4** and **12.5** should be investigated together.

- The already mentioned more in depth study of the Age group based demand for ED services – more so for the under-50 age-groups. One could for example extend the number of under 50 clusters to 6 (or outermost 8) – and / or incorporate more parameters in such an investigation. In other words, a continuation and "proliferation" of the current research. ##

  Cf. under-50-specific parts of the current thesis to establish a point of departure from whence to continue the "journey" / investigation.

- Concerning the under-30s / alcohol *liaison* and how to prevent it from (or at least contain its potential for) adding disproportionately to ED Demand – causing EDC (viz. ED Crowding – cf. Section **2.1.1**). Investigate potential alleviating solutions for anticipated to be very high demand days / nights. Example: After the usual ED Presentation and Triage the under-Thirties (viz. Teens / Young Adults and Twenty-Something groups) join a separate queue with somewhat altered rules of engagement, such as the doubling-up of the "How soon treated" parameter of table **T7.4.1** - with Triage=4 becoming "Within 2 hours" in stead of "60 minutes", and Triage=5 becoming "Within 4 hours" in stead of "2 hours". That should free up the usual queue for the remainder of the community. ##

In each case Seasonality is already (else can be) included as yet another parameter

Additional Further Research

This could include:

- Further research regarding treatment following upon ED Triage, per age-group. Hardern et al [2003] for example researched frequency of condition as part of an investigation into Rapid Diagnosis. It would make interesting reading to profile conditions per age group, and / or subsequent treatment (for conditions) per same age group. **## &&**

- In a similar vain; Ceglowski et al [2005] clustered combinations of operating processes in their attempt to establish some commonality – and subsequently to rank these clusters of processes from most common cluster to least. Now, yet again (as with the immediately preceding bullet point), an age group parameter could be incorporated. **## &&**

- Cultural group related research – which may give a clearer picture regarding demand for ED services and propensities per cultural group. **##**

- Other "Seasonal" studies, for example the impact of various Sports "seasons" on demand for ED services – a more specific example being that of a Rugby season: investigating rugby-injury-related ED presentations per rugby-match-venue / closest-ED – and to do so for all affected Saturdays comprising a particular rugby "season". **##**

- How to incorporate official weather predictions in the short term – thinking along the lines of excessive weather conditions – such as extreme heat (asthma etc.), extreme cold (seasonal colds and pneumonia), extremely wet weather (car accidents). Research done by Marks et al [2001] and Kovats et al [2004] about the exacerbating impact of thunderstorm activity, as well as Kovats et al's investigation about the causal impact of hot weather and heat waves upon mortality. **##**

- A comparative study involving al least two Emergency Departments – one of which in an alpine locale / winter sport vicinity and another of which coastal. Matter-Walstra et al's [2006] research would be a good starting point for the alpine regional facility component. **##**

&& Both Hardern et al and Ceglowski et al found a handful of conditions / treatment-clusters (respectively) dominating proportionately

In each case Seasonality is already (else can be) included as yet another parameter

13. APPENDICES

APPENDICES

13.1 APPENDICES A: RESULTS: CHAPTER 7

APPENDICES A*

RESULTS
FOR
CHAPTER 7

APPENDIX **A1**
APPENDIX **A2**
APPENDIX **A3**
APPENDIX **A4**
APPENDIX **A5**
APPENDIX **A6**

13.1 APPENDIX A1: RESULTS: CHAPTER 7.1

RESULTS HELD IN THIS APPENDIX

S7.1.1	**S7.1.2**	**S7.1.3**	**S7.1.4**	**S7.1.5**	**S7.1.6**
S7.1.7	**S7.1.8**				

C7.1.1	**C7.1.2**	**C7.1.3**	**C7.1.4**	**C7.1.5**	**C7.1.6**
C7.1.7	**C7.1.8**	**C7.1.9**	**C7.1.10**	**C7.1.11**	**C7.1.12**
C7.1.13	**C7.1.14**	**C7.1.15**	**C7.1.16**	**C7.1.17**	**C7.1.18**
C7.1.19	**C7.1.20**	**C7.1.21**	**C7.1.22**	**C7.1.23**	**C7.1.24**
C7.1.25	**C7.1.26**	**C7.1.27**	**C7.1.28**	**C7.1.29**	**C7.1.30**

7. RESULTS: HOSP T VS HOSP W USING FULL DATA SETS

7.1 RESULTS: Using FULL DS: PER SEASON – DEMAND OVER 12 MONTHS

- **(Postulate1)** Per Season: To determine seasonal demand over 12 month periods running from July to June (inclusive).

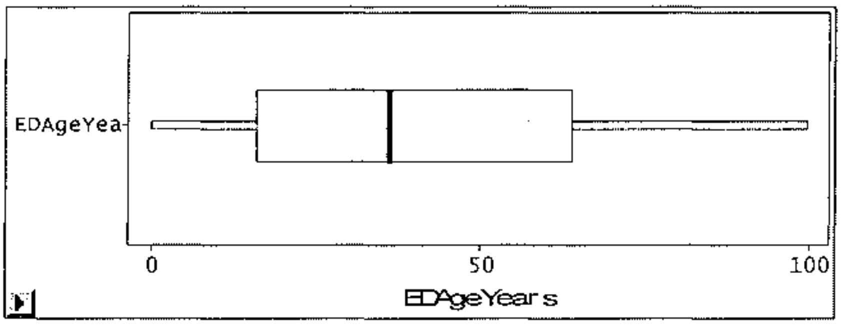
7.1.1 Using FULL DS: FINDINGS

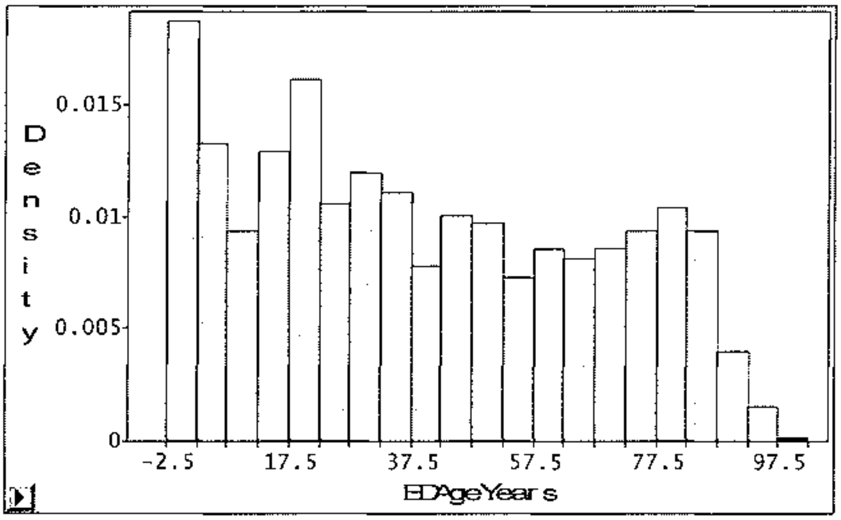
FINDINGS AND COMMENTS

Cf. Earlier Pages **76 - 86**

7.1.2 Using FULL DS: SAS RESULTS

EDAgeYears



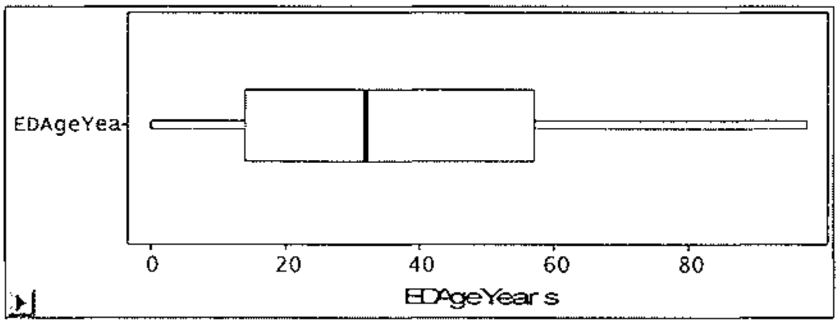


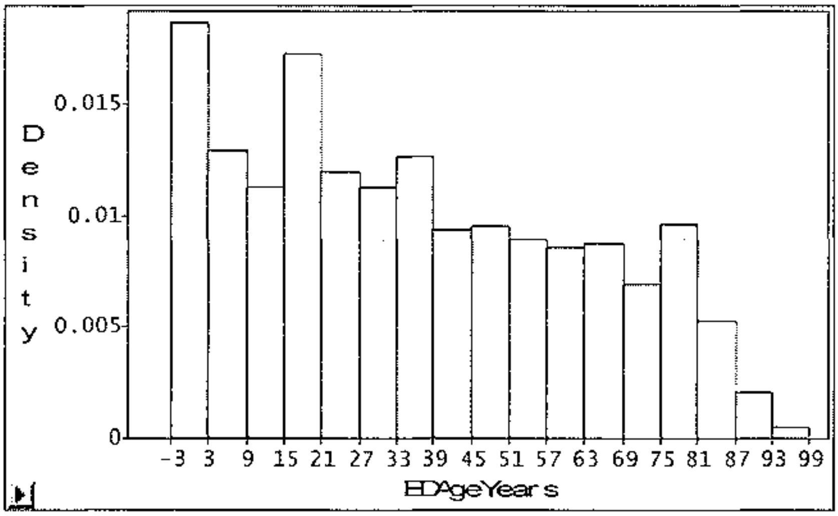
Moments			
N	2859.0000	Sum Wgts	2859.0000
Mean	39.4561	Sum	112805.000
Std Dev	27.7811	Variance	771.7877
Skewness	0.2545	Kurtosis	-1.1810
USS	6656615.00	CSS	2205769.24
CV	70.4101	Std Mean	0.5196

Quantiles			
100% Max	100.0000	99.0%	92.0000
75% Q3	64.0000	97.5%	88.0000
50% Med	36.0000	95.0%	85.0000
25% Q1	16.0000	90.0%	80.0000
0% Min	0	10.0%	3.0000
Range	100.0000	5.0%	1.0000
Q3-Q1	48.0000	2.5%	0
Mode	0	1.0%	0

S7.1.1 Box Plot & Distribution: Hospital T - JUL 2005 Age distribution of ED Presentations

EDAgeYears



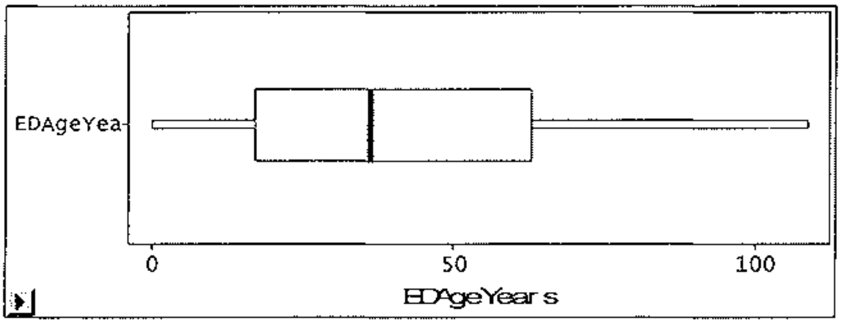


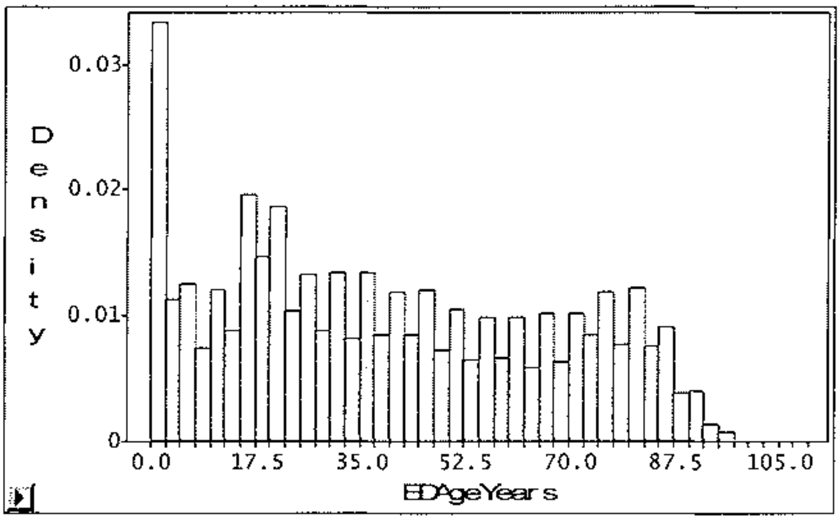
Moments			
N	1412.0000	Sum Wgts	1412.0000
Mean	35.5765	Sum	50234.0000
Std Dev	26.1466	Variance	683.6462
Skewness	0.3546	Kurtosis	-1.0289
USS	2751774.00	CSS	964624.739
CV	73.4941	Std Mean	0.6958

Quantiles			
100% Max	98.0000	99.0%	90.0000
75% Q3	57.0000	97.5%	85.0000
50% Med	32.0000	95.0%	80.0000
25% Q1	14.0000	90.0%	75.0000
0% Min	0	10.0%	2.0000
Range	98.0000	5.0%	0
Q3-Q1	43.0000	2.5%	0
Mode	0	1.0%	0

S7.1.2 Box Plot & Distribution: Hospital W - JUL 2005 Age distribution of ED Presentations

EDAgeYears



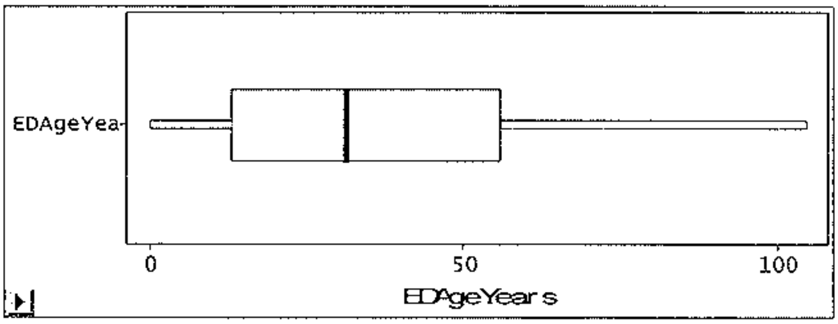


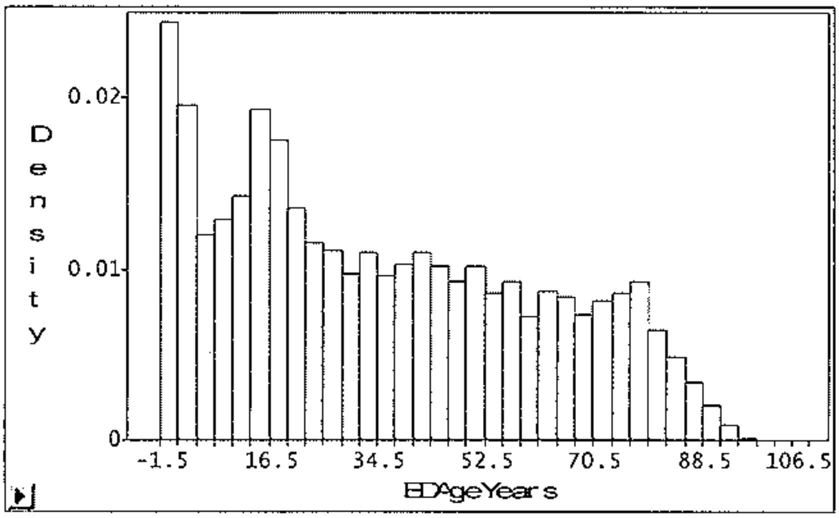
Moments			
N	35244.0000	Sum Wgts	35244.0000
Mean	39.4236	Sum	1389446.00
Std Dev	27.1256	Variance	735.7957
Skewness	0.2650	Kurtosis	-1.1481
USS	80708636.0	CSS	25931647.4
CV	68.8053	Std Mean	0.1445

Quantiles			
100% Max	109.0000	99.0%	91.0000
75% Q3	63.0000	97.5%	88.0000
50% Med	36.0000	95.0%	84.0000
25% Q1	17.0000	90.0%	79.0000
0% Min	0	10.0%	4.0000
Range	109.0000	5.0%	1.0000
Q3-Q1	46.0000	2.5%	0
Mode	0	1.0%	0

S7.1.3 Box Plot & Distribution: Hospital T – FULL Fin Year 2006 Age distribution of ED Presentations

EDAgeYears



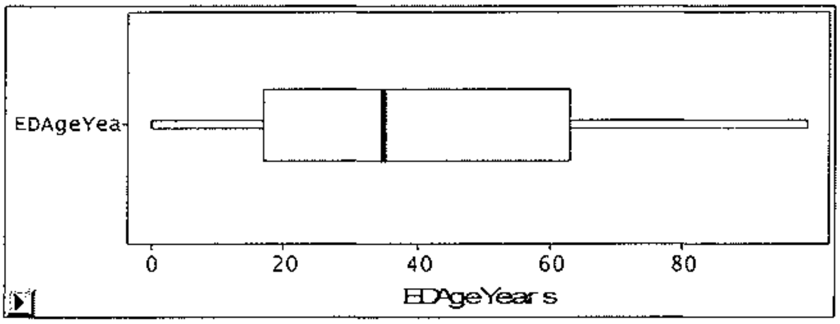


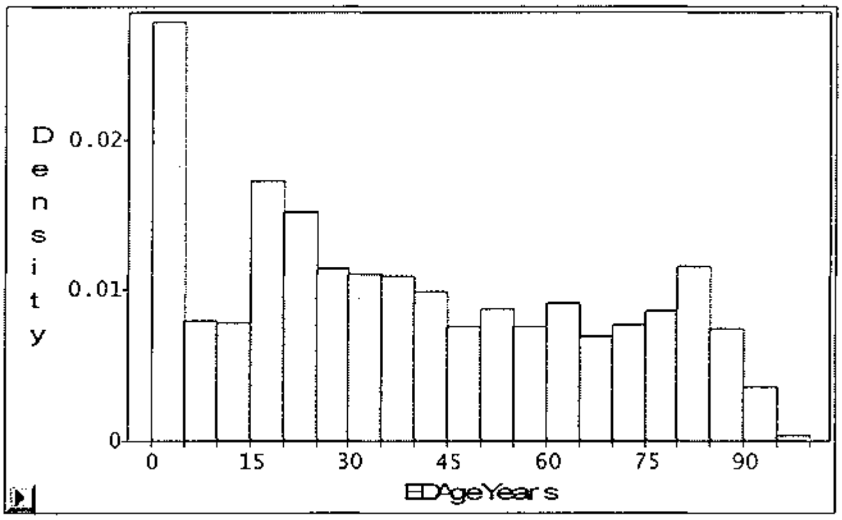
Moments			
N	18053.0000	Sum Wgts	18053.0000
Mean	35.3711	Sum	638555.000
Std Dev	25.9184	Variance	671.7629
Skewness	0.3773	Kurtosis	-1.0453
USS	34713075.0	CSS	12126663.4
CV	73.2755	Std Mean	0.1929

Quantiles			
100% Max	105.0000	99.0%	89.0000
75% Q3	56.0000	97.5%	85.0000
50% Med	31.0000	95.0%	80.0000
25% Q1	13.0000	90.0%	75.0000
0% Min	0	10.0%	3.0000
Range	105.0000	5.0%	1.0000
Q3-Q1	43.0000	2.5%	0
Mode	0	1.0%	0

S7.1.4 Box Plot & Distribution: Hospital W – FULL Fin Year 2006 Age distribution of ED Presentations

EDAgeYears



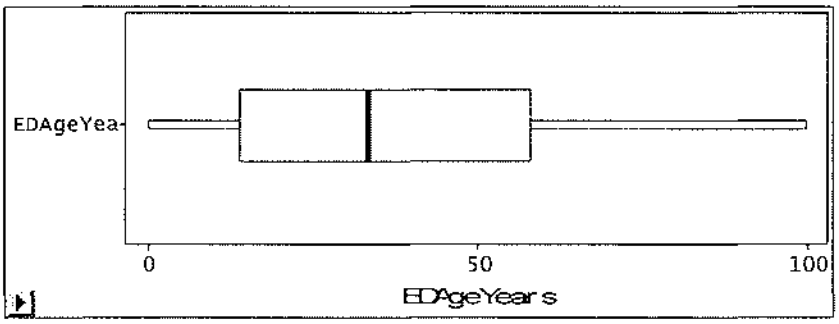


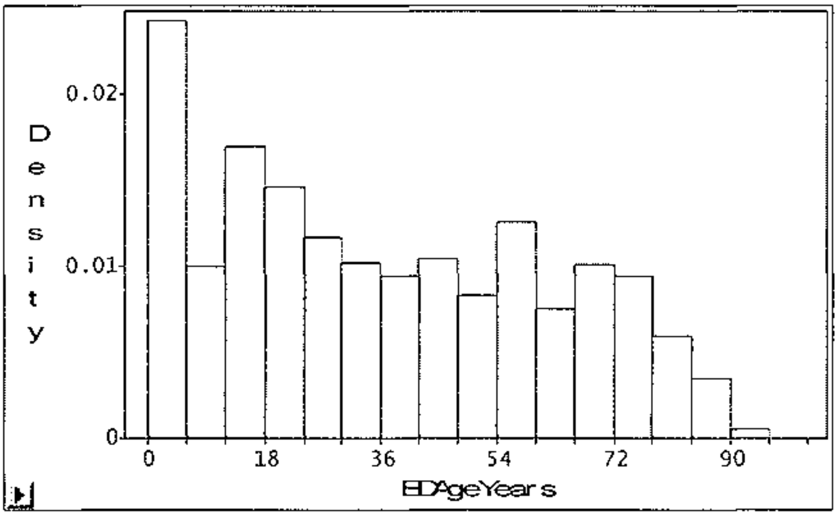
Moments			
N	3095.0000	Sum Wgts	3095.0000
Mean	39.0714	Sum	120926.000
Std Dev	27.8685	Variance	776.6513
Skewness	0.2820	Kurtosis	-1.1477
USS	7127708.00	CSS	2402959.22
CV	71.3270	Std Mean	0.5009

Quantiles			
100% Max	99.0000	99.0%	92.0000
75% Q3	63.0000	97.5%	89.0000
50% Med	35.0000	95.0%	85.0000
25% Q1	17.0000	90.0%	81.0000
0% Min	0	10.0%	2.0000
Range	99.0000	5.0%	1.0000
Q3-Q1	46.0000	2.5%	0
Mode	0	1.0%	0

S7.1.5 Box Plot & Distribution: Hospital T - JUL 2006 Age distribution of ED Presentations

EDAgeYears



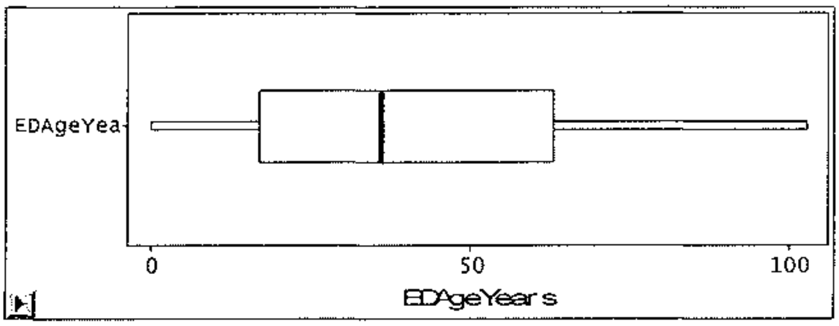


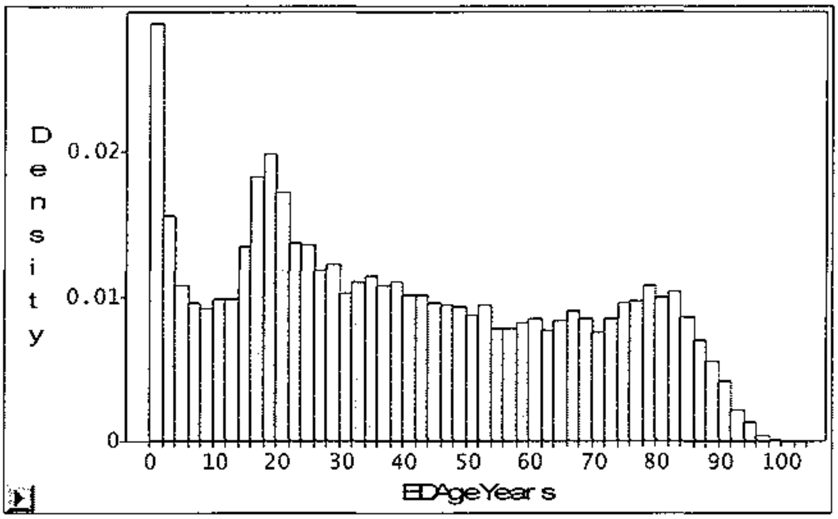
Moments			
N	1495.0000	Sum Wgts	1495.0000
Mean	36.2789	Sum	54237.0000
Std Dev	25.7133	Variance	661.1732
Skewness	0.2828	Kurtosis	-1.1274
USS	2955453.00	CSS	987792.686
CV	70.8766	Std Mean	0.6650

Quantiles			
100% Max	100.0000	99.0%	87.0000
75% Q3	58.0000	97.5%	84.0000
50% Med	33.0000	95.0%	79.0000
25% Q1	14.0000	90.0%	73.0000
0% Min	0	10.0%	2.0000
Range	100.0000	5.0%	1.0000
Q3-Q1	44.0000	2.5%	0
Mode	0	1.0%	0

S7.1.6 Box Plot & Distribution: Hospital W - JUL 2006 Age distribution of ED Presentations

EDAgeYears



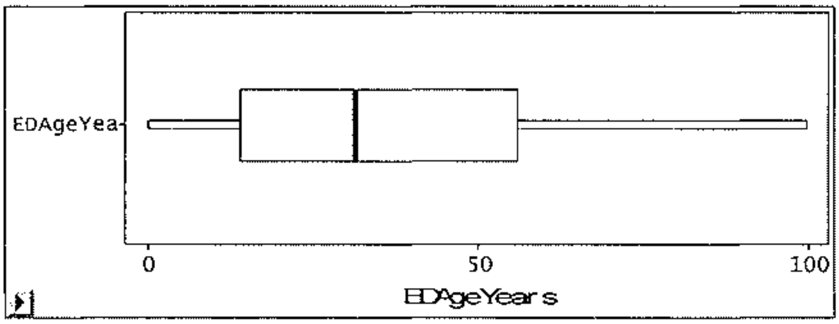


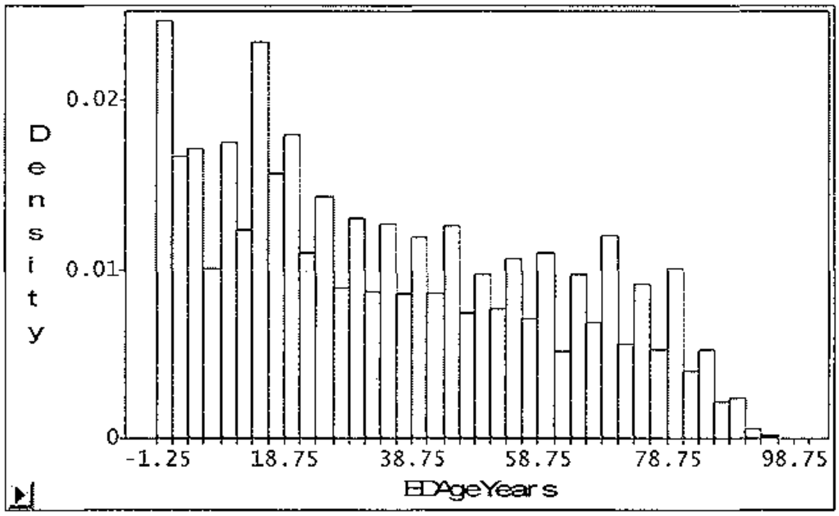
Moments			
N	36195.0000	Sum Wgts	36195.0000
Mean	39.7498	Sum	1438743.00
Std Dev	26.9392	Variance	725.7180
Skewness	0.2752	Kurtosis	-1.1337
USS	83456345.0	CSS	26266638.7
CV	67.7718	Std Mean	0.1416

Quantiles			
100% Max	103.0000	99.0%	91.0000
75% Q3	63.0000	97.5%	88.0000
50% Med	36.0000	95.0%	85.0000
25% Q1	17.0000	90.0%	80.0000
0% Min	0	10.0%	4.0000
Range	103.0000	5.0%	1.0000
Q3-Q1	46.0000	2.5%	0
Mode	0	1.0%	0

S7.1.7 Box Plot & Distribution: Hospital T – FULL Fin Year 2007 Age distribution of ED Presentations

EDAgeYears





Moments

N	18804.0000	Sum Wgts	18804.0000
Mean	35.1330	Sum	660641.000
Std Dev	25.4839	Variance	649.4283
Skewness	0.4021	Kurtosis	-1.0188
USS	35421503.0	CSS	12211200.4
CV	72.5355	Std Mean	0.1858

Quantiles

100% Max	100.0000	99.0%	88.0000
75% Q3	56.0000	97.5%	84.0000
50% Med	31.0000	95.0%	80.0000
25% Q1	14.0000	90.0%	73.0000
0% Min	0	10.0%	3.0000
Range	100.0000	5.0%	1.0000
Q3-Q1	42.0000	2.5%	0
Mode	1.0000	1.0%	0

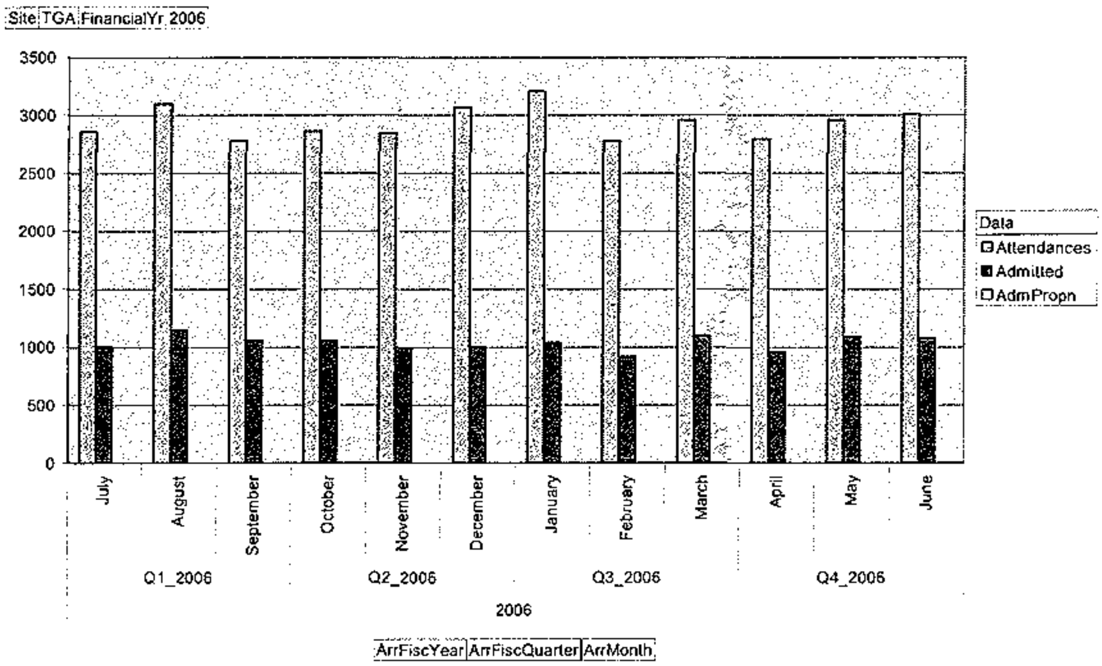
S7.1.8 Box Plot & Distribution: Hospital W – FULL Fin Year 2007 Age distribution of ED Presentations

7.1.3 Using FULL DS: CUBE RESULTS

Site	TGA
FinancialYr	2006

			Data		
ArrFiscYear	ArrFiscQuart	ArrMonth	Attendances	Admitted	AdmPropn
2006	Q1_2006	July	2859	1004	35.12%
		August	3097	1147	37.04%
		September	2780	1053	37.88%
	Q2_2006	October	2863	1053	36.78%
		November	2843	996	35.03%
		December	3068	1001	32.63%
	Q3_2006	January	3209	1041	32.44%
		February	2780	918	33.02%
		March	2957	1102	37.27%
	Q4_2006	April	2796	957	34.23%
		May	2960	1091	36.86%
		June	3013	1079	35.81%
2006 Total			35225	12442	35.32%

C7.1.1 Cube Pivot Table: Hospital T – Fin Yr 2006 Seasonal demand over 12 months

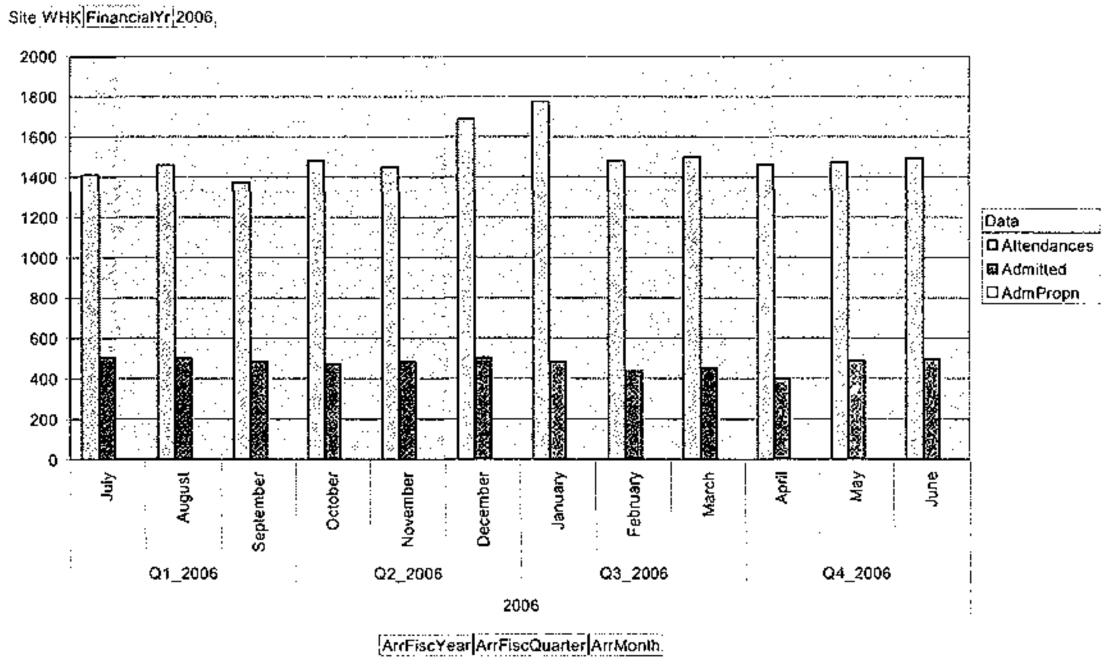


C7.1.2 Bar Chart: Hospital T – Fin Yr 2006 Seasonal demand over 12 months

Site	WHK
FinancialYr	2006

			Data		
ArrFiscYear	ArrFiscQuart	ArrMonth	Attendances	Admitted	AdmPropn
2006	Q1_2006	July	1412	508	35.98%
		August	1460	502	34.38%
		September	1373	484	35.25%
	Q2_2006	October	1480	472	31.89%
		November	1449	485	33.47%
		December	1688	505	29.92%
	Q3_2006	January	1776	485	27.31%
		February	1482	438	29.55%
		March	1501	454	30.25%
	Q4_2006	April	1462	402	27.50%
		May	1474	493	33.45%
		June	1494	496	33.20%
2006 Total			18051	5724	31.71%

C7.1.3 Cube Pivot Table: Hospital W – Fin Yr 2006 Seasonal demand over 12 months

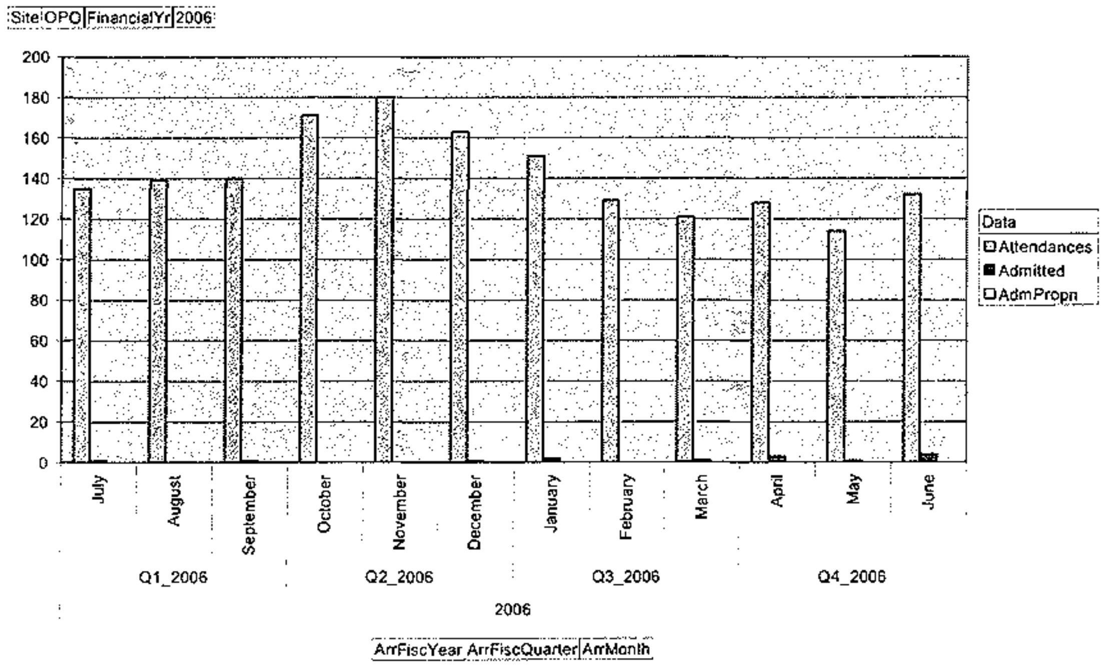


C7.1.4 Bar Chart: Hospital W – Fin Yr 2006 Seasonal demand over 12 months

Site	OPO
FinancialYr	2006

			Data		
ArrFiscYear	ArrFiscQuart	ArrMonth	Attendances	Admitted	AdmPropn
2006	Q1_2006	July	135	1	0.74%
		August	139	0	0.00%
		September	140	1	0.71%
	Q2_2006	October	171	0	0.00%
		November	180	0	0.00%
		December	163	1	0.61%
	Q3_2006	January	151	2	1.32%
		February	129	0	0.00%
		March	121	1	0.83%
	Q4_2006	April	128	3	2.34%
		May	114	1	0.88%
		June	132	4	3.03%
2006 Total			1703	14	0.82%

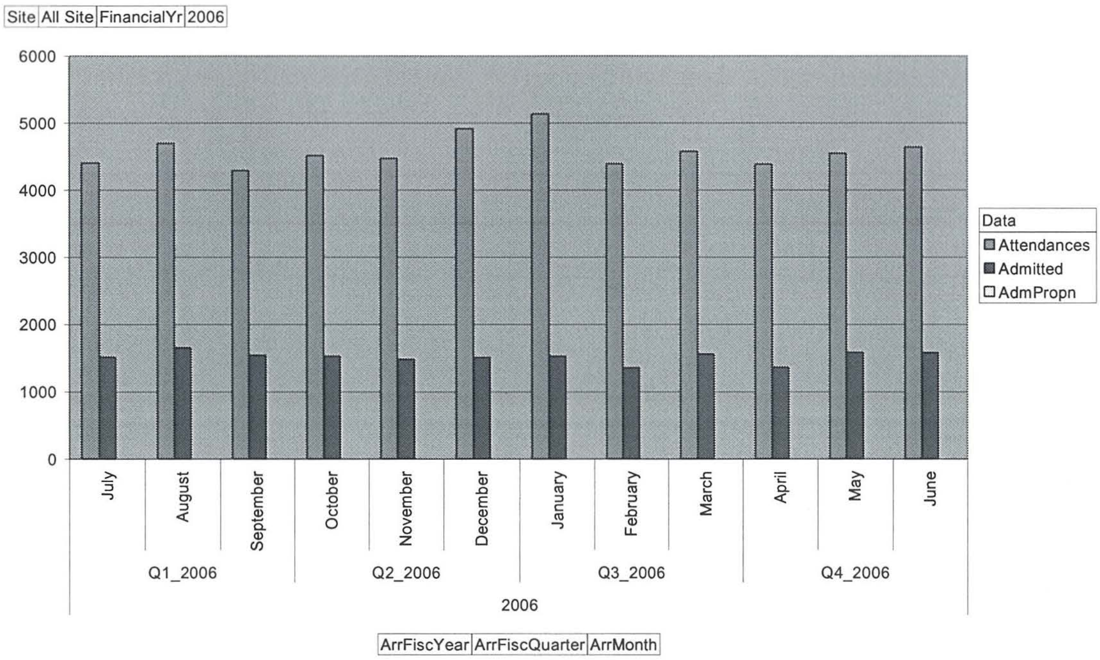
C7.1.5 Cube Pivot Table: Hospital O – Fin Yr 2006 Seasonal demand over 12 months



C7.1.6 Bar Chart: Hospital O – Fin Yr 2006 Seasonal demand over 12 months

Site	All Site				
FinancialYr	2006				
			Data		
ArrFiscYear	ArrFiscQuart	ArrMonth	Attendances	Admitted	AdmPropn
2006	Q1_2006	July	4406	1513	34.34%
		August	4696	1649	35.11%
		September	4293	1538	35.83%
	Q2_2006	October	4514	1525	33.78%
		November	4472	1481	33.12%
		December	4919	1507	30.64%
	Q3_2006	January	5136	1528	29.75%
		February	4391	1356	30.88%
		March	4579	1557	34.00%
	Q4_2006	April	4386	1362	31.05%
		May	4548	1585	34.85%
		June	4639	1579	34.04%
2006 Total			54979	18180	33.07%

C7.1.7 Cube Pivot Table: DHB District – Fin Yr 2006 Seasonal demand over 12 months

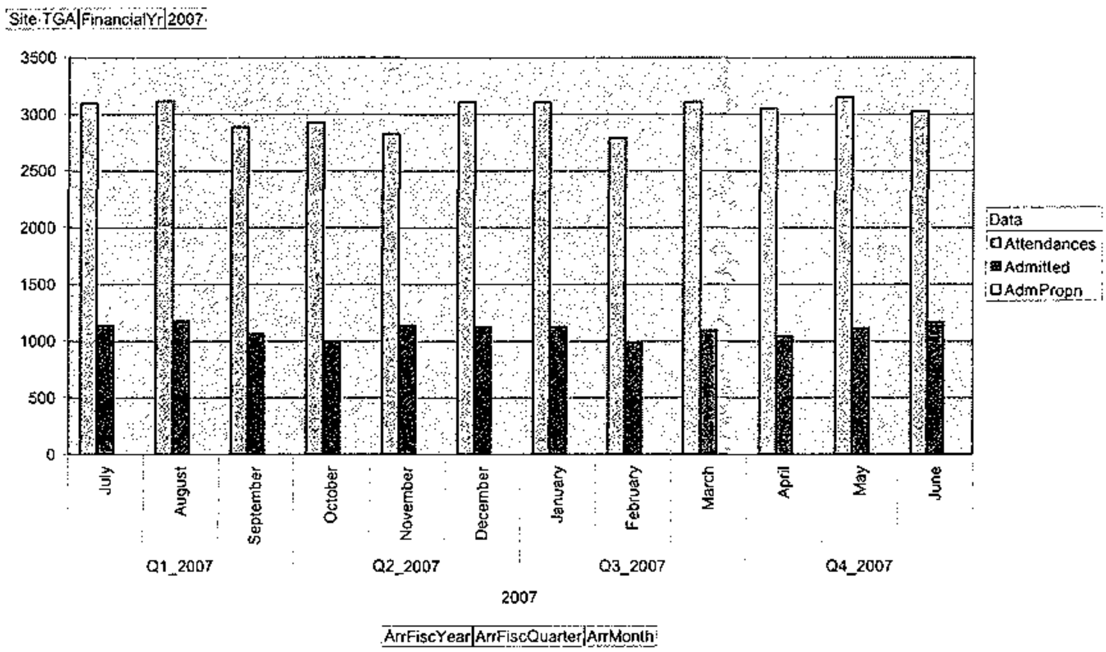


C7.1.8 Bar Chart: DHB District – Fin Yr 2006 Seasonal demand over 12 months

Site	TGA
FinancialYr	2007

			Data		
ArrFiscYear	ArrFiscQuart	ArrMonth	Attendances	Admitted	AdmPropn
2007	Q1_2007	July	3095	1141	36.87%
		August	3114	1175	37.73%
		September	2886	1062	36.80%
	Q2_2007	October	2922	998	34.15%
		November	2827	1141	40.36%
		December	3106	1122	36.12%
	Q3_2007	January	3103	1125	36.26%
		February	2791	987	35.36%
		March	3107	1091	35.11%
	Q4_2007	April	3056	1044	34.17%
		May	3148	1114	35.39%
		June	3025	1168	38.61%
2007 Total			36179	13168	36.40%

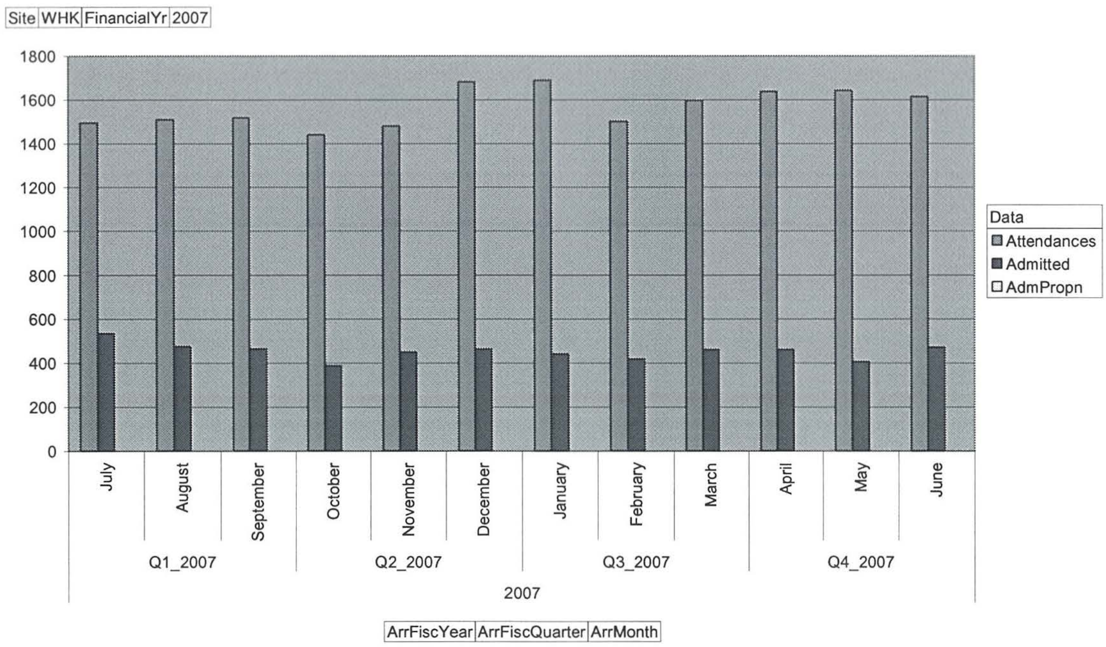
C7.1.9 Cube Pivot Table: Hospital T – Fin Yr 2007 Seasonal demand over 12 months



C7.1.10 Bar Chart: Hospital T – Fin Yr 2007 Seasonal demand over 12 months

Site	WHK				
FinancialYr	2007				
			Data		
ArrFiscYear	ArrFiscQuart	ArrMonth	Attendances	Admitted	AdmPropn
2007	Q1_2007	July	1495	533	35.65%
		August	1509	474	31.41%
		September	1518	463	30.50%
	Q2_2007	October	1440	386	26.81%
		November	1480	448	30.27%
		December	1681	462	27.48%
	Q3_2007	January	1688	440	26.07%
		February	1500	418	27.87%
		March	1596	461	28.88%
	Q4_2007	April	1638	461	28.14%
		May	1641	405	24.68%
		June	1614	471	29.18%
2007 Total			18800	5422	28.84%

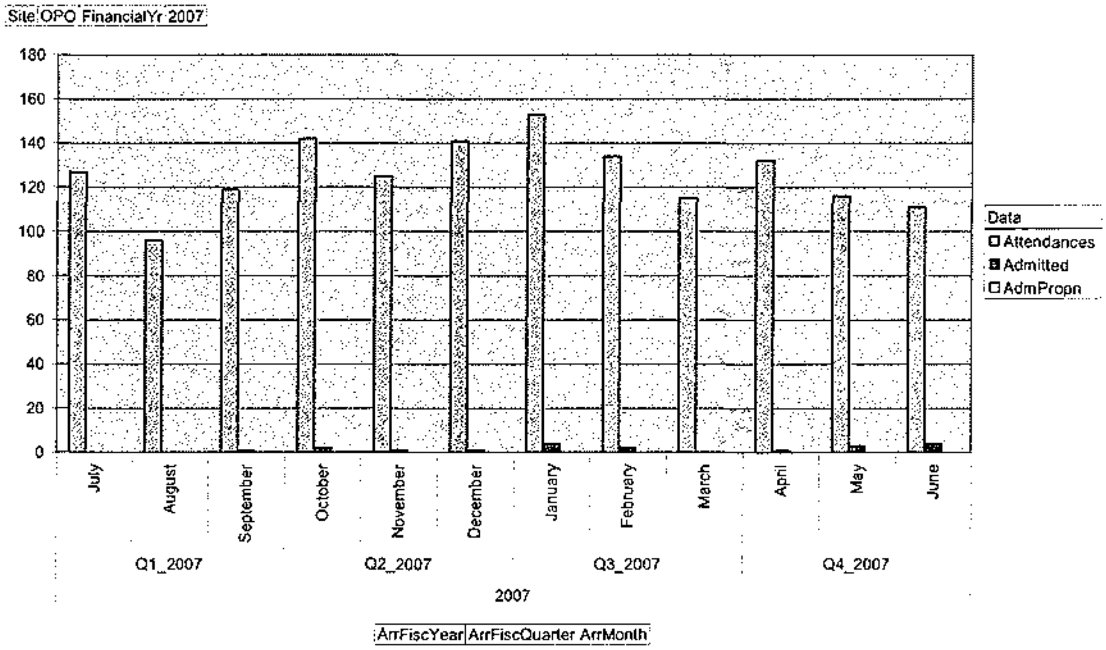
C7.1.11 Cube Pivot Table: Hospital W – Fin Yr 2007 Seasonal demand over 12 months



C7.1.12 Bar Chart: Hospital W – Fin Yr 2007 Seasonal demand over 12 months

Site	OPO				
FinancialYr	2007				
			Data		
ArrFiscYear	ArrFiscQuart	ArrMonth	Attendances	Admitted	AdmPropn
2007	Q1_2007	July	127	0	0.00%
		August	96	0	0.00%
		September	119	1	0.84%
	Q2_2007	October	142	2	1.41%
		November	125	1	0.80%
		December	141	1	0.71%
	Q3_2007	January	153	4	2.61%
		February	134	2	1.49%
		March	115	0	0.00%
	Q4_2007	April	132	1	0.76%
		May	116	3	2.59%
		June	111	4	3.60%
2007 Total			1511	19	1.26%

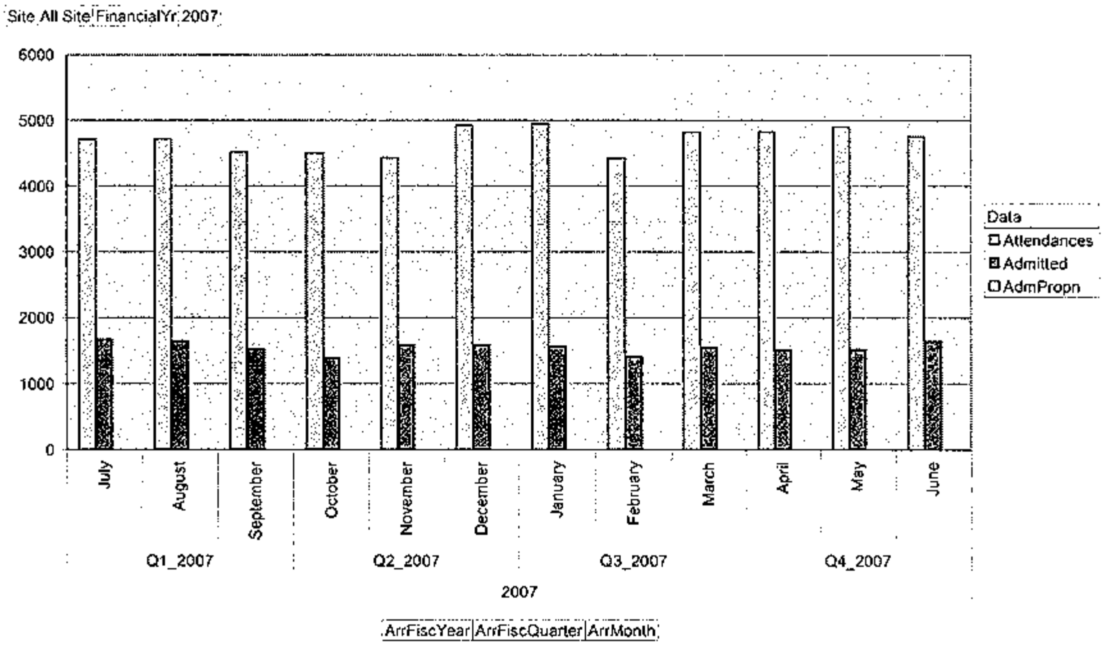
C7.1.13 Cube Pivot Table: Hospital O – Fin Yr 2007 Seasonal demand over 12 months



C7.1.14 Bar Chart: Hospital O – Fin Yr 2007 Seasonal demand over 12 months

Site	All Site				
FinancialYr	2007				
			Data		
ArrFiscYear	ArrFiscQuart	ArrMonth	Attendances	Admitted	AdmPropn
2007	Q1_2007	July	4717	1674	35.49%
		August	4719	1649	34.94%
		September	4523	1526	33.74%
	Q2_2007	October	4504	1386	30.77%
		November	4432	1590	35.88%
		December	4928	1585	32.16%
	Q3_2007	January	4944	1569	31.74%
		February	4425	1407	31.80%
		March	4818	1552	32.21%
	Q4_2007	April	4825	1506	31.21%
		May	4905	1522	31.03%
		June	4750	1643	34.59%
2007 Total			56490	18609	32.94%

C7.1.15 Cube Pivot Table: DHB District – Fin Yr 2007 Seasonal demand over 12 months



C7.1.16 Bar Chart: DHB District – Fin Yr 2007 Seasonal demand over 12 months

Site	TGA					
FinancialYr	2006					
			Data			% Growth Upon
ArrFiscYear	ArrFiscQuart	ArrMonth	Attendances	Admitted	AdmPropn	Lowest Month
2006	Q1_2006	July	2859	1004	35.12%	**2.84**
		August	3097	1147	37.04%	**11.40**
		September	2780	1053	37.88%	**0.00** $$
	Q2_2006	October	2863	1053	36.78%	**2.99**
		November	2843	996	35.03%	**2.27**
		December	3068	1001	32.63%	**10.36**
	Q3_2006	January	3209	1041	32.44%	**15.43**
		February	2780	918	33.02%	**0.00** $$
		March	2957	1102	37.27%	**6.37**
	Q4_2006	April	2796	957	34.23%	**0.58**
		May	2960	1091	36.86%	**6.47**
		June	3013	1079	35.81%	**8.38**
2006 Total			35225	12442	35.32%	**5.59**

(Legend: **$$** Sep and Feb precisely same Attendance aggregate)

C7.1.17 Cube Pivot Table: Hospital T – Fin Yr 2006 – Per Month % Growth above Base Month

Site	TGA					
FinancialYr	2007					
			Data			% Growth Upon
ArrFiscYear	ArrFiscQuart	ArrMonth	Attendances	Admitted	AdmPropn	Lowest Month
2007	Q1_2007	July	3095	1141	36.87%	**10.89**
		August	3114	1175	37.73%	**11.57**
		September	2886	1062	36.80%	**3.40**
	Q2_2007	October	2922	998	34.15%	**4.69**
		November	2827	1141	40.36%	**1.29**
		December	3106	1122	36.12%	**11.29**
	Q3_2007	January	3103	1125	36.26%	**11.18**
		February	2791	987	35.36%	**0.00**
		March	3107	1091	35.11%	**11.32**
	Q4_2007	April	3055	1044	34.17%	**9.46**
		May	3148	1114	35.39%	**12.79**
		June	3025	1168	38.61%	**8.38**
2007 Total			36179	13168	36.40%	**8.02**

C7.1.18 Cube Pivot Table: Hospital T – Fin Yr 2007 – Per Month % Growth above Base Month

Site	WHK
FinancialYr	2006

			Data			% Growth Upon
ArrFiscYear	ArrFiscQuart	ArrMonth	Attendances	Admitted	AdmPropn	Lowest Month
2006	Q1_2006	July	1412	508	35.98%	**2.84**
		August	1460	502	34.38%	**6.34**
		September	1373	484	35.25%	**0.00**
	Q2_2006	October	1480	472	31.89%	**7.79**
		November	1449	485	33.47%	**5.54**
		December	1688	505	29.92%	**22.94**
	Q3_2006	January	1776	485	27.31%	**29.35**
		February	1482	438	29.55%	**7.94**
		March	1501	454	30.25%	**9.32**
	Q4_2006	April	1462	402	27.50%	**6.48**
		May	1474	493	33.45%	**7.36**
		June	1494	496	33.20%	**8.81**
2006 Total			18051	5724	31.71%	**9.56**

C7.1.19 Cube Pivot Table: Hospital W – Fin Yr 2006 – Per Month % Growth above Base Month

Site	WHK
FinancialYr	2007

			Data			% Growth Upon
ArrFiscYear	ArrFiscQuart	ArrMonth	Attendances	Admitted	AdmPropn	Lowest Month
2007	Q1_2007	July	1495	533	35.65%	**3.82**
		August	1509	474	31.41%	**4.79**
		September	1518	463	30.50%	**5.42**
	Q2_2007	October	1440	386	26.81%	**0.00**
		November	1480	448	30.27%	**2.78**
		December	1681	462	27.48%	**16.74**
	Q3_2007	January	1688	440	26.07%	**17.22**
		February	1500	418	27.87%	**4.17**
		March	1596	461	28.88%	**10.83**
	Q4_2007	April	1638	461	28.14%	**13.75**
		May	1641	405	24.68%	**13.96**
		June	1614	471	29.18%	**12.08**
2007 Total			18800	5422	28.84%	**8.80**

C7.1.20 Cube Pivot Table: Hospital W – Fin Yr 2007 – Per Month % Growth above Base Month

Site	OPO
FinancialYr	2006

			Data			% Growth Upon
ArrFiscYear	ArrFiscQuart	ArrMonth	Attendances	Admitted	AdmPropn	Lowest Month
2006	Q1_2006	July	135	1	0.74%	**18.42**
		August	139	0	0.00%	**21.93**
		September	140	1	0.71%	**22.81**
	Q2_2006	October	171	0	0.00%	**50.00**
		November	180	0	0.00%	**57.89**
		December	163	1	0.61%	**42.98**
	Q3_2006	January	151	2	1.32%	**32.46**
		February	129	0	0.00%	**13.16**
		March	121	1	0.83%	**6.14**
	Q4_2006	April	128	3	2.34%	**12.28**
		May	114	1	0.88%	**0.00**
		June	132	4	3.03%	**15.79**
2006 Total			1703	14	0.82%	**24.49**

C7.1.21 Cube Pivot Table: Hospital O – Fin Yr 2006 – Per Month % Growth above Base Month

Site	OPO
FinancialYr	2007

			Data			% Growth Upon
ArrFiscYear	ArrFiscQuart	ArrMonth	Attendances	Admitted	AdmPropn	Lowest Month
2007	Q1_2007	July	127	0	0.00%	**32.29**
		August	96	0	0.00%	**0.00**
		September	119	1	0.84%	**23.96**
	Q2_2007	October	142	2	1.41%	**47.92**
		November	125	1	0.80%	**30.21**
		December	141	1	0.71%	**46.88**
	Q3_2007	January	153	4	2.61%	**59.38**
		February	134	2	1.49%	**39.58**
		March	115	0	0.00%	**19.79**
	Q4_2007	April	132	1	0.76%	**37.50**
		May	116	3	2.59%	**20.83**
		June	111	4	3.60%	**15.63**
2007 Total			1511	19	1.26%	**31.16**

C7.1.22 Cube Pivot Table: Hospital O – Fin Yr 2007 – Per Month % Growth above Base Month

Site	All Site					
FinancialYr	2006					
			Data			% Growth Upon
ArrFiscYear	ArrFiscQuart	ArrMonth	Attendances	Admitted	AdmPropn	Lowest Month
2006	Q1_2006	July	4406	1513	34.34%	**2.63**
		August	4696	1649	35.11%	**9.39**
		September	4293	1538	35.83%	**0.00**
	Q2_2006	October	4514	1525	33.78%	**5.15**
		November	4472	1481	33.12%	**4.17**
		December	4919	1507	30.64%	**14.58**
	Q3_2006	January	5136	1528	29.75%	**19.64**
		February	4391	1356	30.88%	**2.28**
		March	4579	1557	34.00%	**6.66**
	Q4_2006	April	4386	1362	31.05%	**2.17**
		May	4548	1585	34.85%	**5.94**
		June	4639	1579	34.04%	**8.06**
2006 Total			54979	18180	33.07%	**6.72**

C7.1.23 Cube Pivot Table: DHB District – Fin Yr 2006 – Per Month % Growth above Base Month

Site	All Site					
FinancialYr	2007					
			Data			% Growth Upon
ArrFiscYear	ArrFiscQuart	ArrMonth	Attendances	Admitted	AdmPropn	Lowest Month
2007	Q1_2007	July	4717	1674	35.49%	**6.60**
		August	4719	1649	34.94%	**6.64**
		September	4523	1526	33.74%	**2.21**
	Q2_2007	October	4504	1386	30.77%	**1.79**
		November	4432	1590	35.88%	**0.16**
		December	4928	1585	32.16%	**11.37**
	Q3_2007	January	4944	1569	31.74%	**11.73**
		February	4425	1407	31.80%	**0.00**
		March	4818	1552	32.21%	**8.88**
	Q4_2007	April	4825	1506	31.21%	**9.04**
		May	4905	1522	31.03%	**10.85**
		June	4750	1643	34.59%	**7.34**
2007 Total			56490	18609	32.94%	**6.38**

C7.1.24 Cube Pivot Table: DHB District – Fin Yr 2007 – Per Month % Growth above Base Month

FinancialYr	2006

Attendances			Site				Proportions			
ArrFiscYear	ArrFiscQ	ArrMonth	OPO	TGA	WHK	Grand Total	OPO	TGA	WHK	BOP DHB
2006	Q1_2006	July	135	2859	1412	4406	7.93	8.12	7.82	8.01
		August	139	3097	1460	4696	8.16	8.79	8.09	8.54
		September	140	2780	1373	4293	8.22	7.89	7.61	7.81
	Q2_2006	October	171	2863	1480	4514	10.04	8.13	8.20	8.21
		November	180	2843	1449	4472	10.57	8.07	8.03	8.13
		December	163	3068	1688	4919	9.57	8.71	9.35	8.95
	Q3_2006	January	151	3209	1776	5136	8.87	9.11	9.84	9.34
		February	129	2780	1482	4391	7.57	7.89	8.21	7.99
		March	121	2957	1501	4579	7.11	8.39	8.32	8.33
	Q4_2006	April	128	2796	1462	4386	7.52	7.94	8.10	7.98
		May	114	2960	1474	4548	6.69	8.40	8.17	8.27
		June	132	3013	1494	4639	7.75	8.55	8.28	8.44
Grand Total			1703	35225	18051	54979	100.00	100.00	100.00	100.00

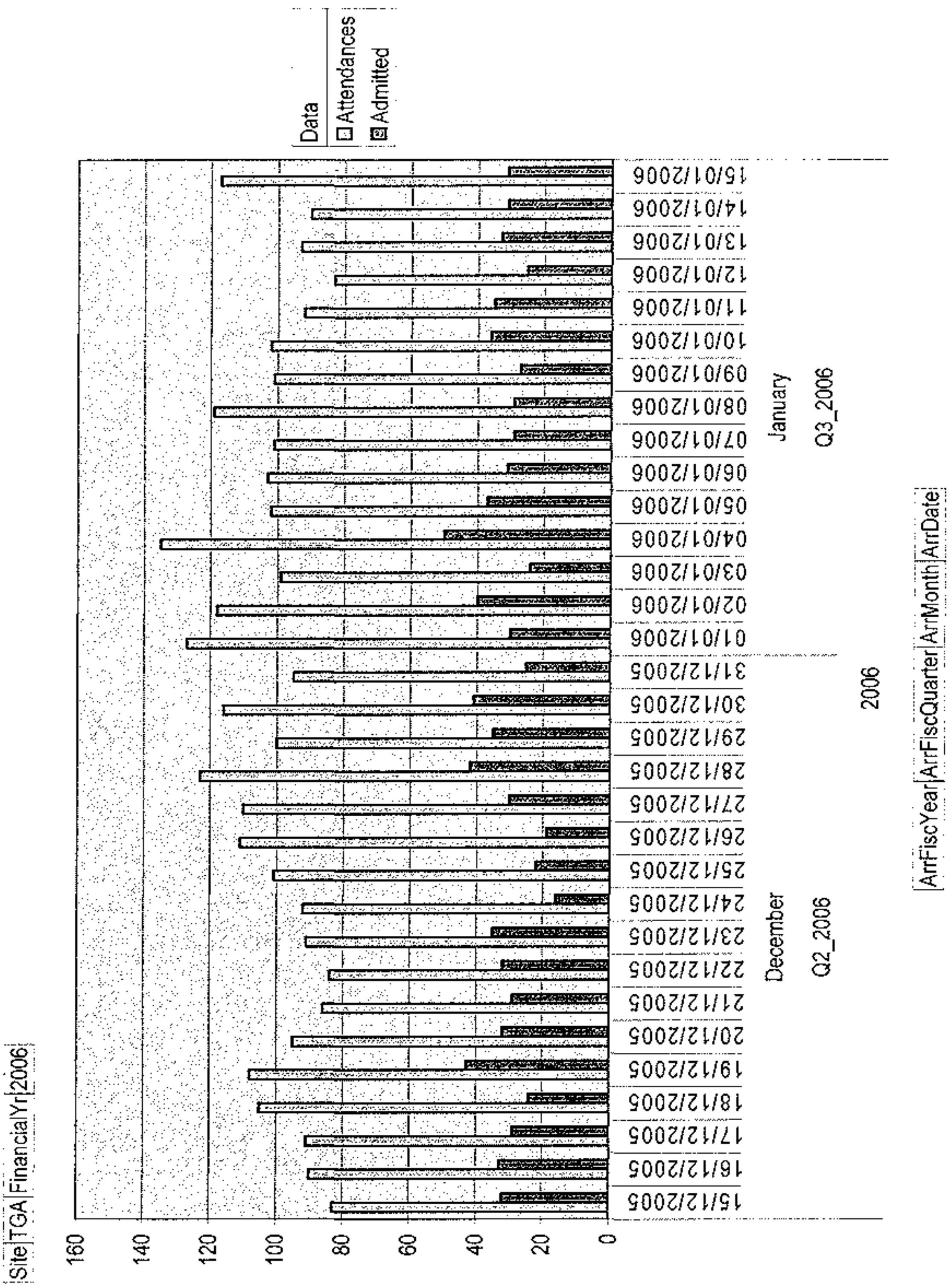
Colour Code Legend: GREY=Highest BLUE=2nd Highest BEIGH=3rd Highest YELLOW=4th Highest

C7.1.25 Cube Pivot Table: OPO, TGA, WHK and DHB Combo for Fin Yr 2006
Generated Associated Table: OPO, TGA, WHK and DHB Proportions
(In case of Black & White print: Shades of Grey, from Darkest to Lightest, equates to Highest to Lowest)

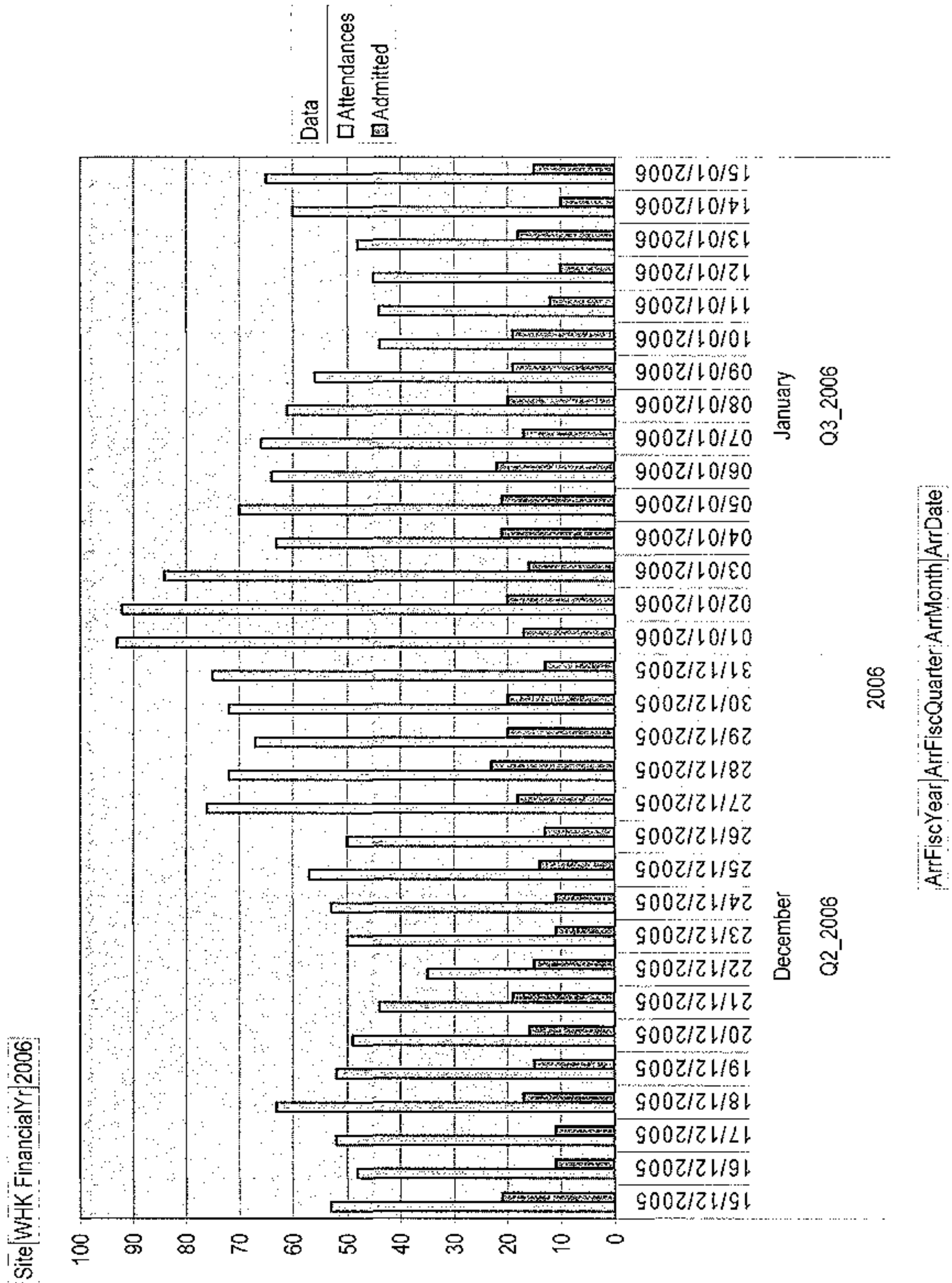
C7.1.26 Cube Pivot Table: OPO, TGA, WHK and DHB Combo for Fin Yr 2007
Generated Associated Table: OPO, TGA, WHK and DHB Proportions
(In case of Black & White print: Shades of Grey, from Darkest to Lightest, equates to Highest to Lowest)

FinancialYr	2007											
Attendances			Site				Proportions			
ArrFiscYear	ArrFiscQ	ArrMonth	OPO	TGA	WHK	Grand Total	OPO	TGA	WHK	BOP DHB
2007	Q1_2007	July	127	3095	1495	4717	8.41	8.55	7.95	8.35
		August	96	3114	1509	4719	6.35	8.61	8.03	8.35
		September	119	2886	1518	4523	7.88	7.98	8.07	8.01
	Q2_2007	October	142	2922	1440	4504	9.40	8.08	7.66	7.97
		November	125	2827	1480	4432	8.27	7.81	7.87	7.85
		December	141	3106	1681	4928	9.33	8.59	8.94	8.72
	Q3_2007	January	153	3103	1688	4944	10.13	8.58	8.98	8.75
		February	134	2791	1500	4425	8.87	7.71	7.98	7.83
		March	115	3107	1596	4818	7.61	8.59	8.49	8.53
	Q4_2007	April	132	3055	1638	4825	8.74	8.44	8.71	8.54
		May	116	3148	1641	4905	7.68	8.70	8.73	8.68
		June	111	3025	1614	4750	7.35	8.36	8.59	8.41
Grand Total			1511	36179	18800	56490	100.00	100.00	100.00	100.00

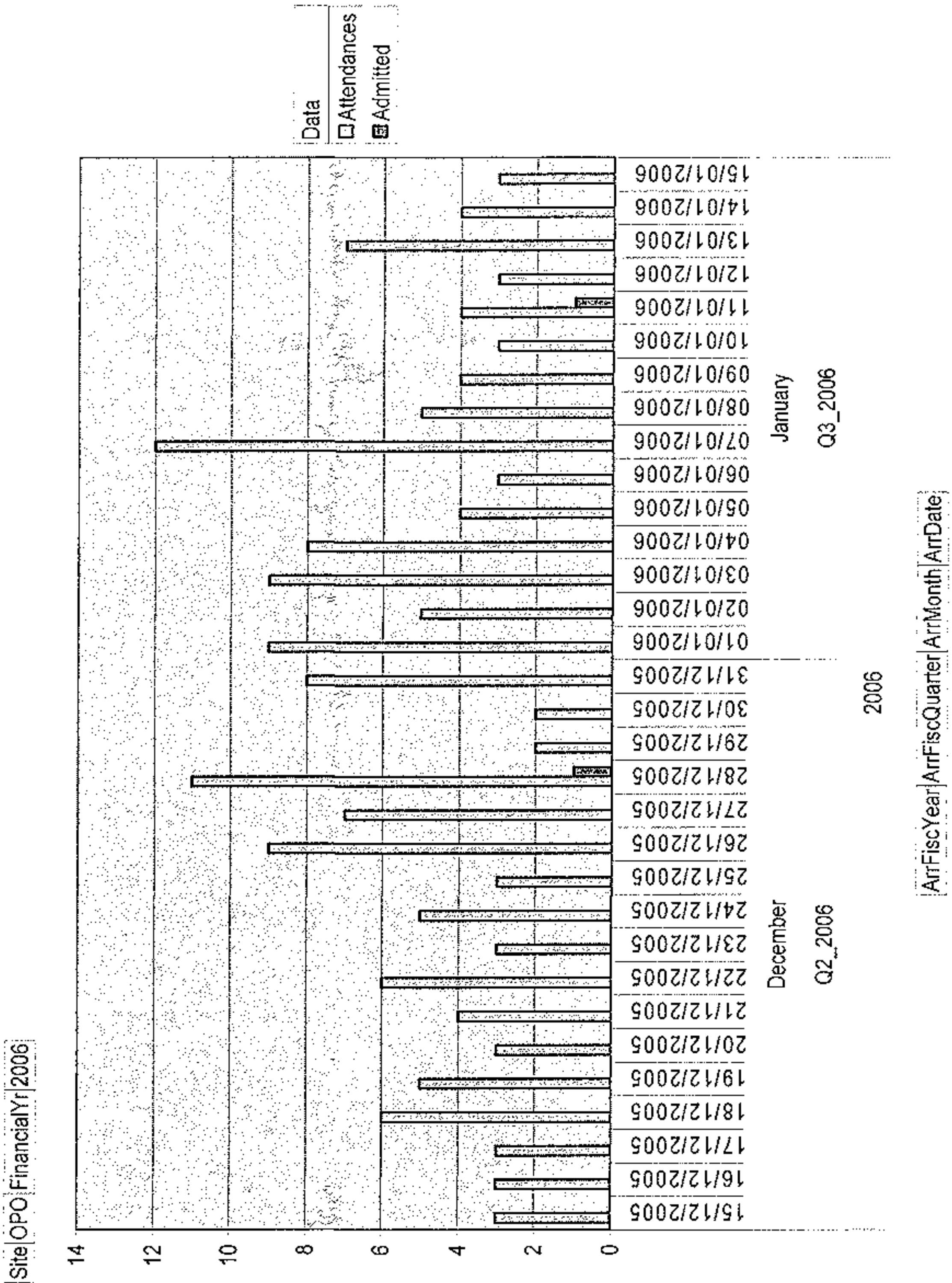
Colour Code Legend: GREY=Highest BLUE=2nd Highest BEIGH=3rd Highest YELLOW=4th Highest



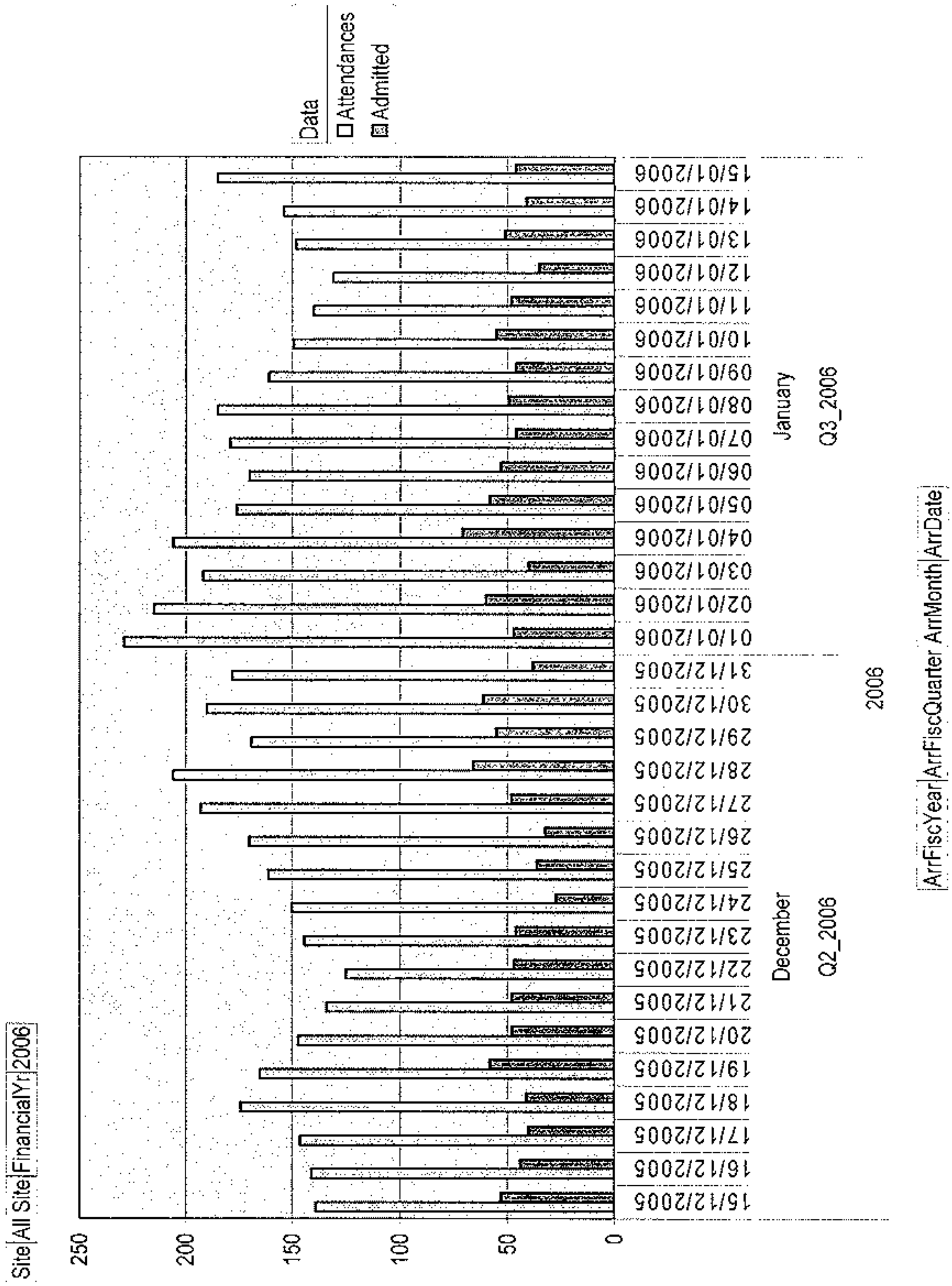
C7.1.27 Bar Chart: Hosp T – Fin Yr 2006 Seasonal demand over Christmas / New Year (Dec 15th 2005 – Jan 15th 2006)



C7.1.28 Bar Chart: Hosp W – Fin Yr 2006 Seasonal demand over Christmas / New Year (Dec 15th 2005 – Jan 15th 2006)



C7.1.29 <u>Bar Chart</u>: Hosp O – Fin Yr 2006 Seasonal demand over Christmas / New Year (Dec 15th 2005 – Jan 15th 2006)



C7.1.30 Bar Chart: BOP DHB – Fin Yr 2006 Seasonal demand over Christmas / New Year (Dec 15th 2005 – Jan 15th 2006)

13.1 APPENDIX A2: RESULTS: CHAPTER 7.2

RESULTS HELD IN THIS APPENDIX

C7.2.1	C7.2.2	C7.2.3	C7.2.4	C7.2.5	C7.2.6
C7.2.7	C7.2.8	C7.2.9	C7.2.10	C7.2.11	C7.2.12
C7.2.13	C7.2.14	C7.2.15	C7.2.16	C7.2.17	C7.2.18
C7.2.19	C7.2.20	C7.2.21	C7.2.22	C7.2.23	C7.2.24
C7.2.25	C7.2.26	C7.2.27	C7.2.28	C7.2.29	C7.2.30
C7.2.31	C7.2.32	C7.2.33	C7.2.34	C7.2.35	C7.2.36

7.2. <u>RESULTS</u>: Using FULL DS: <u>PER SEASON – DEMAND PER DAY OF WEEK</u>

- **(Postulate2)** Per Season: To determine proportions of demand for ED services **per day of week**

7.2.1 Using FULL DS: FINDINGS

FINDINGS AND COMMENTS

Cf. Earlier Pages **87 - 92**

7.2.2 Using FULL DS: CUBE RESULTS

CUBES RESULTS – HOSP T ED & HOSP W ED - FINANCIAL YEAR 2006

Site	TGA
FinancialYr	2006

Attendances			ArrWeekDay							
ArrFiscYea	ArrFiscQu	ArrMonth	Sunday	Monday	Tuesday	Wednesd	Thursday	Friday	Saturday	Grand Total
2006	Q1_2006	July	486	368	355	352	388	453	457	2859
		August	404	512	476	500	403	412	390	3097
		Septemb	406	385	355	374	400	473	387	2780
	Q2_2006	October	474	503	397	345	379	366	399	2863
		Novembe	412	383	486	472	352	359	379	2843
		Decembe	432	434	388	399	443	502	470	3068
	Q3_2006	January	598	570	517	421	341	393	369	3209
		February	416	399	408	405	402	370	380	2780
		March	401	434	376	437	454	493	362	2957
	Q4_2006	April	486	403	388	354	355	354	456	2796
		May	402	520	461	452	387	353	385	2960
		June	400	436	406	395	482	488	406	3013
2006 Total			5317	5347	5013	4906	4786	5016	4840	35225

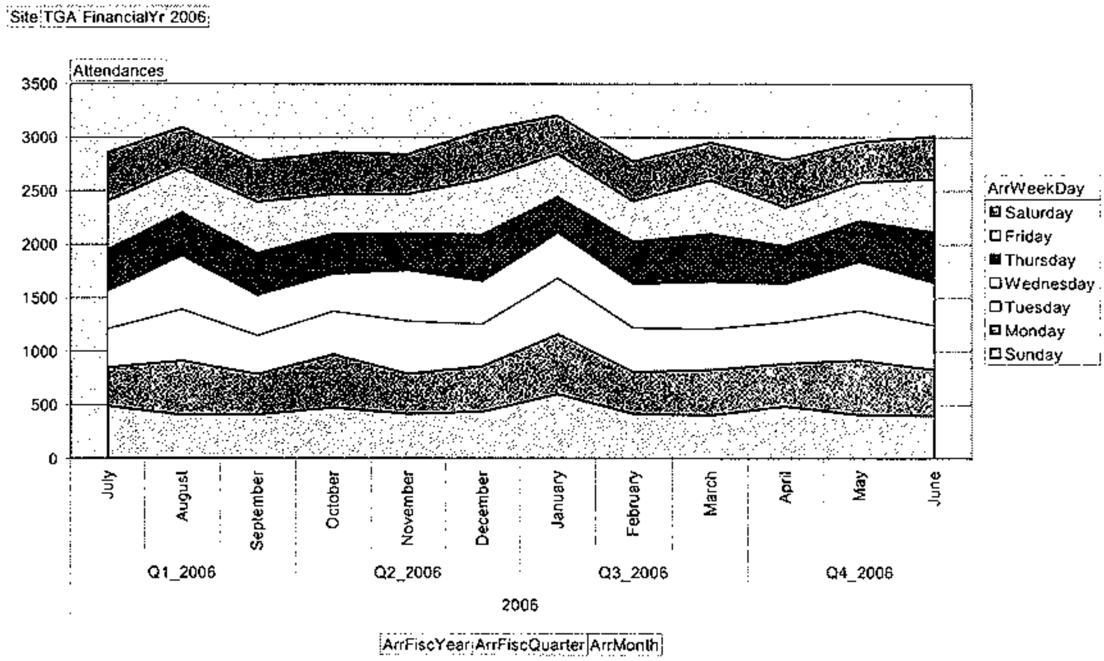
C7.2.1 Cube Pivot Table: Hosp T – FULL Fin Year 2006 Presentations per DOW per Annum

Site	WHK
FinancialYr	2006

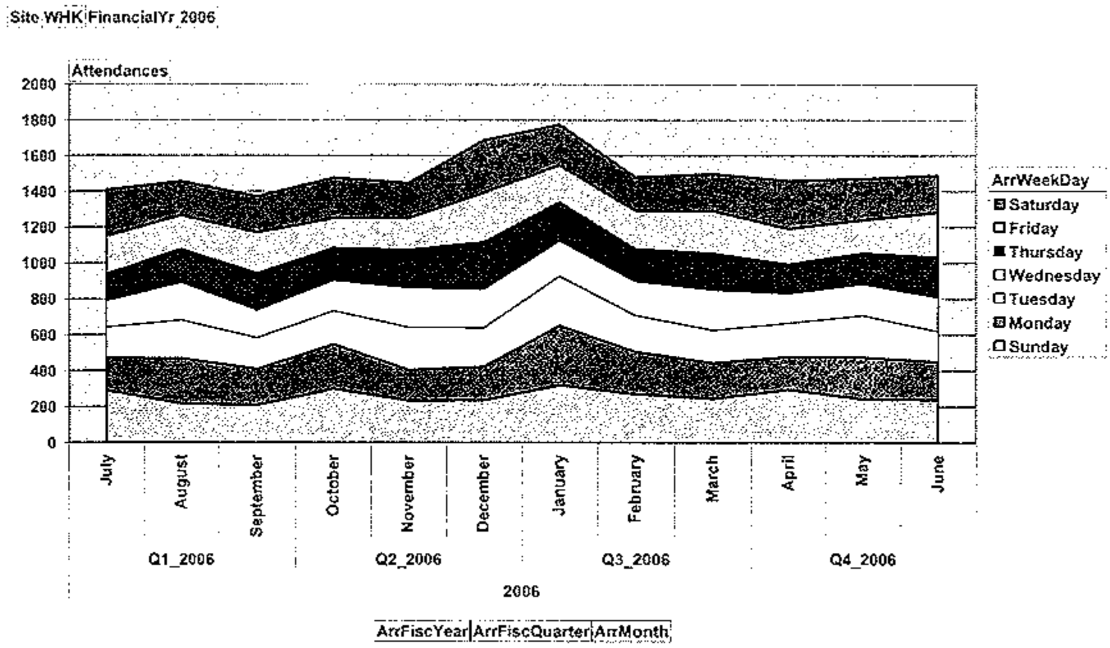
Attendances			ArrWeekDay							
ArrFiscYea	ArrFiscQu	ArrMonth	Sunday	Monday	Tuesday	Wednesd	Thursday	Friday	Saturday	Grand Total
2006	Q1_2006	July	289	185	168	146	152	209	263	1412
		August	215	256	211	208	188	186	196	1460
		Septemb	207	206	170	153	207	225	205	1373
	Q2_2006	October	298	253	181	171	182	163	232	1480
		Novembe	232	176	234	220	213	173	201	1449
		Decembe	234	191	214	214	265	273	297	1688
	Q3_2006	January	318	336	272	197	217	205	231	1776
		February	270	240	198	189	183	212	190	1482
		March	242	204	180	223	206	235	211	1501
	Q4_2006	April	294	187	185	163	166	193	274	1462
		May	240	239	228	175	176	179	237	1474
		June	238	213	168	187	229	246	213	1494
2006 Total			3077	2686	2409	2246	2384	2499	2750	18051

C7.2.2 Cube Pivot Table: Hosp W – FULL Fin Year 2006 Presentations per DOW per Annum

HOSP T ED & HOSP W ED – COMPOUNDED SEVEN DAYS OF WEEK COMPARED - FIN YEAR 2006

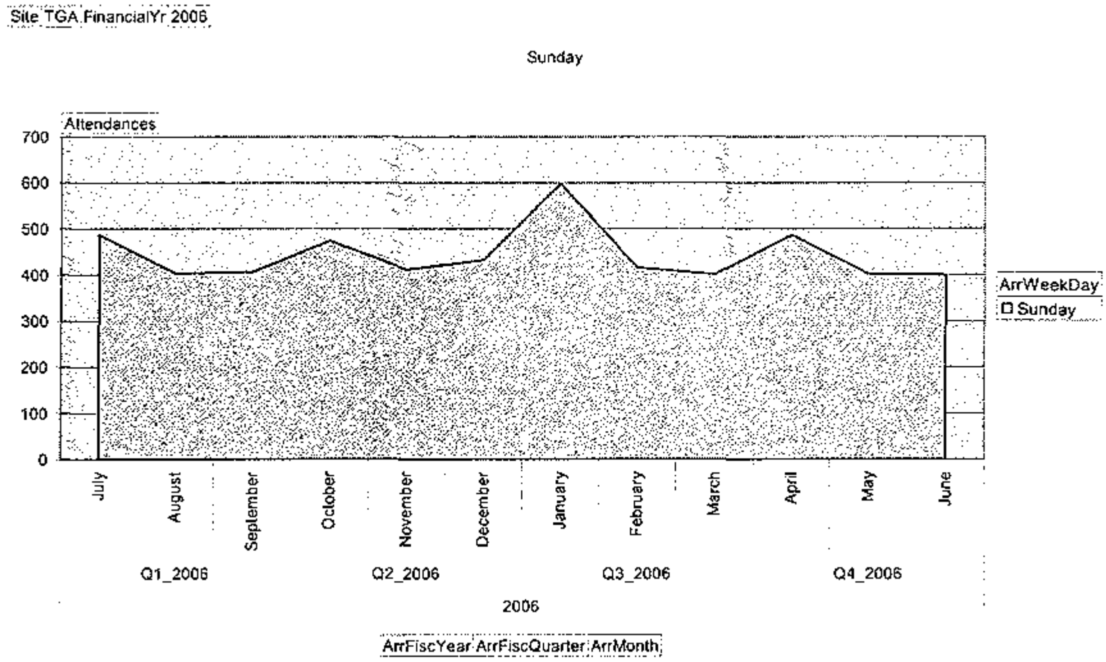


C7.2.3 Graph: Hosp T – FULL Fin Year 2006 – COMPOUNDED Presentations per DOW per Annum

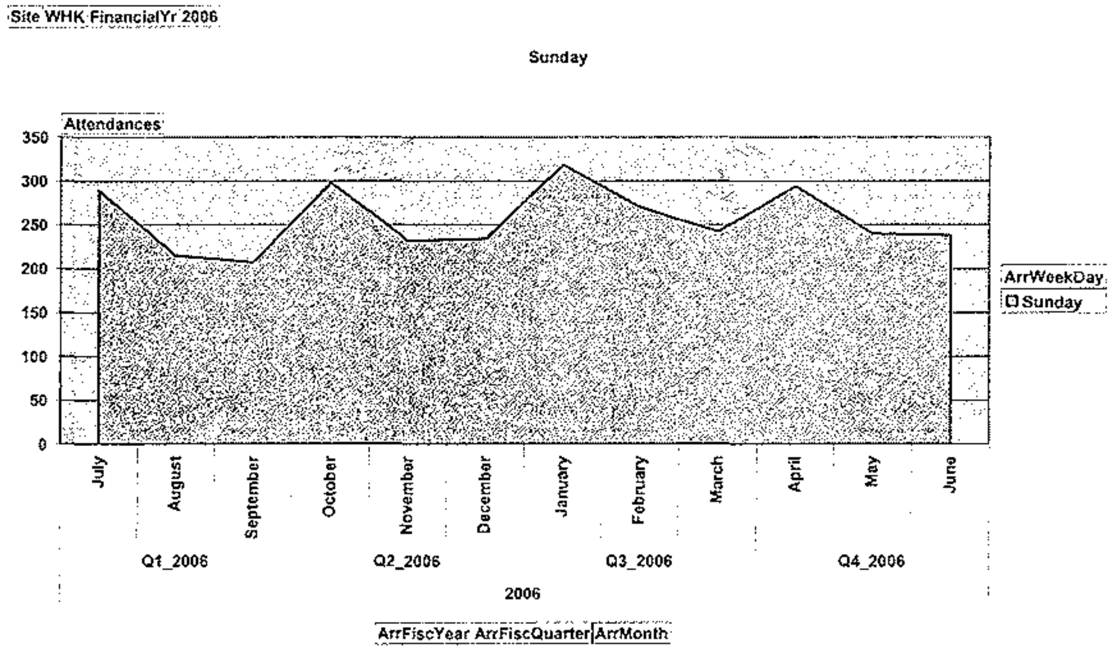


C7.2.4 Graph: Hosp W – FULL Fin Year 2006 – COMPOUNDED Presentations per DOW per Annum

HOSP T ED & HOSP W ED - SUNDAYS COMPARED - FIN YEAR 2006

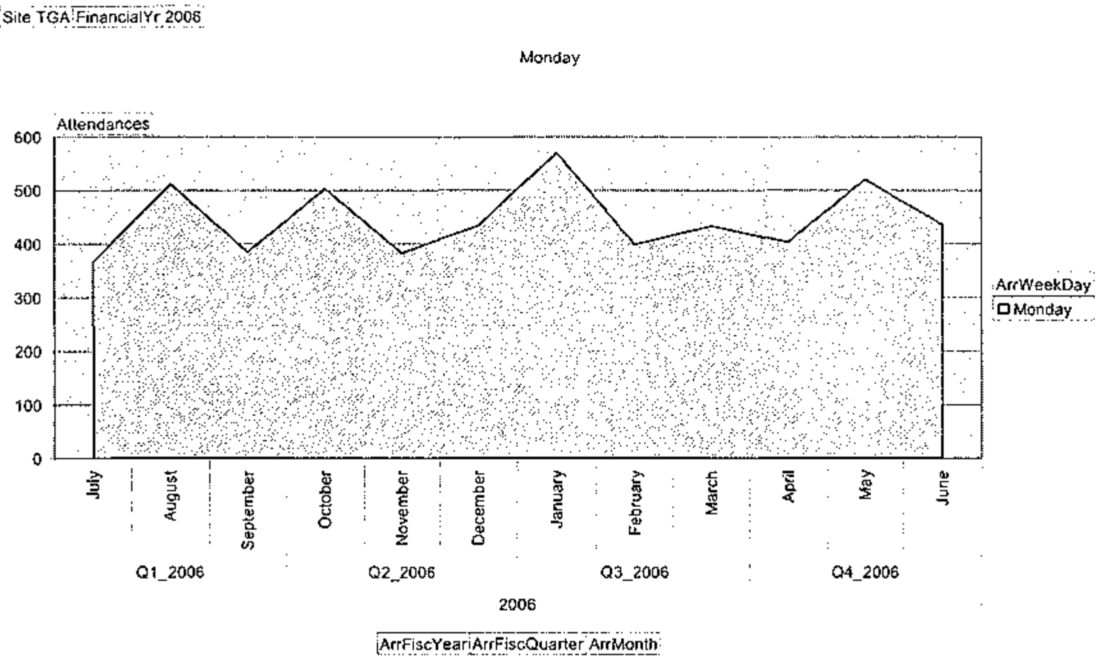


C7.2.5 Graph: Hosp T – FULL Fin Year 2006 – SUNDAY Presentations per Annum

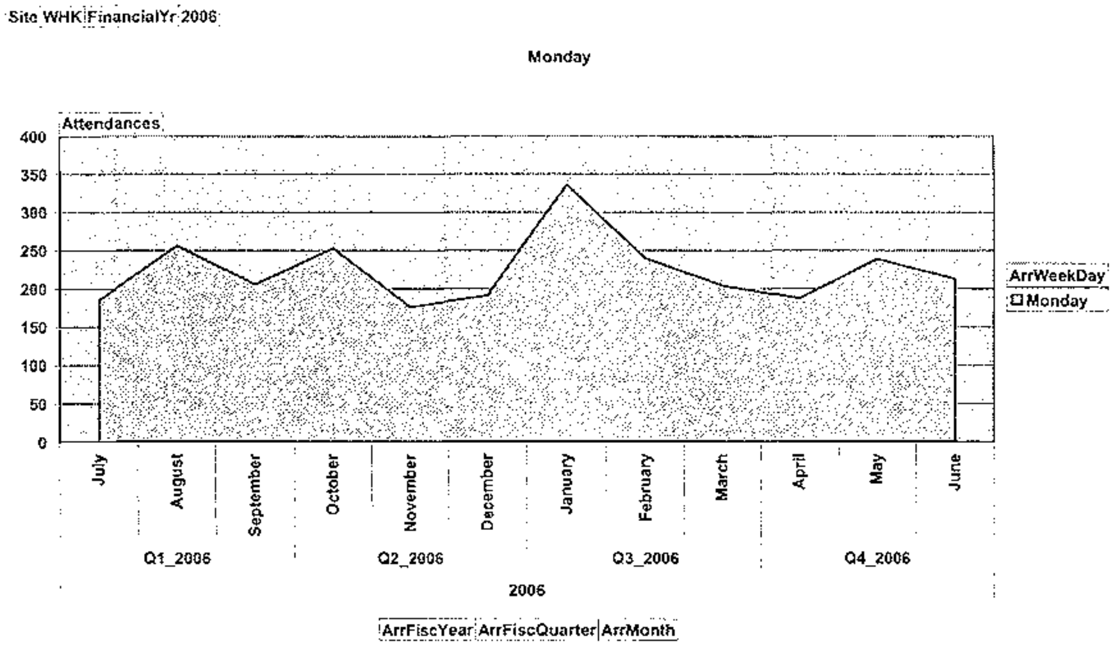


C7.2.6 Graph: Hosp W – FULL Fin Year 2006 – SUNDAY Presentations per Annum

HOSP T ED & HOSP W ED - MONDAYS COMPARED - FIN YEAR 2006

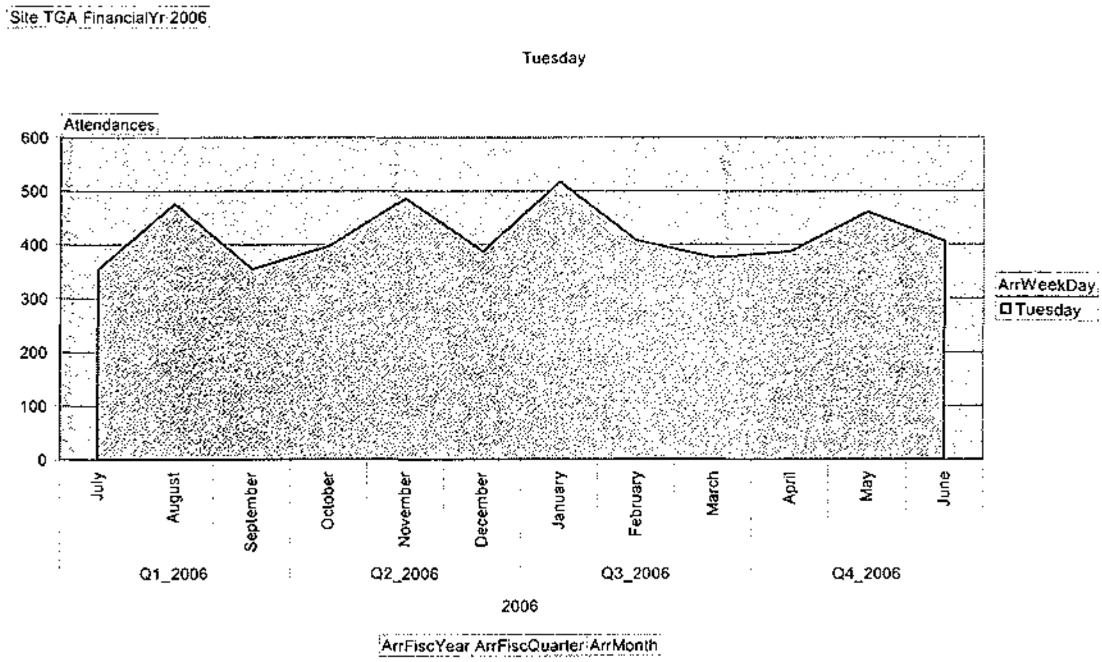


C7.2.7 Graph: Hosp T – FULL Fin Year 2006 – MONDAY Presentations per Annum

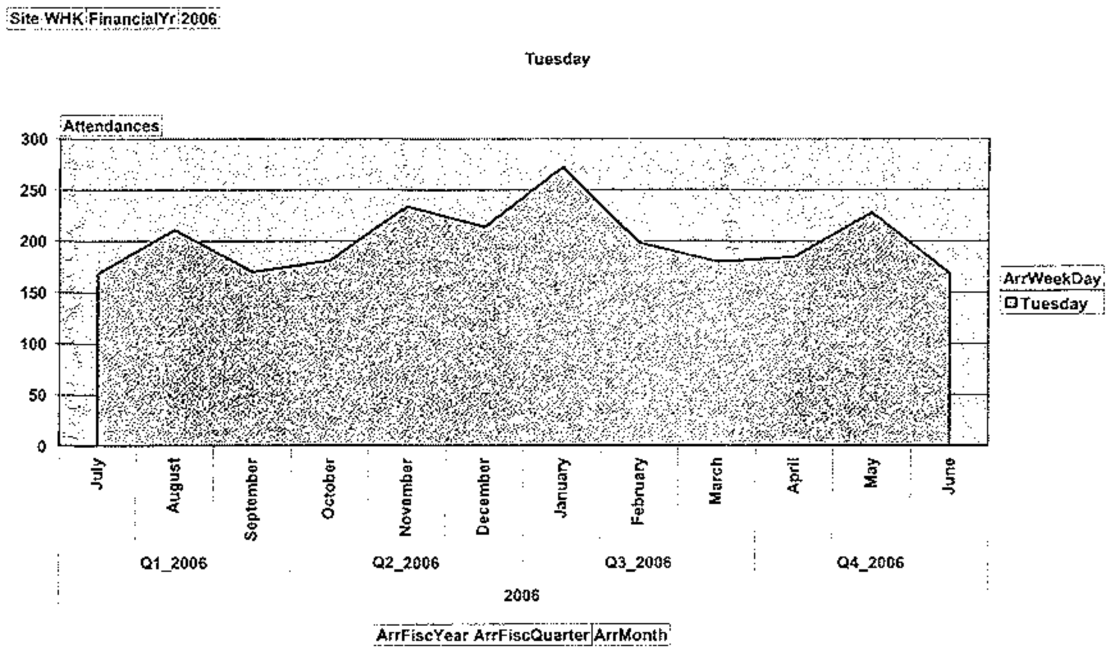


C7.2.8 Graph: Hosp W – FULL Fin Year 2006 – MONDAY Presentations per Annum

HOSP T ED & HOSP W ED - TUESDAYS COMPARED - FIN YEAR 2006

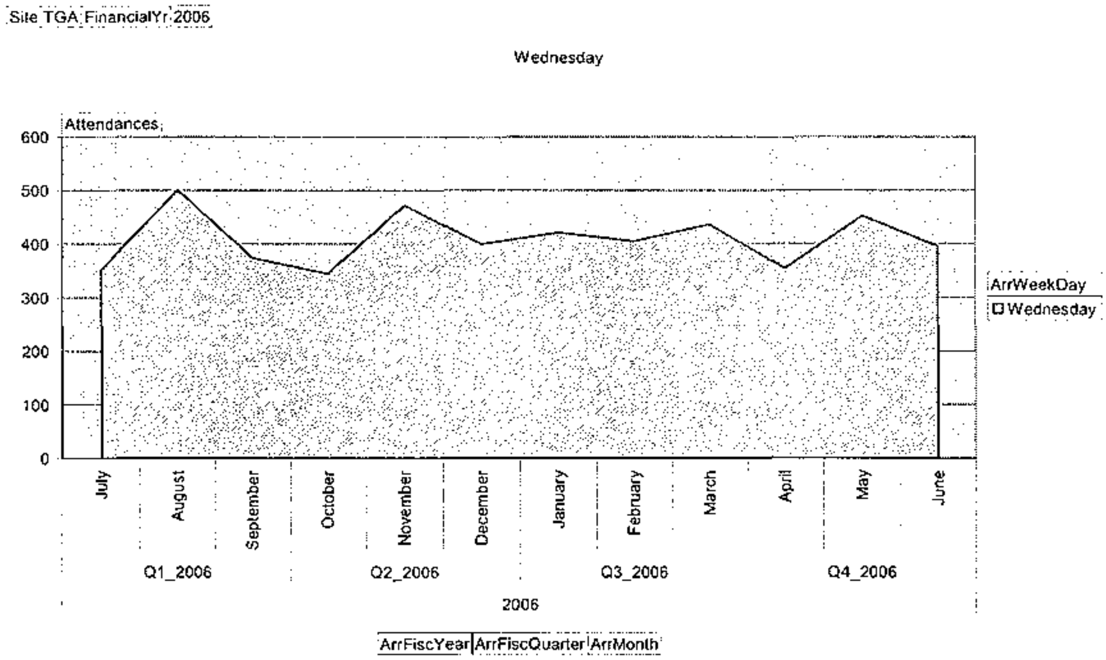


C7.2.9 Graph: Hosp T – FULL Fin Year 2006 – TUESDAY Presentations per Annum

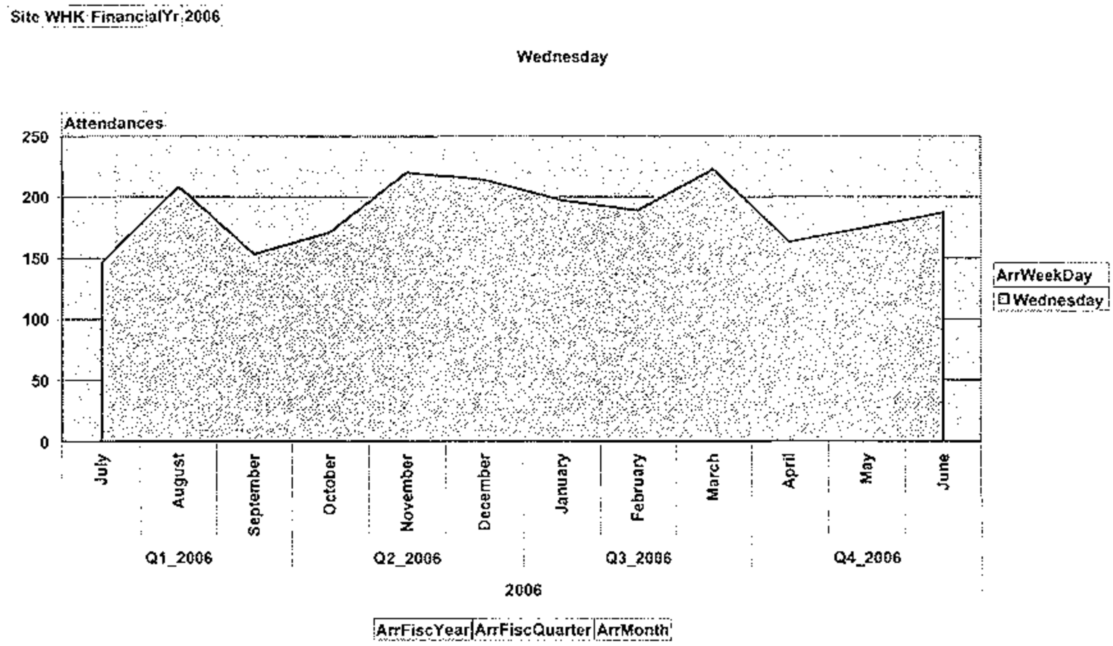


C7.2.10 Graph: Hosp W – FULL Fin Year 2006 – TUESDAY Presentations per Annum

HOSP T ED & HOSP W ED - WEDNESDAYS COMPARED - FIN YEAR 2006

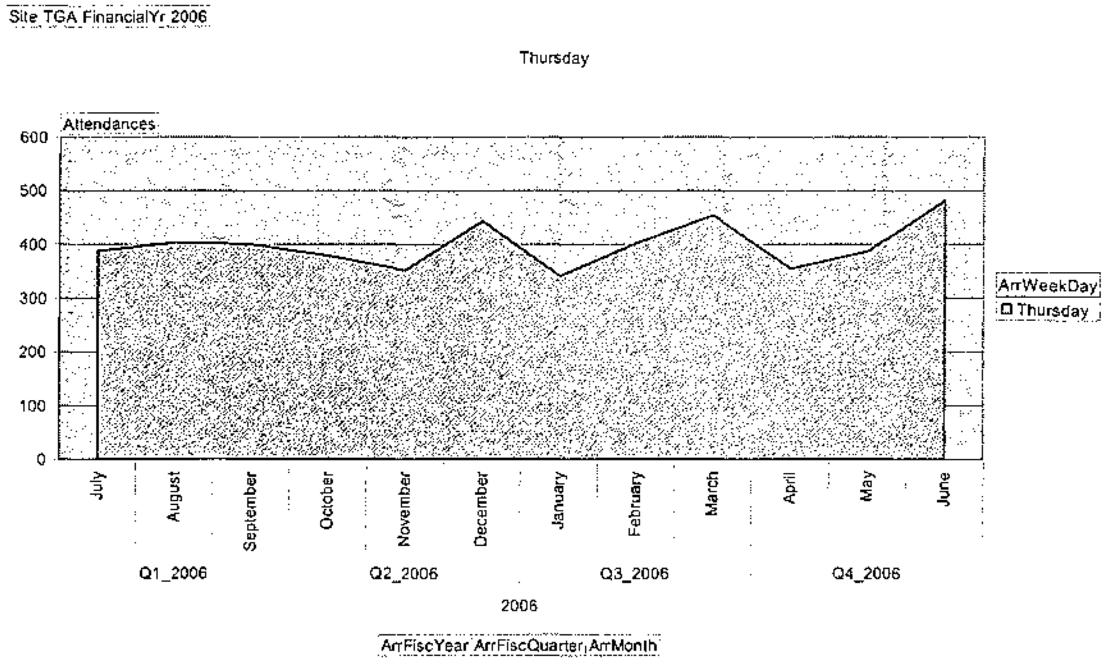


C7.2.11 Graph: Hosp T – FULL Fin Year 2006 – WEDNESDAY Presentations per Annum

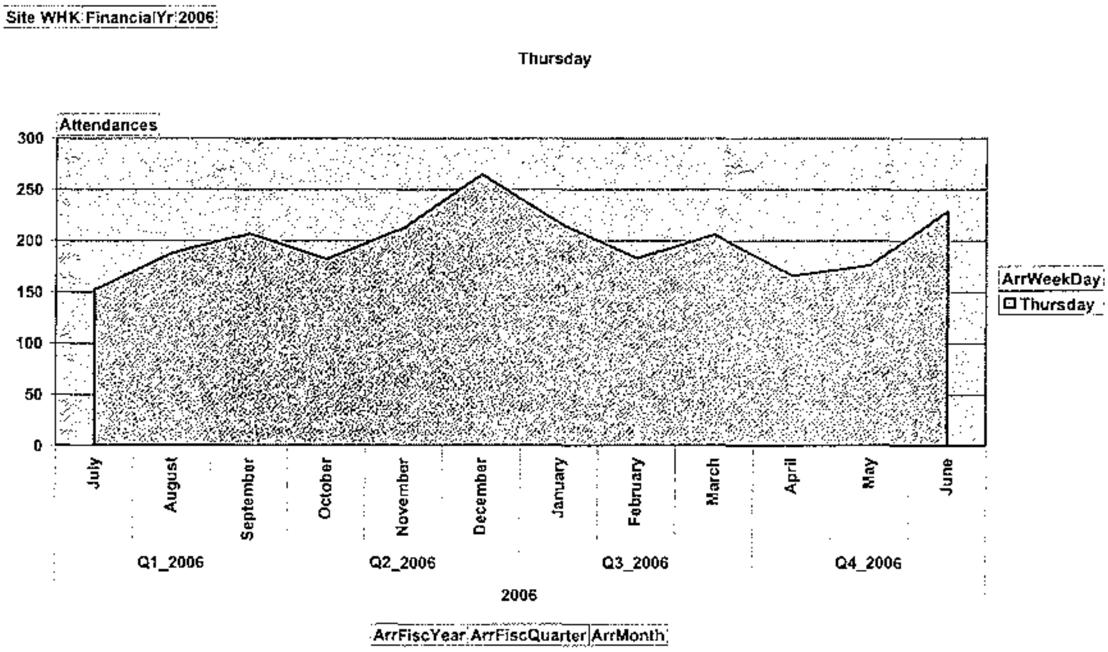


C7.2.12 Graph: Hosp W – FULL Fin Year 2006 – WEDNESDAY Presentations per Annum

HOSP T ED & HOSP W ED - THURSDAYS COMPARED - FIN YEAR 2006

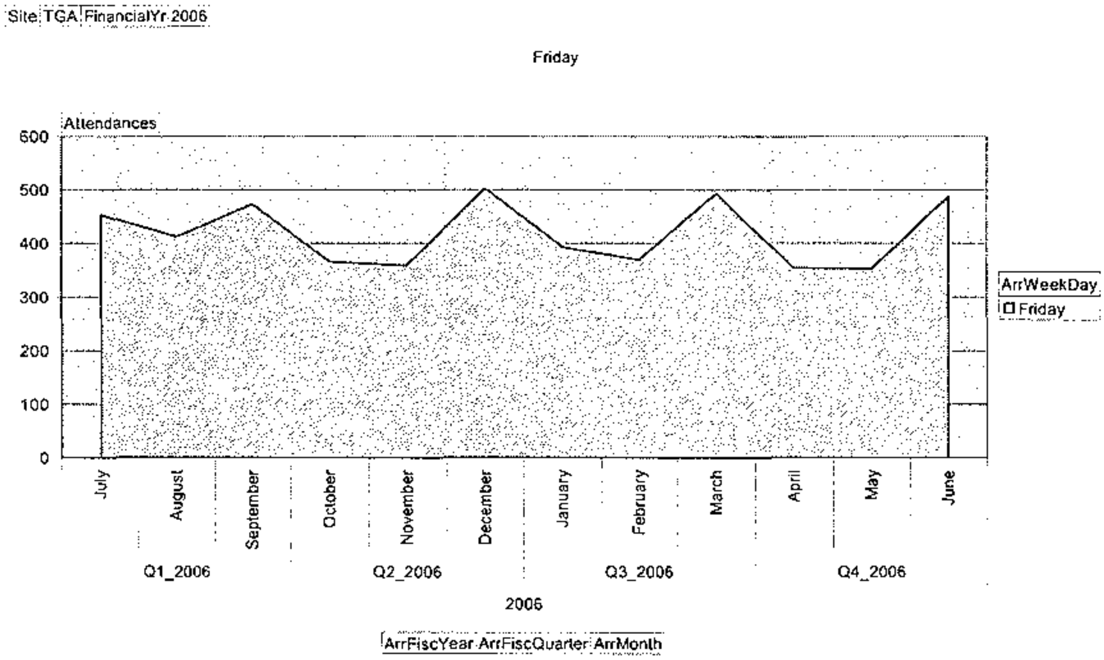


C7.2.13 Graph: Hosp T – FULL Fin Year 2006 – THURSDAY Presentations per Annum

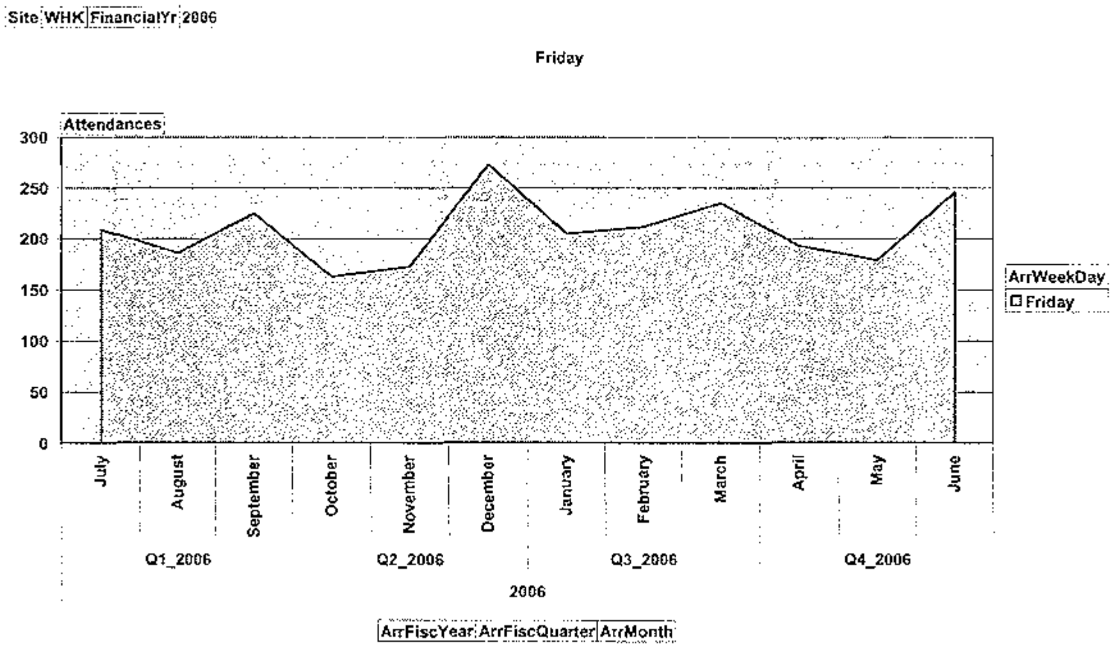


C7.2.14 Graph: Hosp W – FULL Fin Year 2006 – THURSDAY Presentations per Annum

HOSP T ED & HOSP W ED - FRIDAYS COMPARED - FIN YEAR 2006

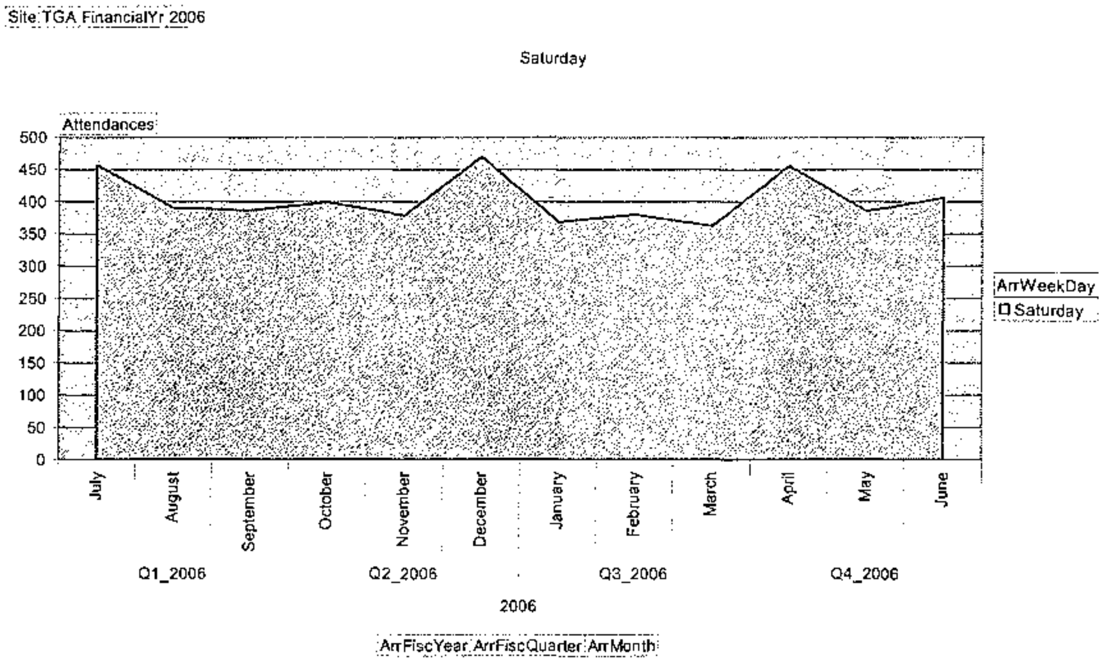


C7.2.15 Graph: Hosp T – FULL Fin Year 2006 – FRIDAY Presentations per Annum

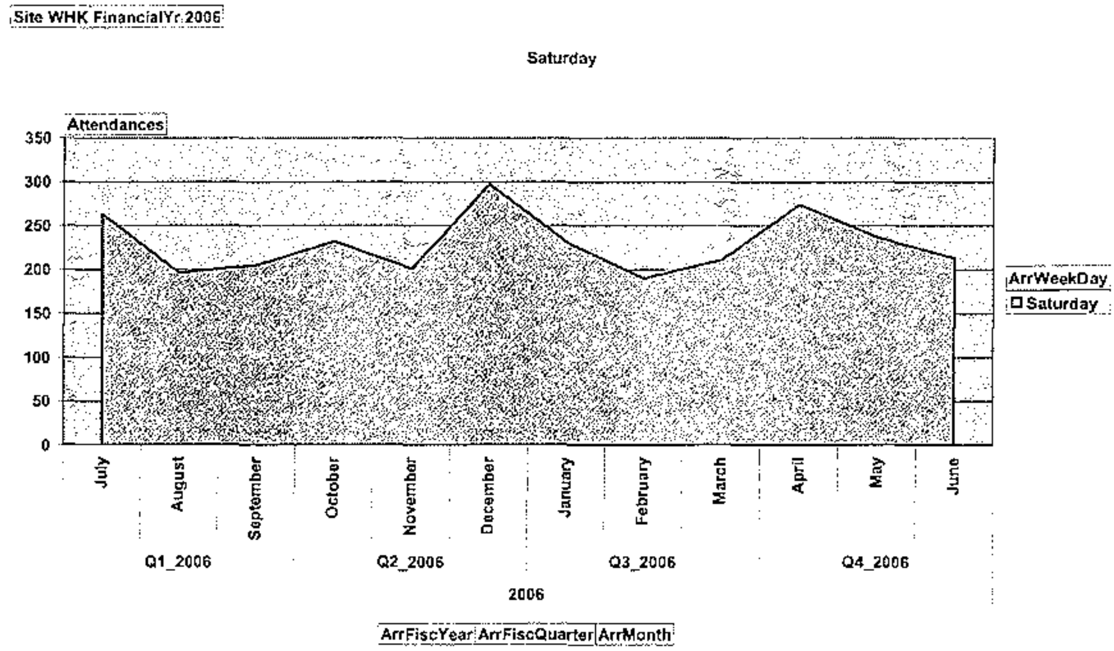


C7.2.16 Graph: Hosp W – FULL Fin Year 2006 – FRIDAY Presentations per Annum

HOSP T ED & HOSP W ED - SATURDAYS COMPARED - FIN YEAR 2006

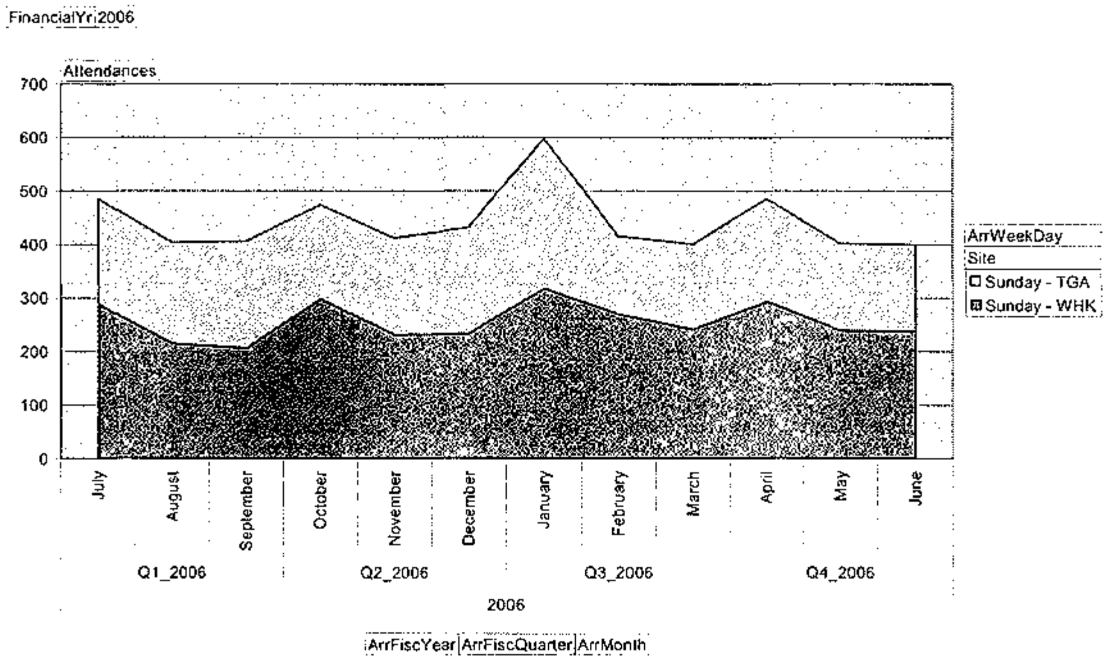


C7.2.17 Graph: Hosp T – FULL Fin Year 2006 – SATURDAY Presentations per Annum

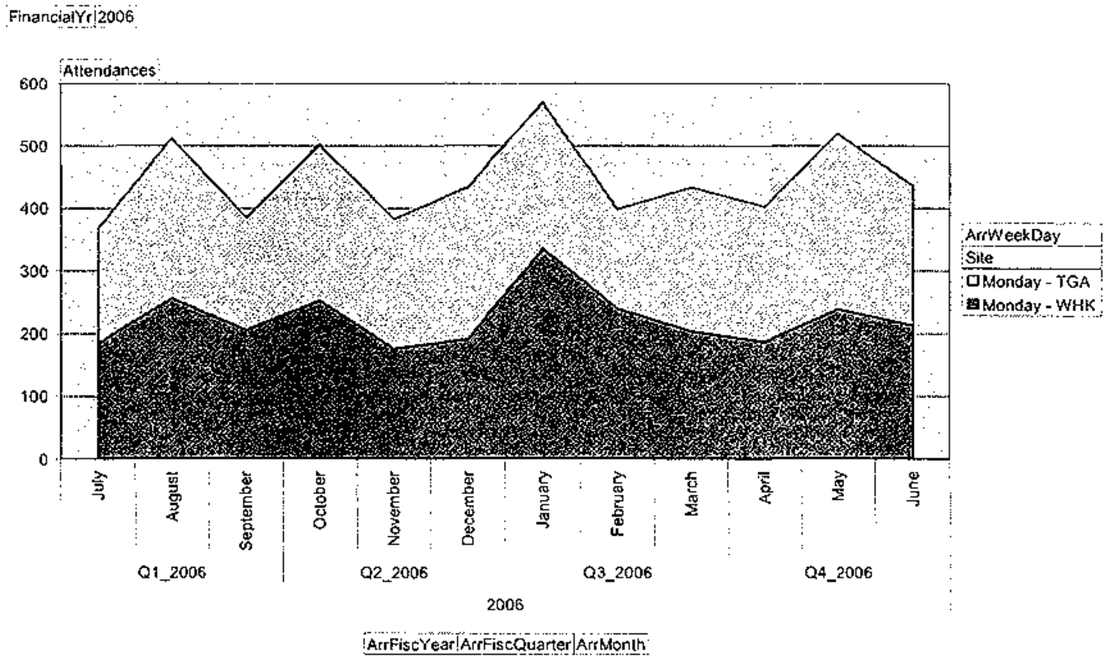


C7.2.18 Graph: Hosp W – FULL Fin Year 2006 – SATURDAY Presentations per Annum

HOSP W ED PROPORTIONALLY SUPERIMPOSED UPON HOSP T ED - SUNDAYS COMPARED & MONDAYS COMPARED - FIN YEAR 2006

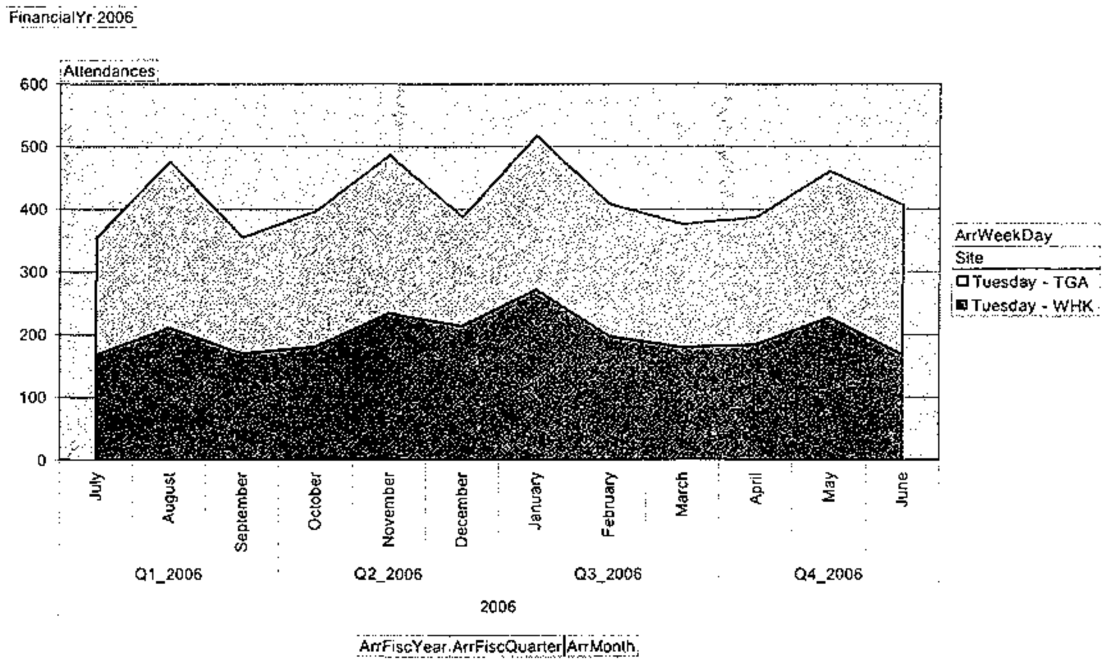


C7.2.19 Graph: Hosp W PROPORTIONALLY SUPERIMPOSED upon Hosp T – FULL Fin Year 2006 – SUNDAY per Annum Presentations compared

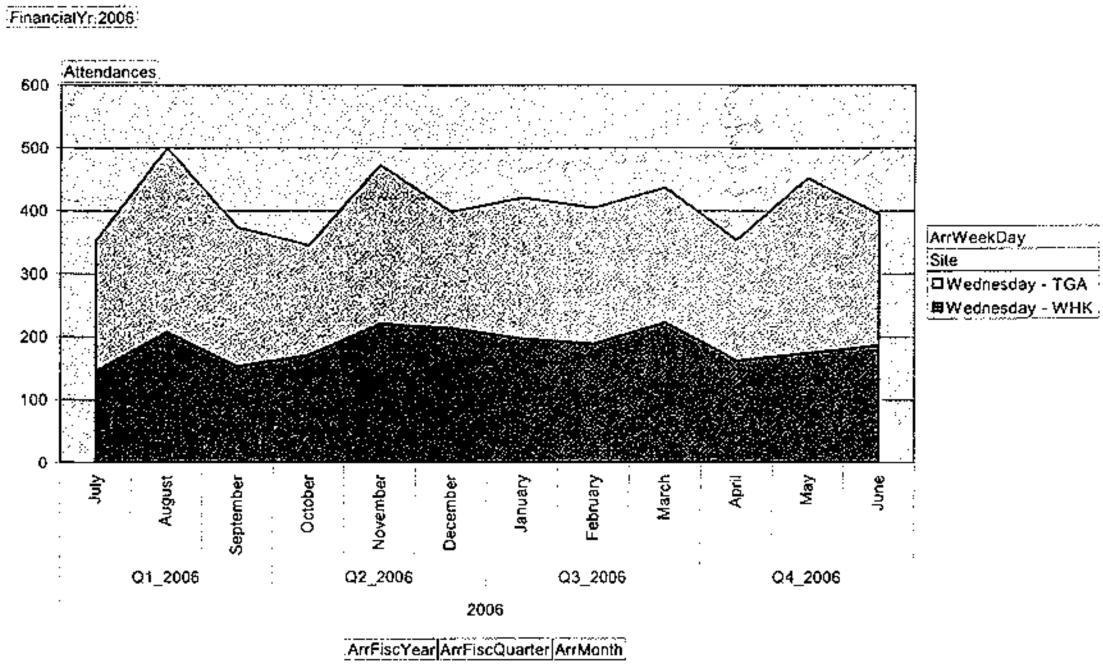


C7.2.20 Graph: Hosp W PROPORTIONALLY SUPERIMPOSED upon Hosp T – FULL Fin Year 2006 – MONDAY per Annum Presentations compared

HOSP W ED PROPORTIONALLY SUPERIMPOSED UPON HOSP T ED - TUESDAYS COMPARED & WEDNESDAYS COMPARED - FIN YEAR 2006

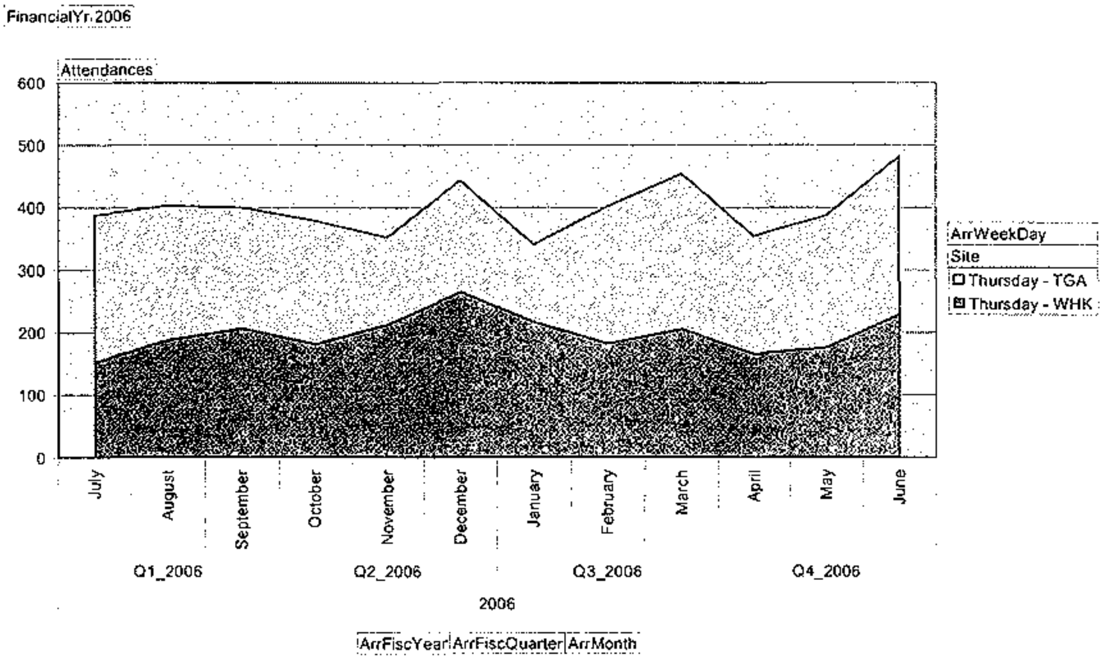


C7.2.21 Graph: Hosp W PROPORTIONALLY SUPERIMPOSED upon Hosp T – FULL Fin Year 2006 – TUESDAY per Annum Presentations compared

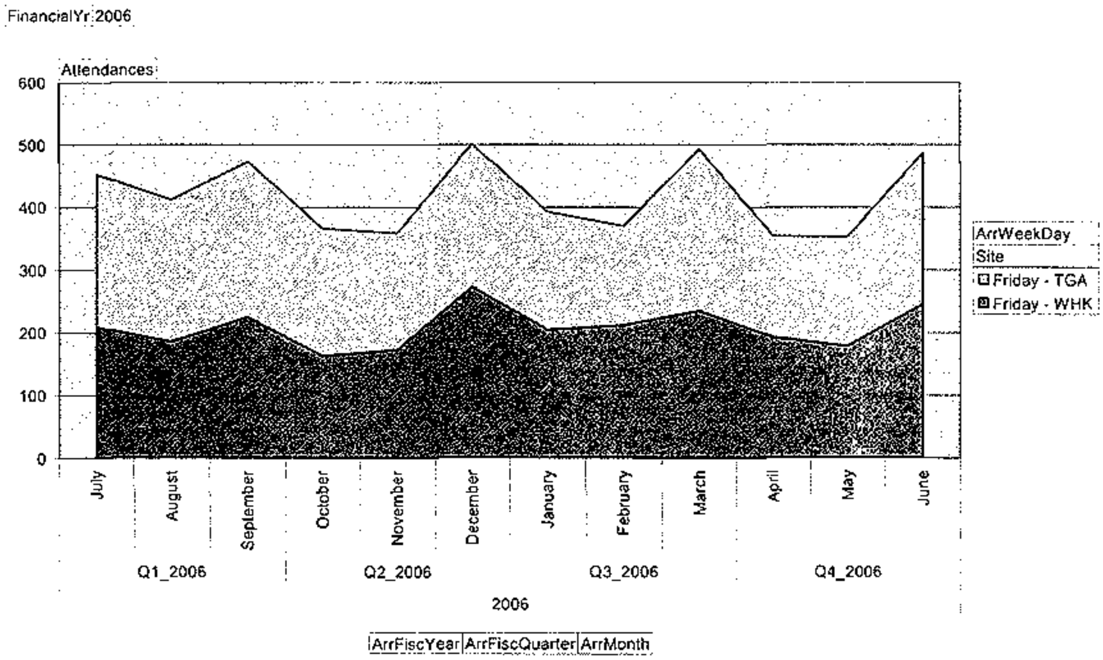


C7.2.22 Graph: Hosp W PROPORTIONALLY SUPERIMPOSED upon Hosp T – FULL Fin Year 2006 – WEDNESDAY per Annum Presentations compared

HOSP W ED PROPORTIONALLY SUPERIMPOSED UPON HOSP T ED – THURSDAYS COMPARED & FRIDAYS COMPARED - FIN YEAR 2006

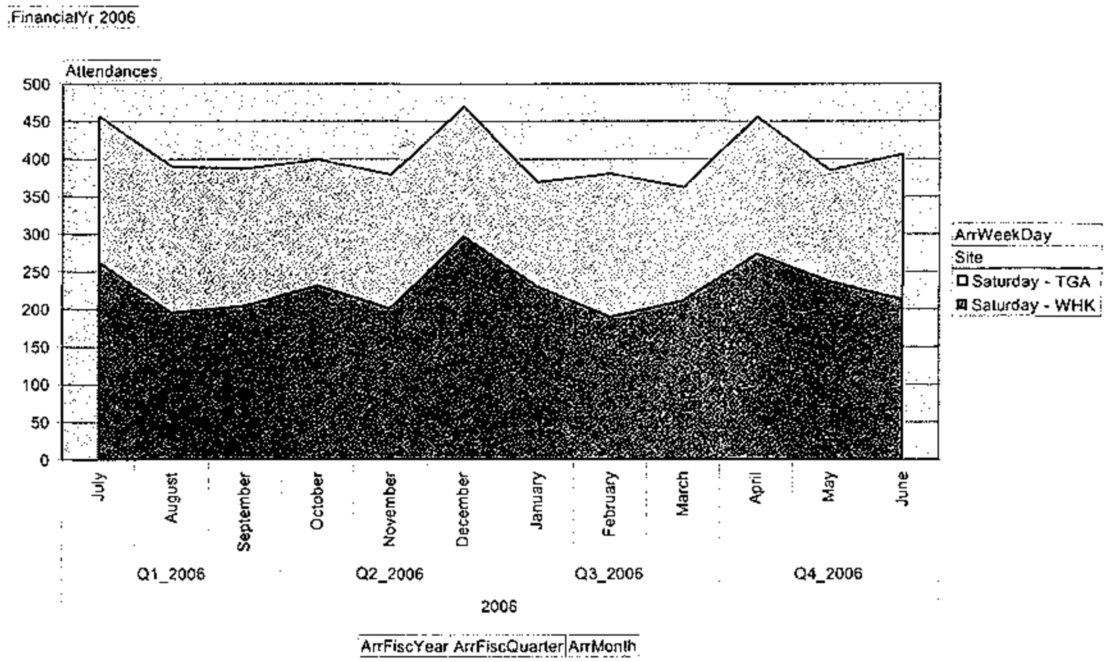


C7.2.23 Graph: Hosp W PROPORTIONALLY SUPERIMPOSED upon Hosp T – FULL Fin Year 2006 – THURSDAY per Annum Presentations compared



C7.2.24 Graph: Hosp W PROPORTIONALLY SUPERIMPOSED upon Hosp T – FULL Fin Year 2006 – FRIDAY per Annum Presentations compared

HOSP W ED PROPORTIONALLY SUPERIMPOSED UPON HOSP T ED – SATURDAYS COMPARED - FIN YEAR 2006



C7.2.25 Graph: Hosp W PROPORTIONALLY SUPERIMPOSED upon Hosp T – FULL Fin Year 2006 – SATURDAY per Annum Presentations compared

CUBES RESULTS – HOSP T ED & HOSP W ED - FINANCIAL YEAR 2007

Site	TGA
FinancialYr	2007

Attendances			ArrWe Day							
ArrFiscYea	ArrFiscQu	ArrMonth	Sunday	Monday	Tuesday	Wednesd	Thursday	Friday	Saturday	Grand Total
2007	Q1_2007	July	576	540	376	381	352	377	493	3095
		August	421	446	494	501	467	402	383	3114
		Septemb	429	424	351	401	365	447	469	2886
	Q2_2007	October	506	491	476	355	328	367	399	2922
		Novembe	395	398	400	463	459	357	355	2827
		Decembe	514	464	396	388	375	484	485	3106
	Q3_2007	January	415	612	450	453	391	419	363	3103
		February	437	428	354	429	353	395	395	2791
		March	441	439	392	362	469	497	507	3107
	Q4_2007	April	525	517	429	417	401	376	390	3055
		May	432	445	539	457	480	405	390	3148
		June	428	448	414	387	408	514	426	3025
2007 Total			5519	5652	5071	4994	4848	5040	5055	36179

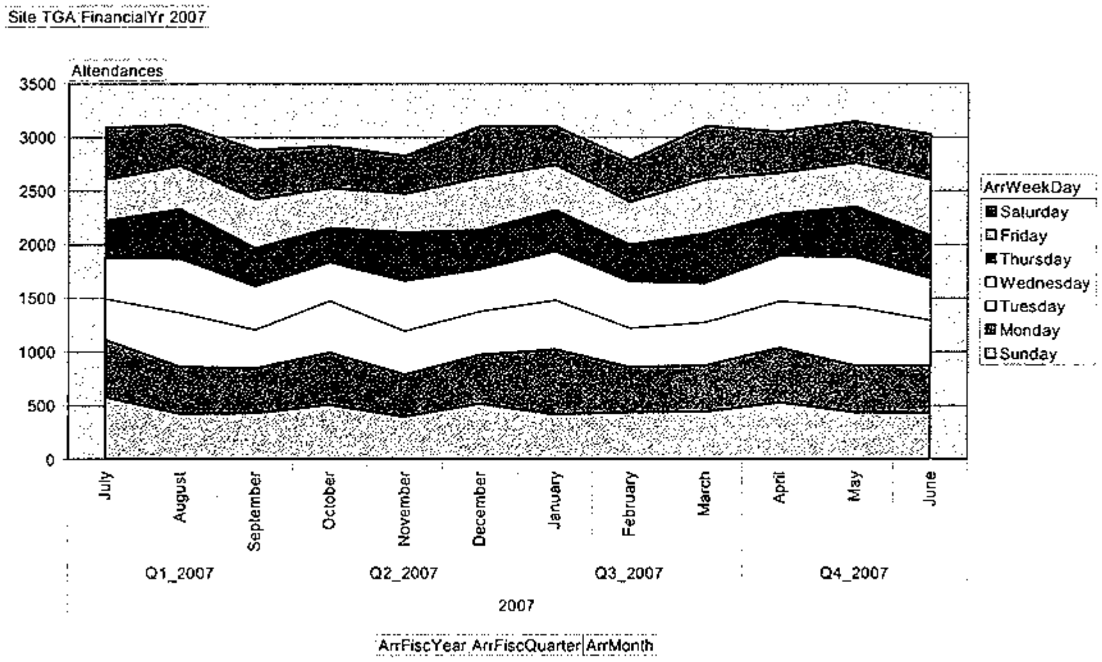
C7.2.26 Cube Pivot Table: Hosp T – FULL Fin Year 2007 Presentations per DOW per Annum

Site	WHK
FinancialYr	2007

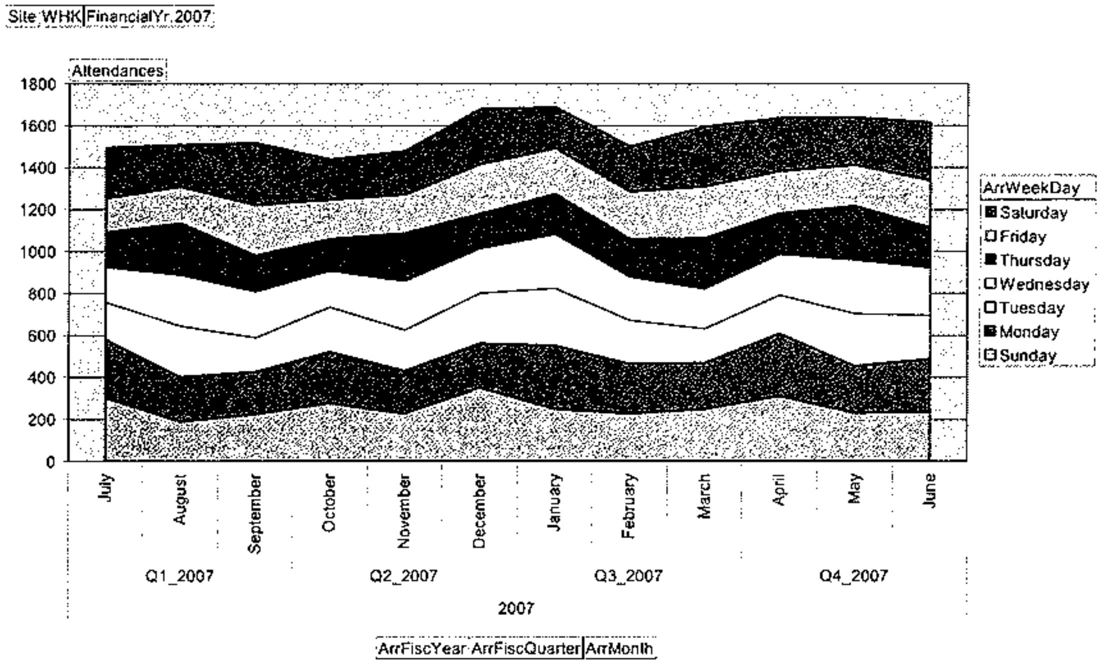
Attendances			ArrWe Day							
ArrFiscYea	ArrFiscQu	ArrMonth	Sunday	Monday	Tuesday	Wednesd	Thursday	Friday	Saturday	Grand Total
2007	Q1_2007	July	302	280	176	165	169	160	243	1495
		August	189	216	238	243	249	173	201	1509
		Septemb	224	205	160	217	176	237	299	1518
	Q2_2007	October	276	249	209	172	154	186	194	1440
		Novembe	228	206	191	233	230	183	209	1480
		Decembe	350	214	236	213	167	235	266	1681
	Q3_2007	January	250	304	269	256	196	216	197	1688
		February	228	240	204	205	185	222	216	1500
		March	250	222	159	189	244	245	287	1596
	Q4_2007	April	310	302	179	194	197	200	256	1638
		May	230	227	247	255	259	192	231	1641
		June	235	256	204	225	194	222	278	1614
2007 Total			3072	2921	2472	2567	2420	2471	2877	18800

C7.2.27 Cube Pivot Table: Hosp W – FULL Fin Year 2007 Presentations per DOW per Annum

HOSP T ED & HOSP W ED – COMPOUNDED SEVEN DAYS OF WEEK COMPARED – FINANCIAL YEAR 2007

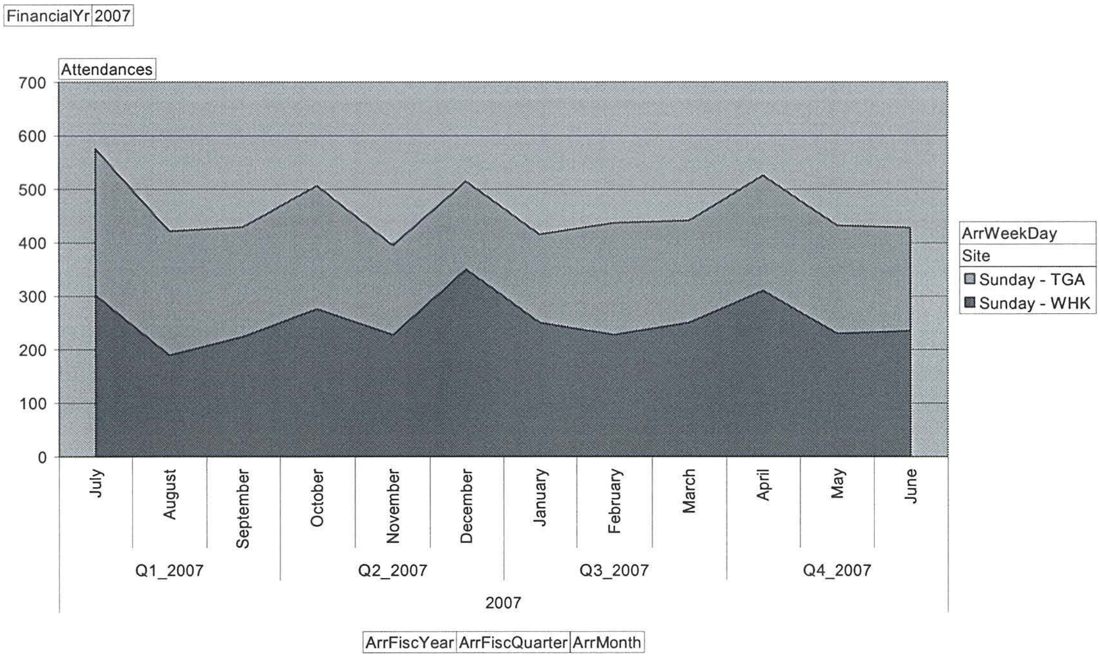


C7.2.28 Graph: Hosp T – FULL Fin Year 2007 – COMPOUNDED Presentations per DOW per Annum

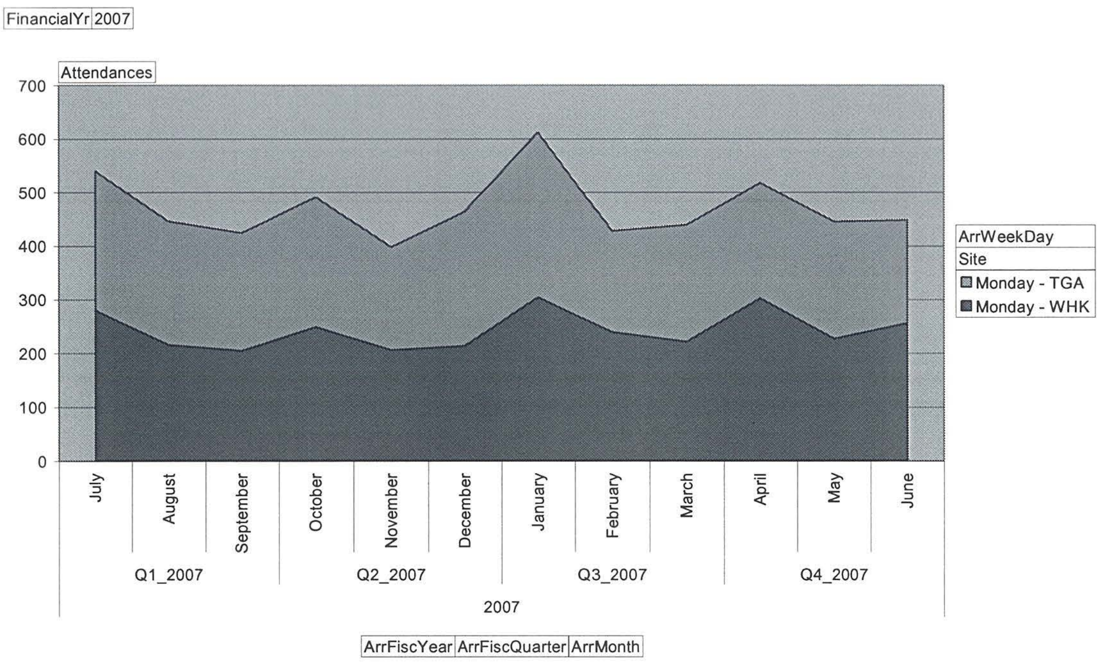


C7.2.29 Graph: Hosp W – FULL Fin Year 2007 – COMPOUNDED Presentations per DOW per Annum

HOSP W ED PROPORTIONALLY SUPERIMPOSED UPON HOSP T ED - SUNDAYS COMPARED & MONDAYS COMPARED - FIN YEAR 2007

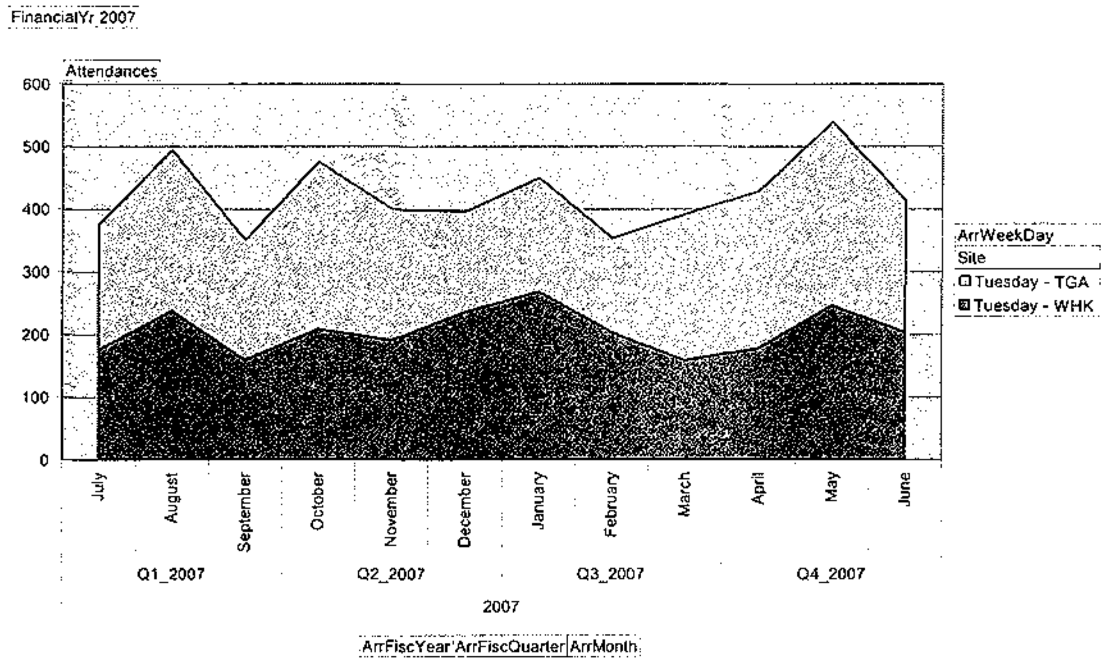


C7.2.30 Graph: Hosp W PROPORTIONALLY SUPERIMPOSED upon Hosp T – FULL Fin Year 2007 – SUNDAY per Annum Presentations compared

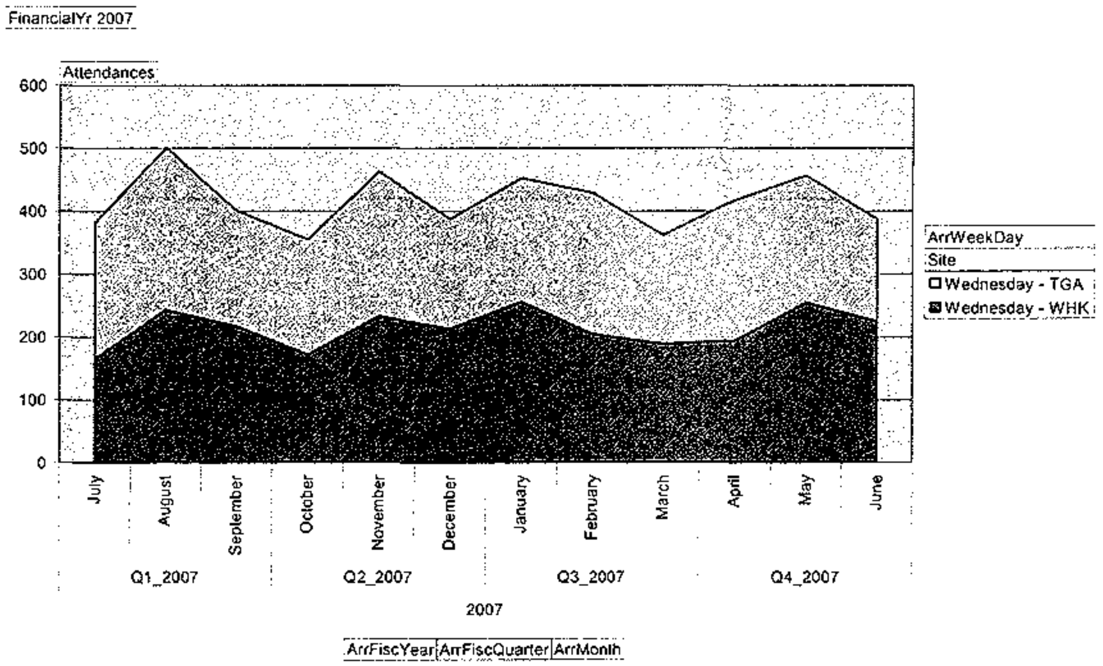


C7.2.31 Graph: Hosp W PROPORTIONALLY SUPERIMPOSED upon Hosp T – FULL Fin Year 2007 – MONDAY per Annum Presentations compared

HOSP W ED PROPORTIONALLY SUPERIMPOSED UPON HOSP T ED - TUESDAYS COMPARED & WEDNESDAYS COMPARED - FIN YEAR 2007

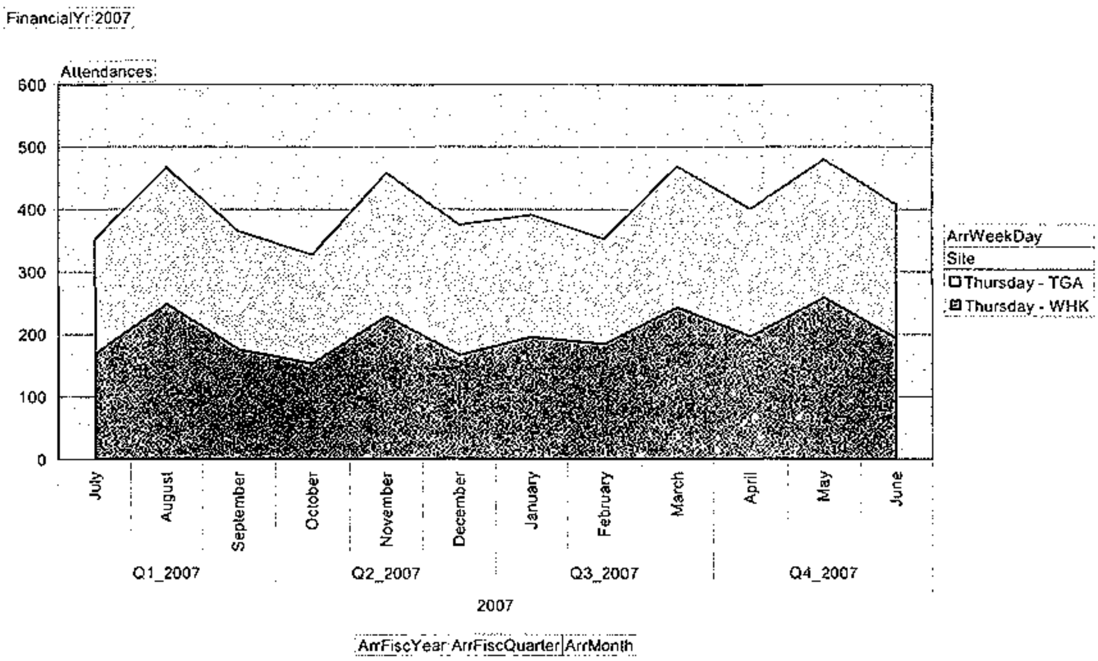


C7.2.32 Graph: Hosp W PROPORTIONALLY SUPERIMPOSED upon Hosp T – FULL Fin Year 2007 – TUESDAY per Annum Presentations compared

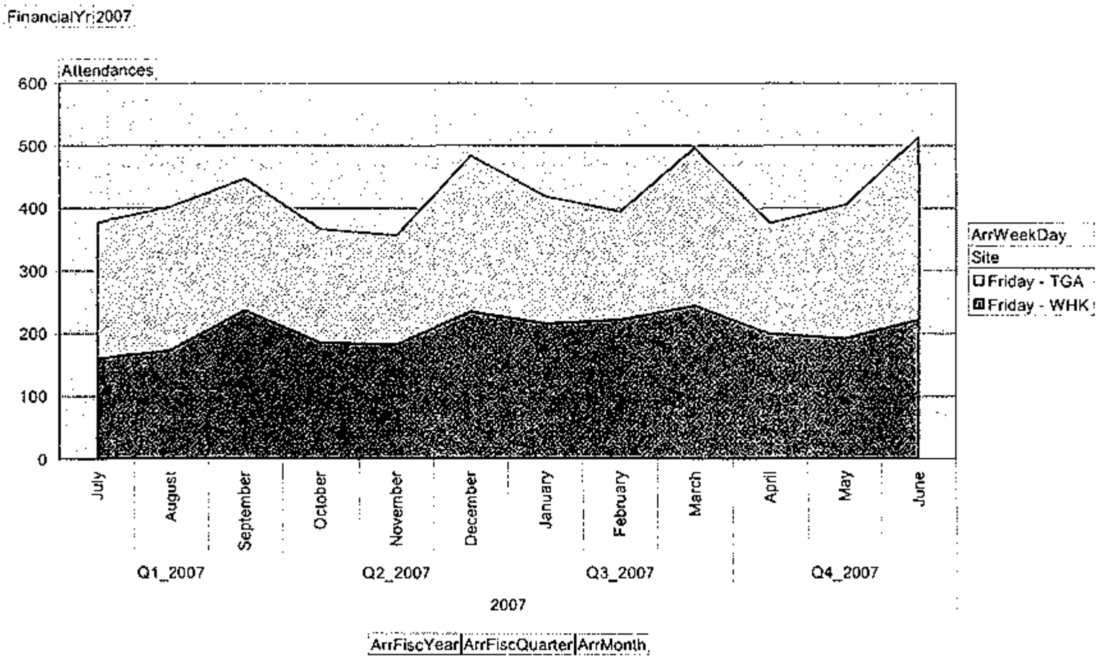


C7.2.33 Graph: Hosp W PROPORTIONALLY SUPERIMPOSED upon Hosp T – FULL Fin Year 2007 – WEDNESDAY per Annum Presentations compared

HOSP W ED PROPORTIONALLY SUPERIMPOSED UPON HOSP T ED – THURSDAYS COMPARED & FRIDAYS COMPARED - FIN YEAR 2007

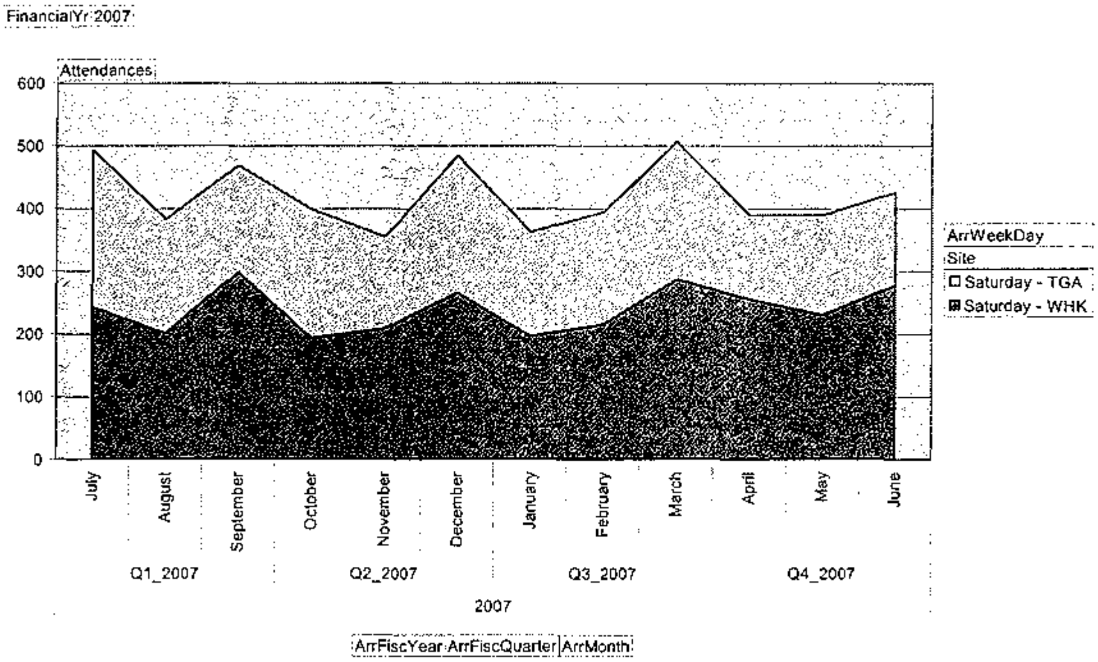


C7.2.34 Graph: Hosp W PROPORTIONALLY SUPERIMPOSED upon Hosp T – FULL Fin Year 2007 – THURSDAY per Annum Presentations compared



C7.2.35 Graph: Hosp W PROPORTIONALLY SUPERIMPOSED upon Hosp T – FULL Fin Year 2007 – FRIDAY per Annum Presentations compared

ED HOSP W PROPORTIONALLY SUPERIMPOSED UPON HOSP T ED – SATURDAYS COMPARED - FIN YEAR 2007



C7.2.36 Graph: Hosp W PROPORTIONALLY SUPERIMPOSED upon Hosp T – FULL Fin Year 2007 – SATURDAY per Annum Presentations compared

13.1 APPENDIX A3: RESULTS: CHAPTER 7.3

RESULTS HELD IN THIS APPENDIX

C7.3.1	C7.3.2	C7.3.3	C7.3.4	C7.3.5	C7.3.6
C7.3.7	C7.3.8	C7.3.9	C7.3.10	C7.3.11	C7.3.12
C7.3.13	C7.3.14	C7.3.15	C7.3.16	C7.3.17	C7.3.18
C7.3.19	C7.3.20	C7.3.21	C7.3.22	C7.3.23	C7.3.24
C7.3.25	C7.3.26	C7.3.27	C7.3.28	C7.3.29	C7.3.30
C7.3.31	C7.3.32	C7.3.33	C7.3.34	C7.3.35	C7.3.36
C7.3.37	C7.3.38	C7.3.39	C7.3.40	C7.3.41	

7.3 RESULTS: Using FULL DS: PER DAY OF WEEK – DEMAND PER TIME OF DAY

- **(Postulate3)** Per Day of Week: To determine proportions of demand for ED services **per time of day**

7.3.1 Using FULL DS: FINDINGS

FINDINGS AND COMMENTS

Cf. Earlier Pages **93 - 99**

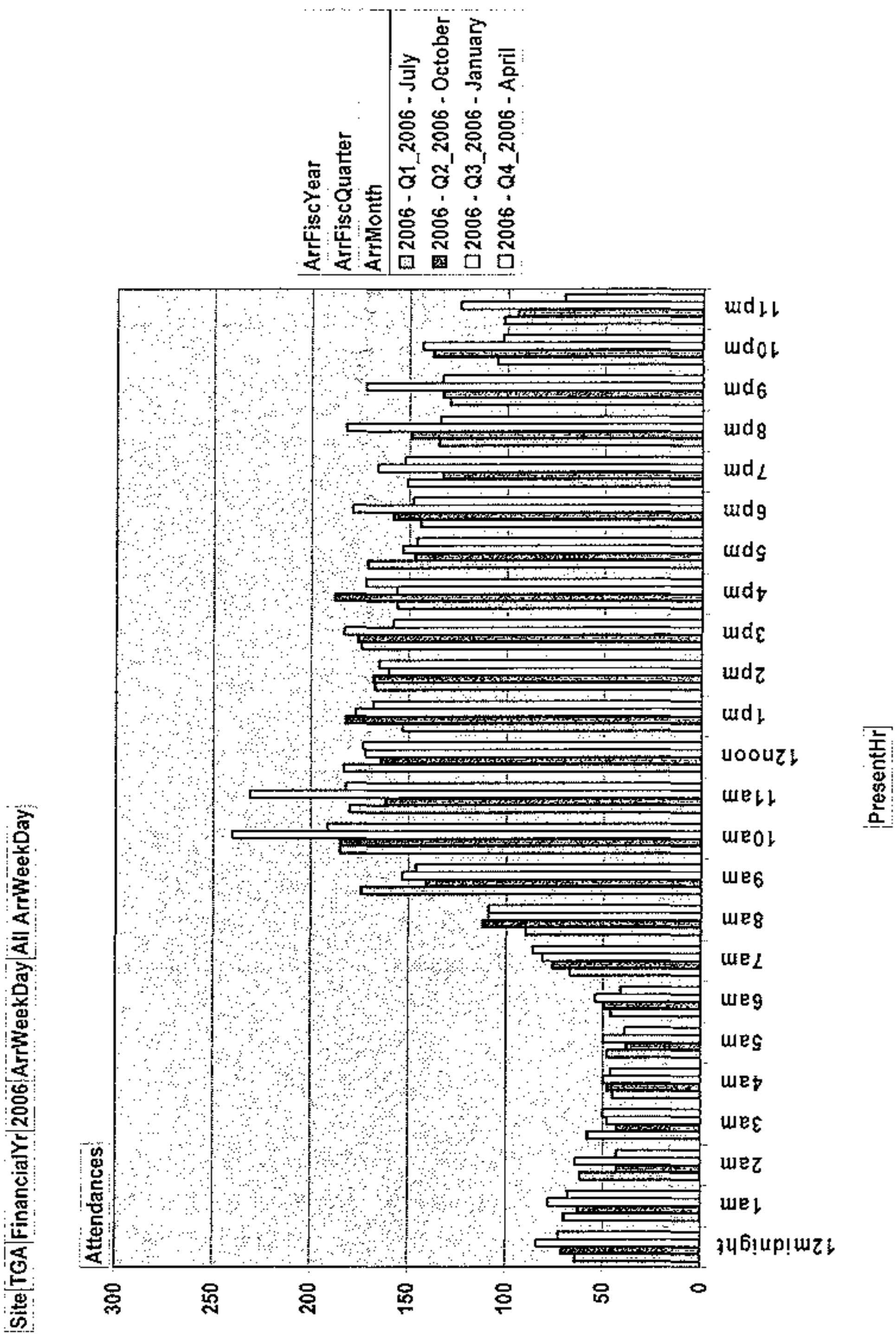
7.3.2 Using FULL DS: CUBE RESULTS

CUBES RESULTS

Site	TGA
FinancialYr	2006
ArrWeekDay	All ArrWeekDay

Attendances	ArrFiscY	ArrFiscQua	ArrMonth	
	2006			
	Q1_2006	Q2_2006	Q3_2006	Q4_2006
PresentHr	July	October	January	April
12midnight	64	71	84	73
1am	70	63	78	68
2am	62	43	64	43
3am	58	43	48	50
4am	45	48	50	46
5am	48	38	50	39
6am	46	50	54	41
7am	67	76	81	86
8am	90	112	109	109
9am	174	141	153	146
10am	185	185	240	191
11am	180	162	231	182
12noon	183	164	172	173
1pm	153	182	177	168
2pm	167	168	160	165
3pm	174	176	183	158
4pm	156	188	156	172
5pm	171	147	153	146
6pm	144	158	179	148
7pm	151	133	166	152
8pm	135	149	182	134
9pm	129	133	172	133
10pm	105	138	143	102
11pm	102	95	124	71

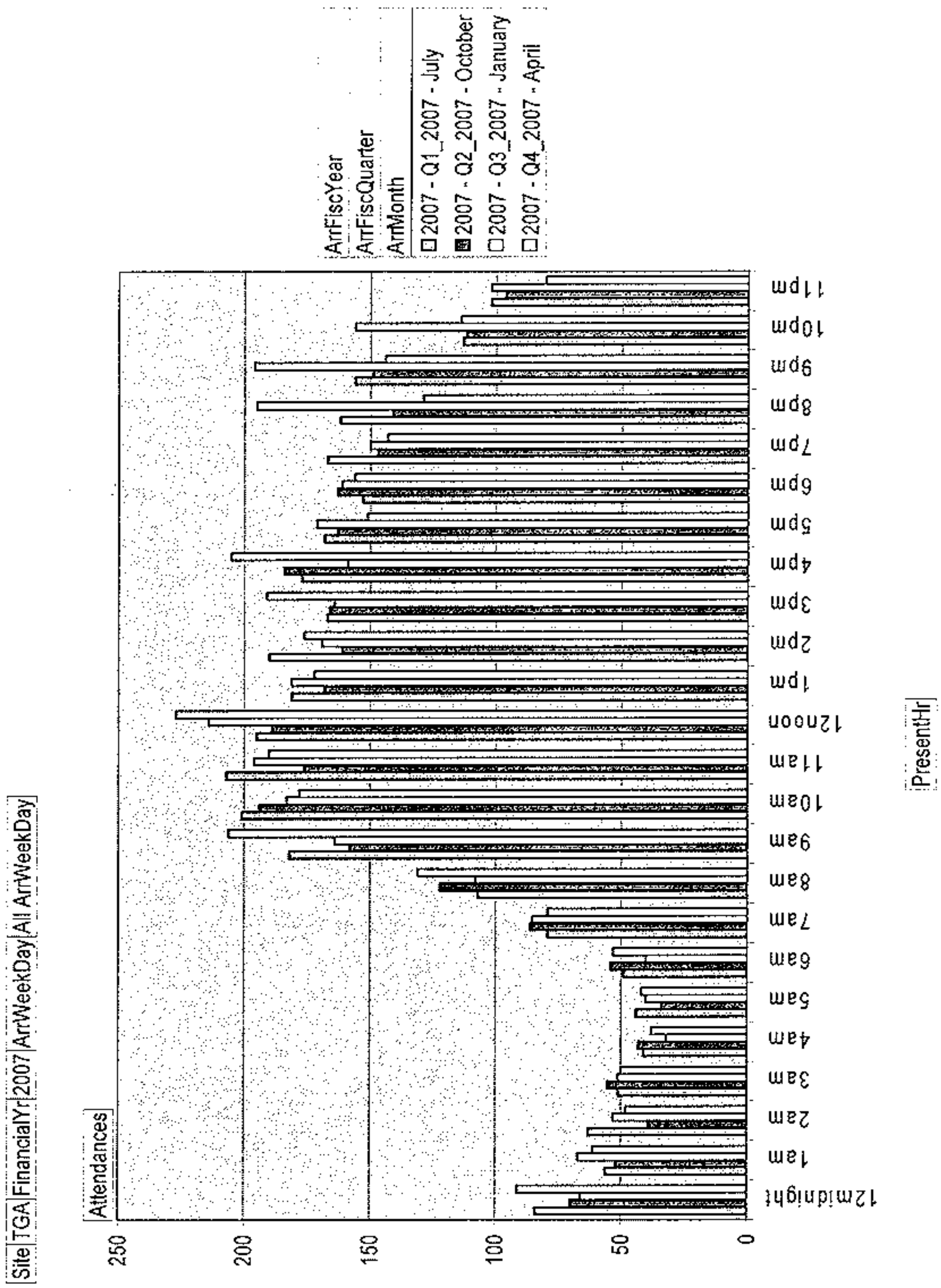
C7.3.1 Cube Pivot Table: Hospital T – FULL Fin Year 2006 – Presentation Hour per “Season” of Year



C7.3.2 Graph: Hospital T – FULL Fin Year 2006 – Presentation Hour per "Season" of Year

Site	TGA			
FinancialYr	2007			
ArrWeekDay	All ArrWeekDay			
Attendances	ArrFiscY	ArrFiscQua	ArrMonth	
	2007			
	Q1_2007	Q2_2007	Q3_2007	Q4_2007
PresentHr	July	October	January	April
12midnight	84	70	66	91
1am	56	52	67	61
2am	63	39	53	48
3am	51	55	51	50
4am	41	43	32	38
5am	44	34	40	42
6am	49	54	40	53
7am	79	86	85	79
8am	107	122	108	131
9am	182	158	164	206
10am	201	194	183	178
11am	207	176	196	190
12noon	195	189	214	227
1pm	181	168	181	172
2pm	190	161	169	176
3pm	167	166	164	191
4pm	177	184	159	205
5pm	168	163	171	151
6pm	153	163	161	156
7pm	167	147	150	143
8pm	162	141	195	129
9pm	156	149	196	144
10pm	113	112	156	114
11pm	102	96	102	80

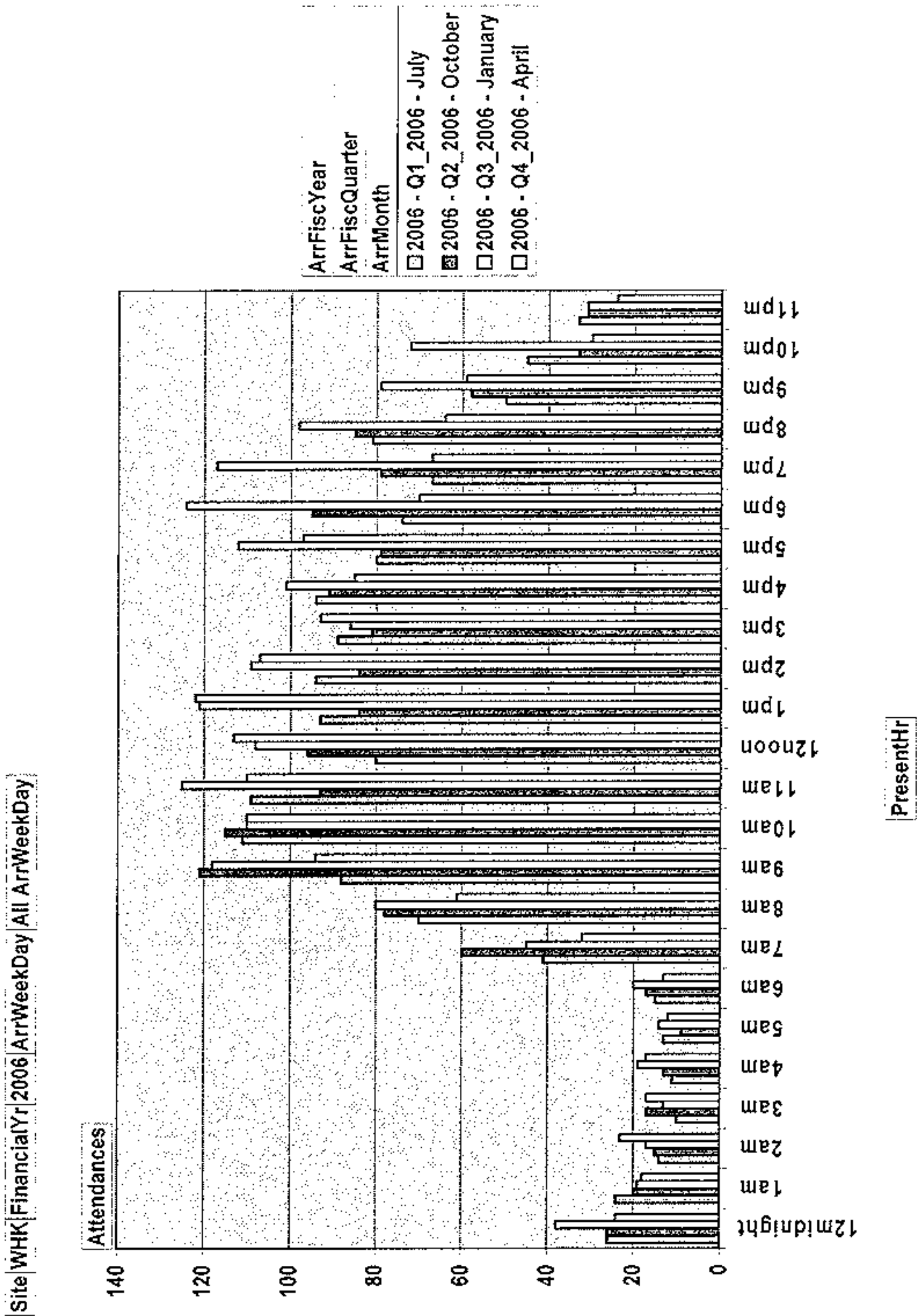
C7.3.3 Cube Pivot Table: Hospital T – FULL Fin Year 2007 – Presentation Hour per "Season" of Year



C7.3.4 Graph: Hospital T – FULL Fin Year 2007 – Presentation Hour per "Season" of Year

Site	WHK			
FinancialYr	2006			
ArrWeekDay	All ArrWeekDay			
Attendances	ArrFiscY	ArrFiscQua	ArrMonth	
	2006			
	Q1_2006	Q2_2006	Q3_2006	Q4_2006
PresentHr	July	October	January	April
12midnight	26	26	38	24
1am	24	20	19	18
2am	14	15	17	23
3am	10	17	13	17
4am	11	13	19	17
5am	13	9	14	12
6am	15	17	20	13
7am	41	60	45	32
8am	70	78	80	61
9am	88	121	118	94
10am	111	115	110	110
11am	109	93	125	110
12noon	80	96	108	113
1pm	93	84	121	122
2pm	94	84	109	107
3pm	89	81	86	93
4pm	94	91	101	85
5pm	80	79	112	97
6pm	74	95	124	70
7pm	67	79	117	67
8pm	81	85	98	64
9pm	50	58	79	59
10pm	45	33	72	30
11pm	33	31	31	24

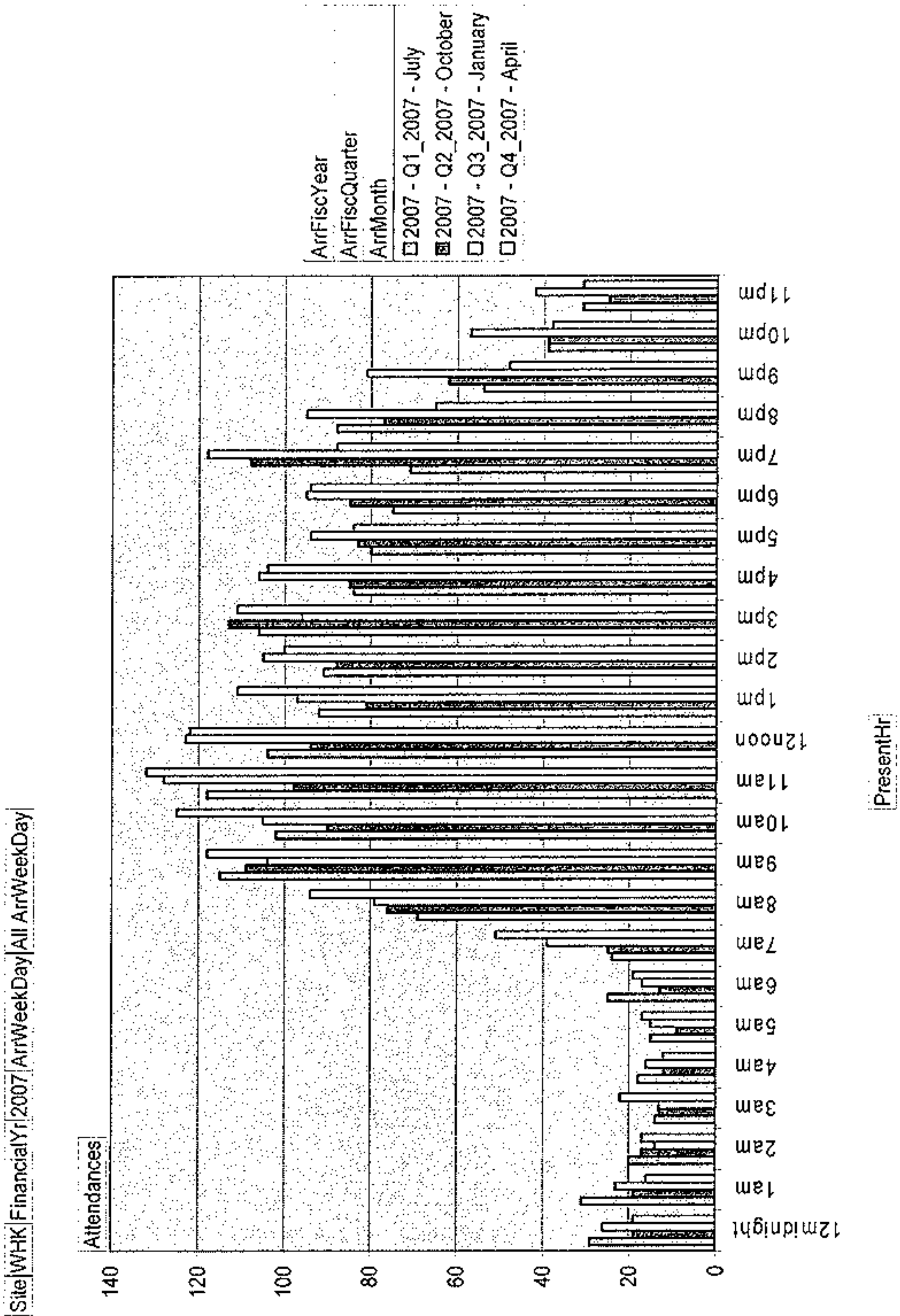
C7.3.5 Cube Pivot Table: Hospital W – FULL Fin Year 2006 – Presentation Hour per "Season" of Year



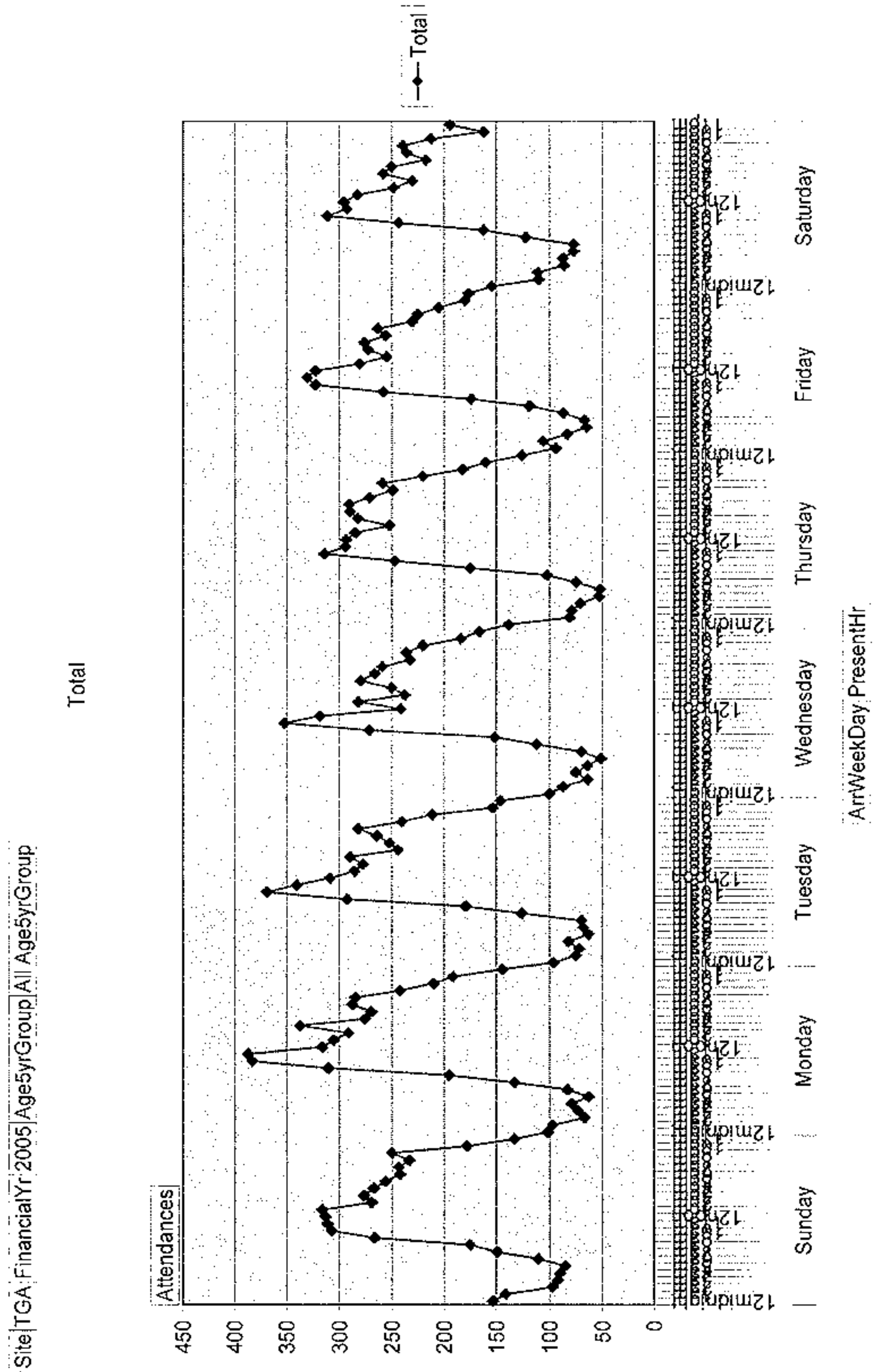
C7.3.6 Graph: Hospital W – FULL Fin Year 2006 - Presentation Hour per "Season" of Year

Site	WHK			
FinancialYr	2007			
ArrWeekDay	All ArrWeekDay			
Attendances	ArrFiscY	ArrFiscQua	ArrMonth	
	2007			
	Q1_2007	Q2_2007	Q3_2007	Q4_2007
PresentHr	July	October	January	April
12midnight	29	19	26	19
1am	31	19	23	16
2am	20	17	14	17
3am	14	13	13	22
4am	18	12	16	12
5am	15	9	15	17
6am	25	13	17	19
7am	24	25	39	51
8am	69	76	79	94
9am	115	109	104	118
10am	102	90	105	125
11am	118	98	128	132
12noon	104	94	123	122
1pm	92	81	97	111
2pm	91	88	105	100
3pm	106	113	96	111
4pm	84	85	106	104
5pm	80	83	94	84
6pm	75	85	95	94
7pm	71	108	118	88
8pm	88	77	95	65
9pm	54	62	81	48
10pm	39	39	57	38
11pm	31	25	42	31

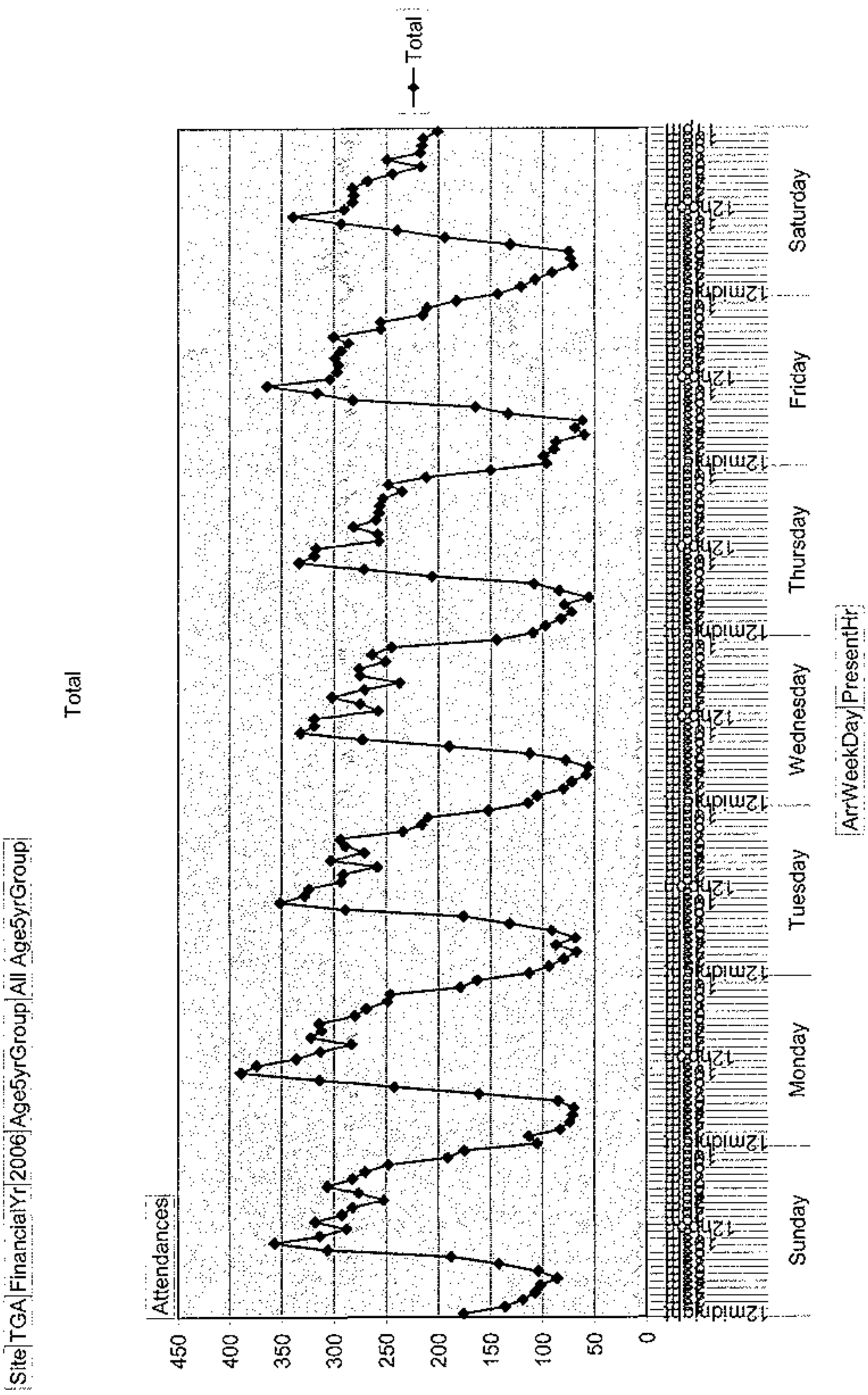
C7.3.7 Cube Pivot Table: Hospital W – FULL Fin Year 2007 – Presentation Hour per "Season" of Year



C7.3.8 Graph: Hospital W – FULL Fin Year 2007 - Presentation Hour per "Season" of Year

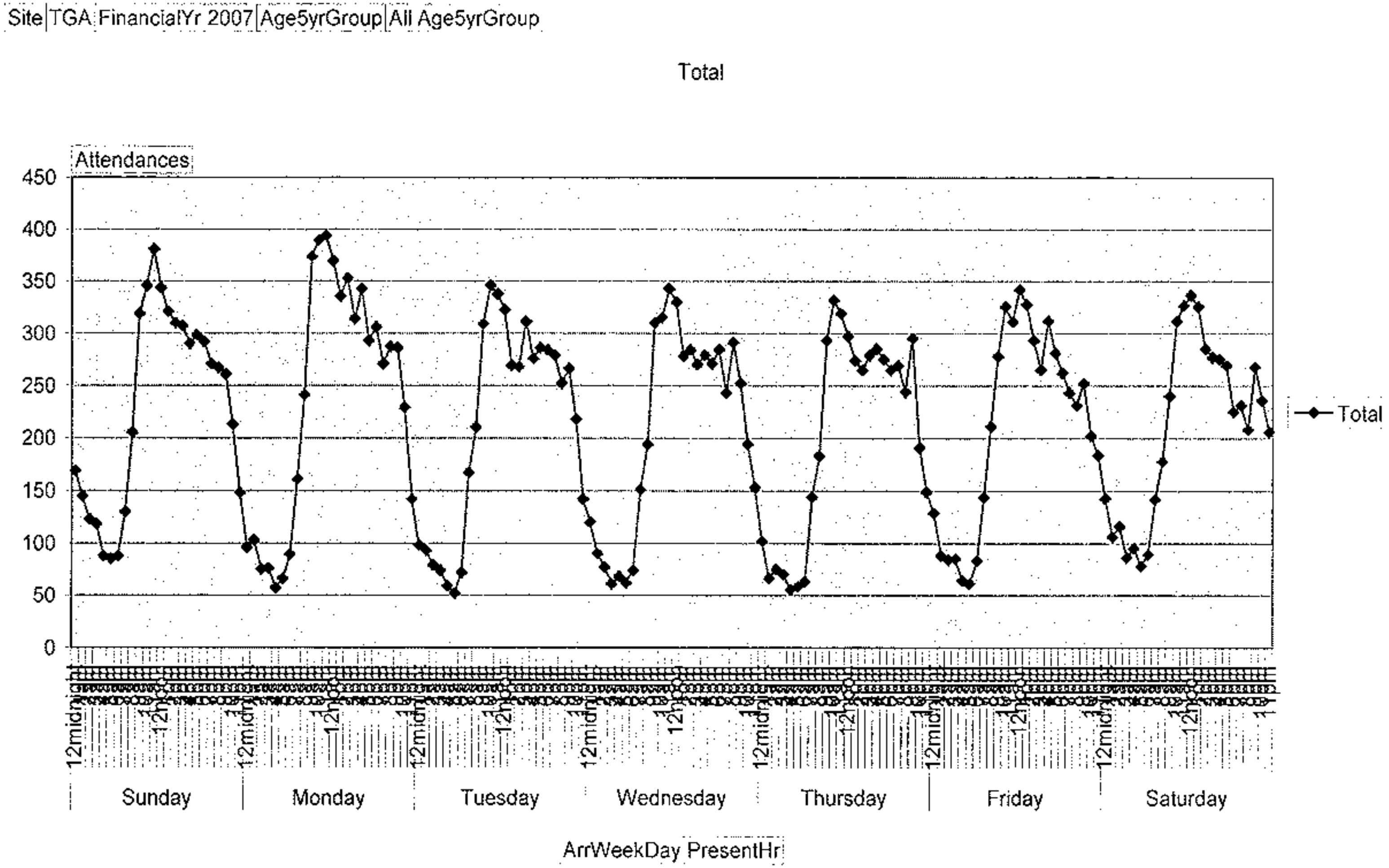


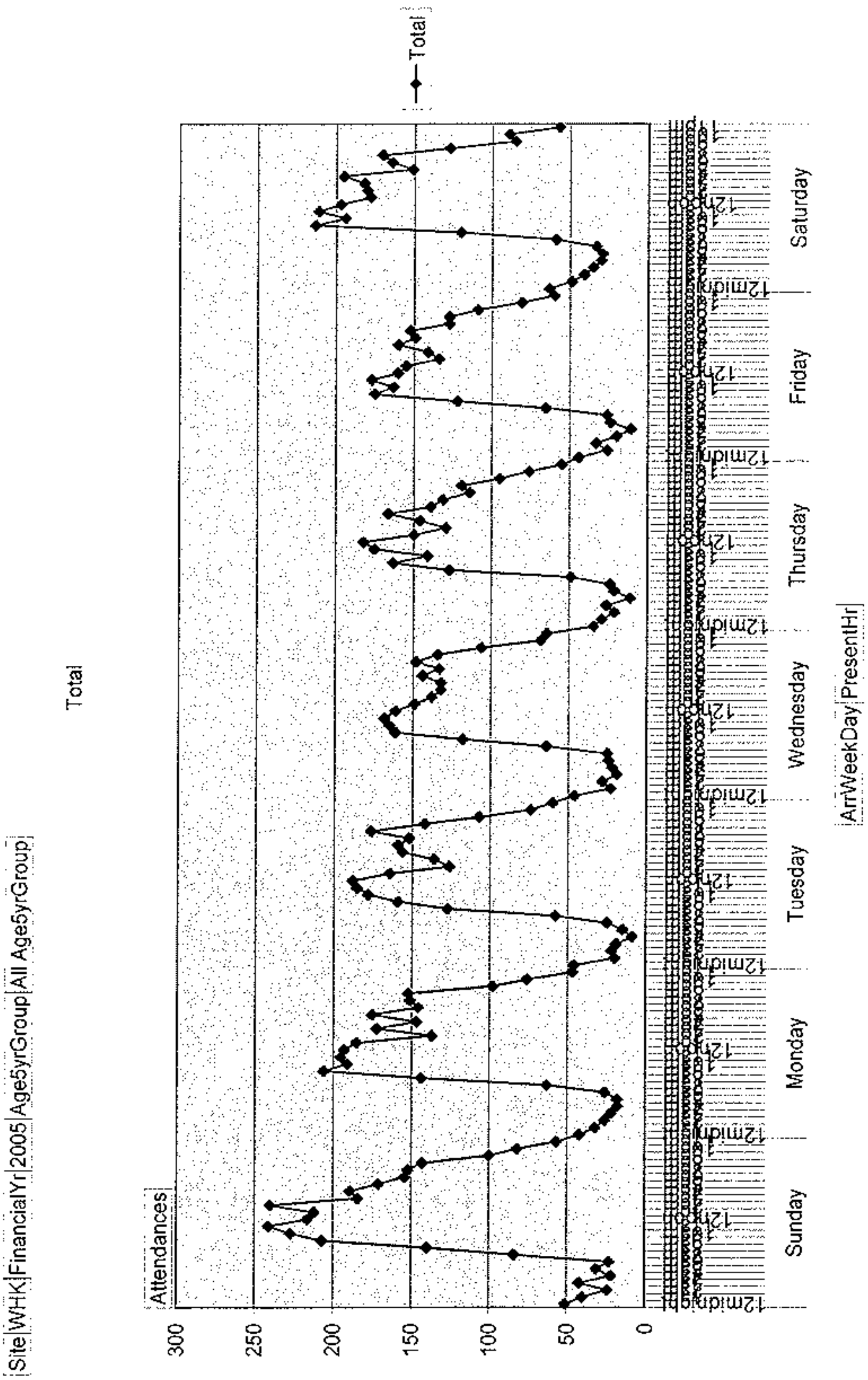
C7.3.9 <u>Chart</u>: Hospital T – FULL Fin Year 2005 - Presentation Hour per Day of Week



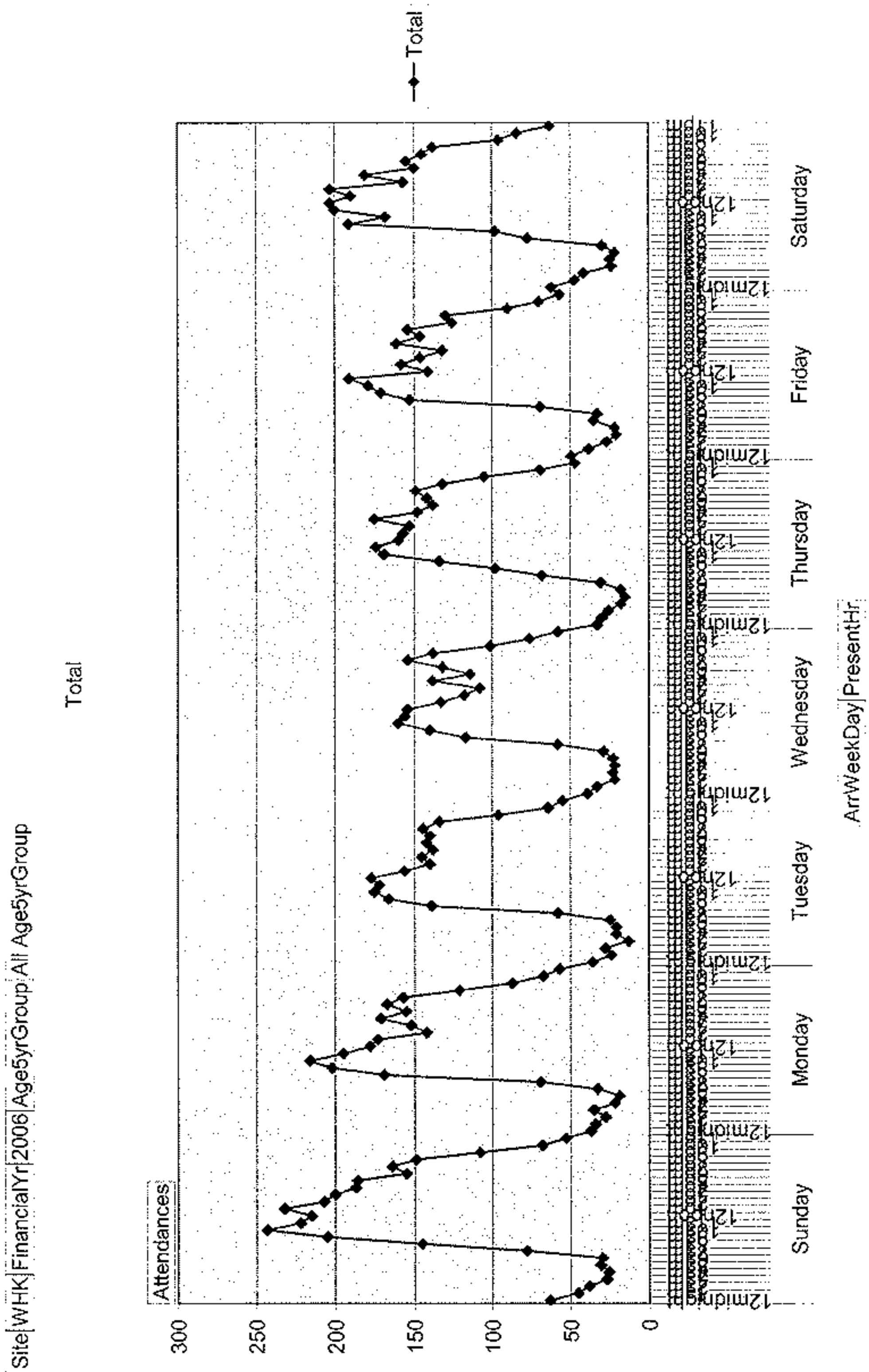
C7.3.10 <u>Chart</u>: Hospital T – FULL Fin Year 2006 - Presentation Hour per Day of Week

C7.3.11 Chart: Hospital T – FULL Fin Year 2007 - Presentation Hour per Day of Week

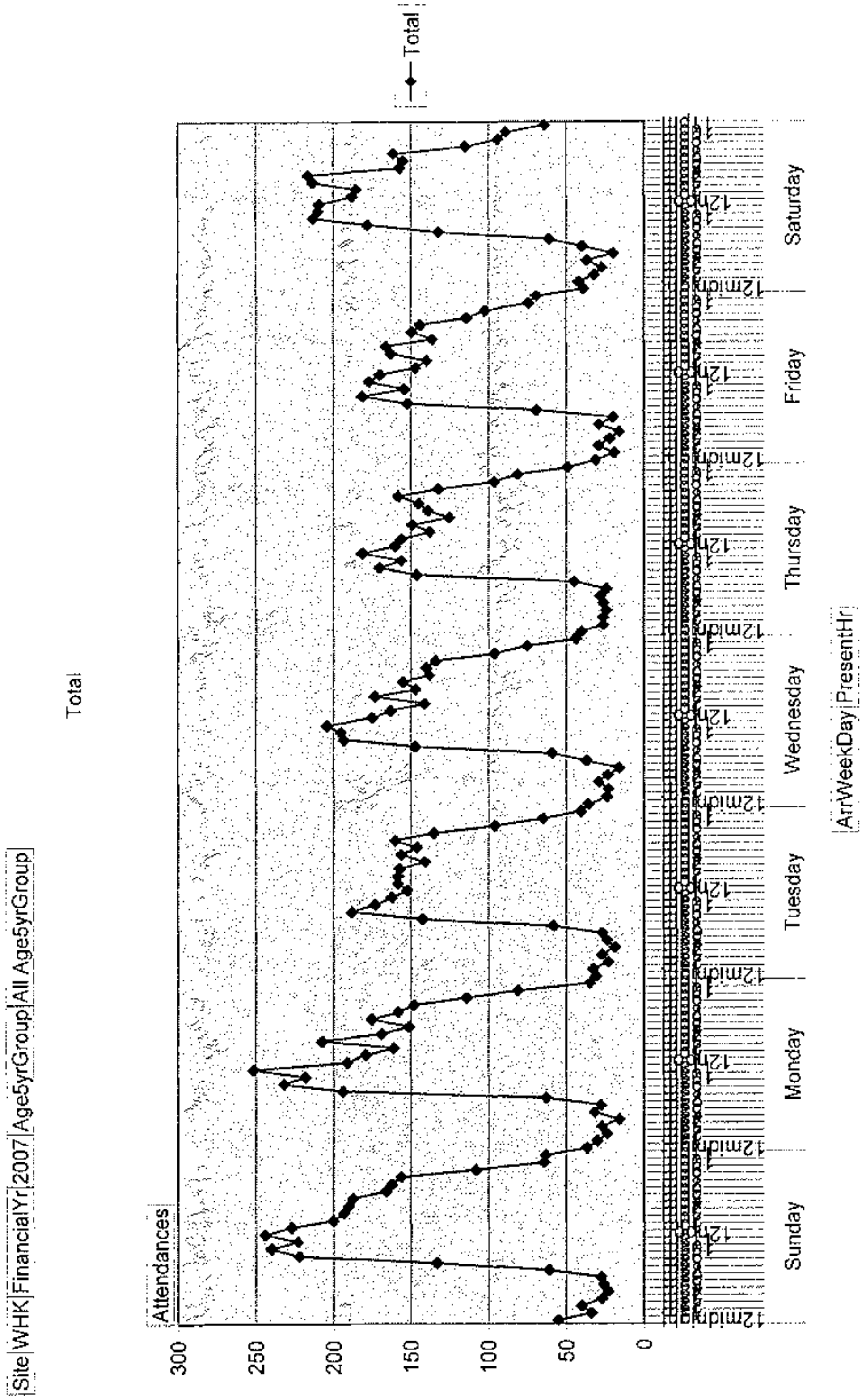




C7.3.12 Chart: Hospital W – FULL Fin Year 2005 - Presentation Hour per Day of Week

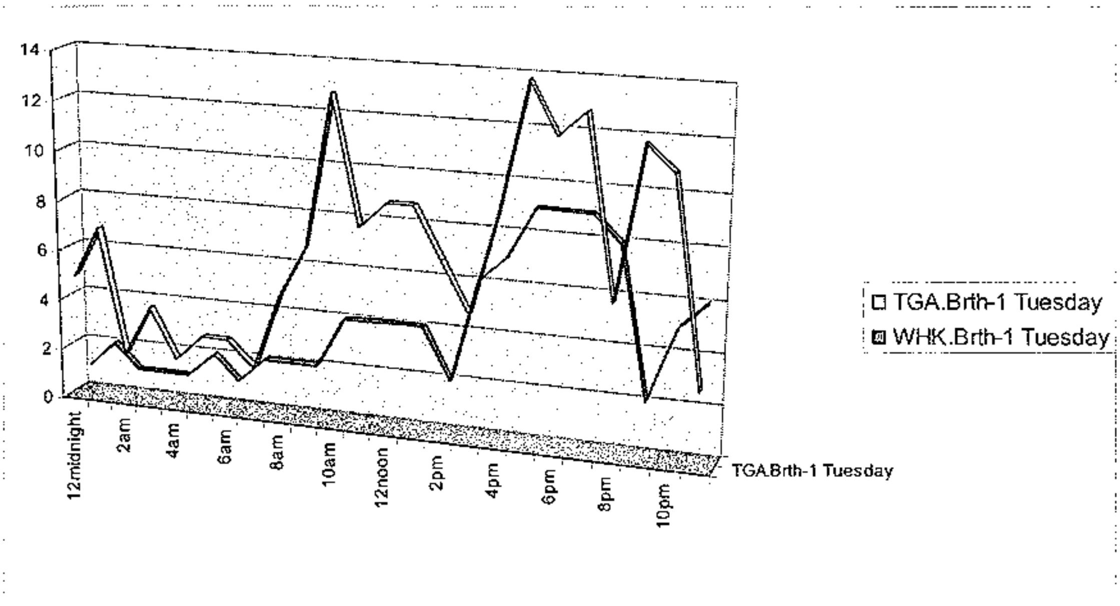


C7.3.13 Chart: Hospital W – FULL Fin Year 2006 - Presentation Hour per Day of Week

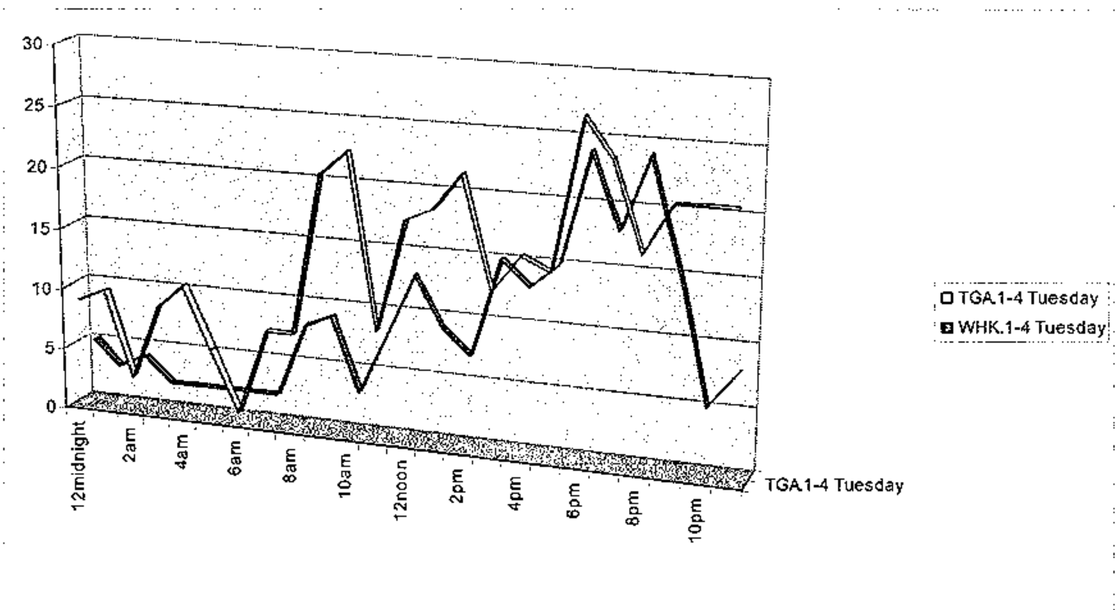


C7.3.14 Chart: Hospital W – FULL Fin Year 2007 - Presentation Hour per Day of Week

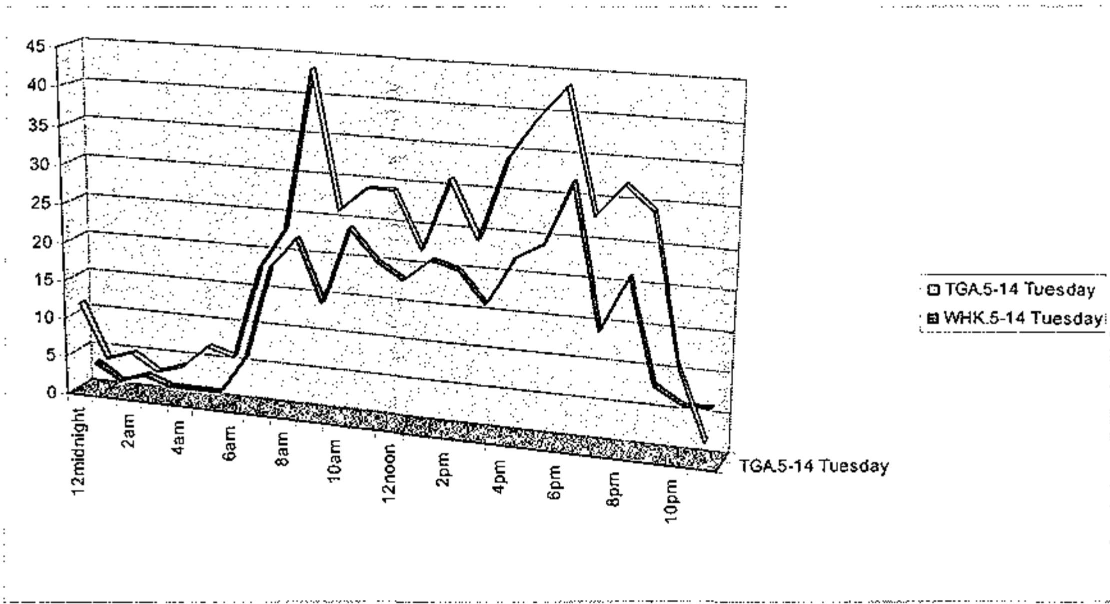
SUPERIMPOSED CHARTS OF HOSP T & HOSP W PER TIME OF DAY PERFORMANCE ON TUESDAYS FOR FIN YEAR 2006



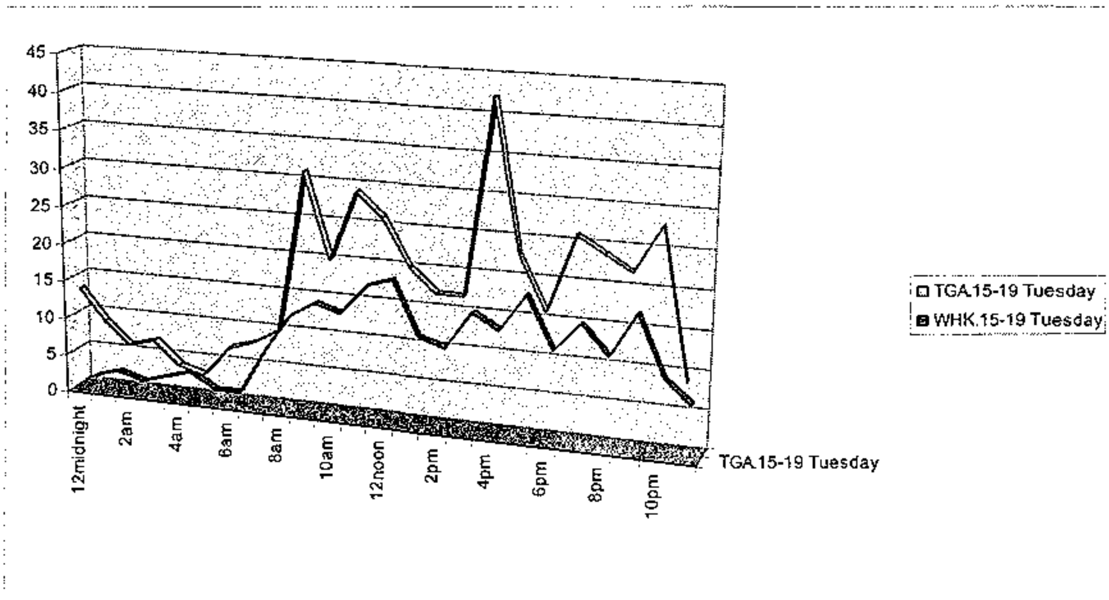
C7.3.15 Chart: Hosp T & Hosp W – FULL Fin Yr 2006 – Tuesdays only – Age Group: Under 1 Yr - Hr of Attendance



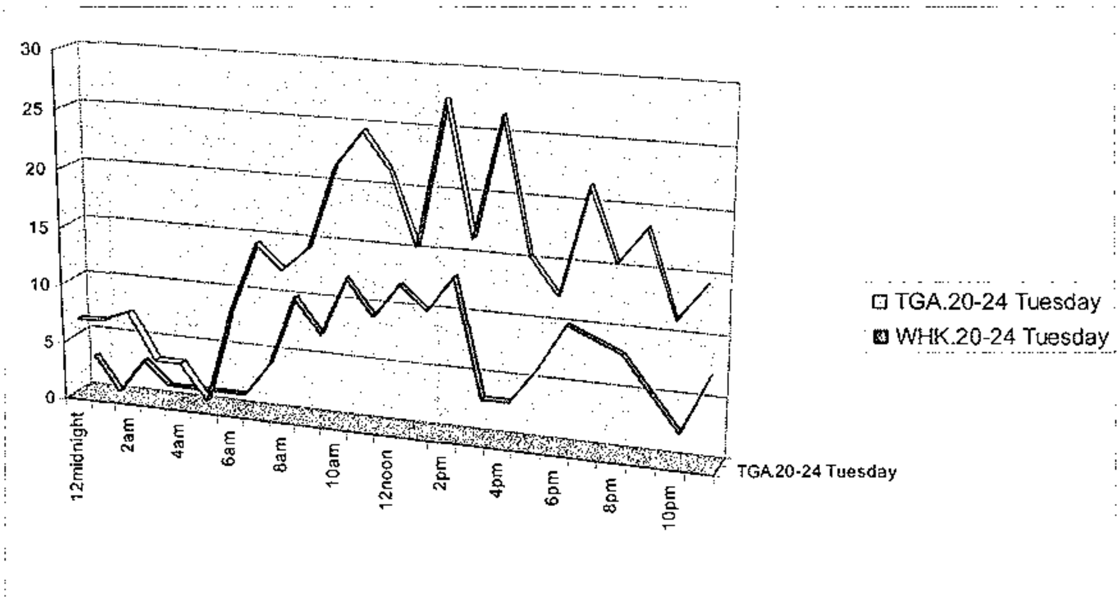
C7.3.16 Chart: Hosp T & Hosp W – FULL Fin Yr 2006 – Tuesdays only – Age Group: 1-4 Yrs - Hr of Attendance



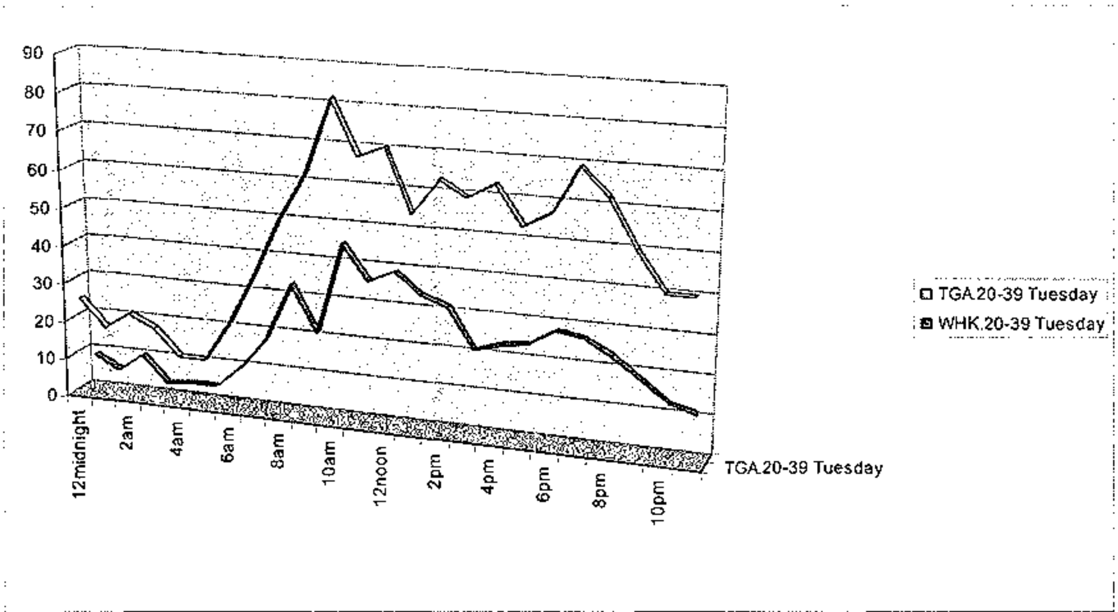
C7.3.17 Chart: Hosp T & Hosp W – FULL Fin Yr 2006 – Tuesdays only – Age Group: 5-14 Yrs - Hr of Attendance



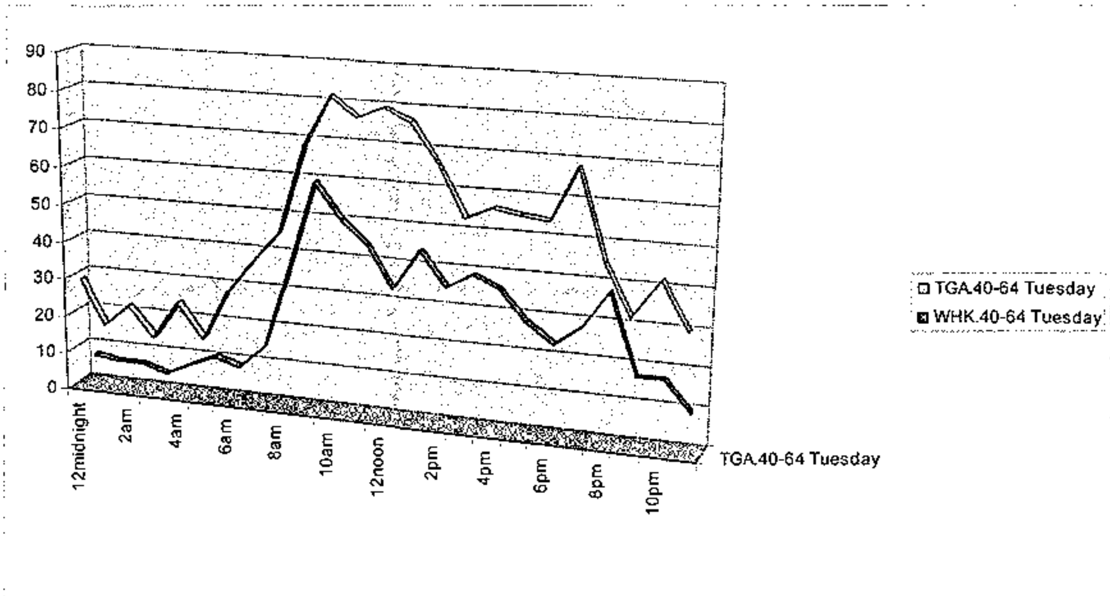
C7.3.18 Chart: Hosp T & Hosp W – FULL Fin Yr 2006 – Tuesdays only – Age Group: 15-19 Yrs - Hr of Attendance



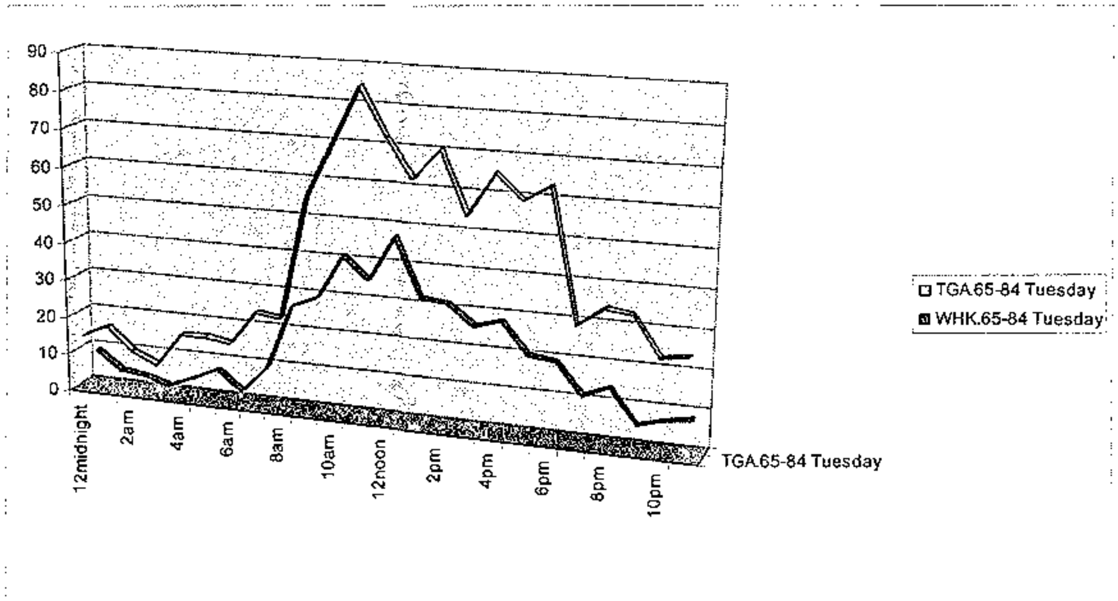
C7.3.19 Chart: Hosp T & Hosp W – FULL Fin Yr 2006 – Tuesdays only – Age Group: 20-24 Yrs - Hr of Attendance



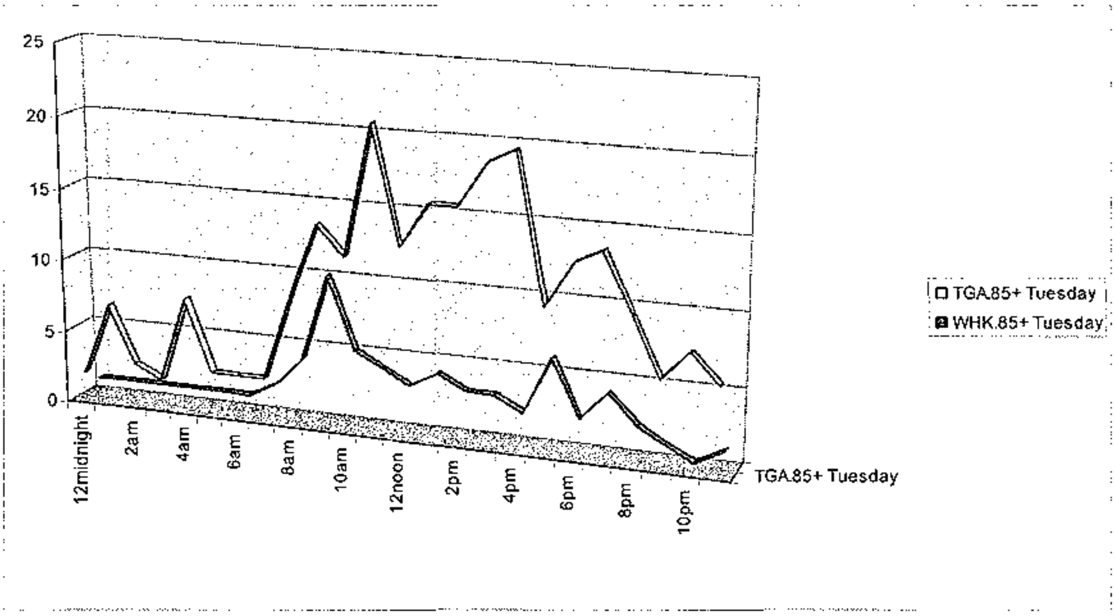
C7.3.20 Chart: Hosp T & Hosp W – FULL Fin Yr 2006 – Tuesdays only – Age Group: 20-39 Yrs - Hr of Attendance



C7.3.21 Chart: Hosp T & Hosp W – FULL Fin Yr 2006 – Tuesdays only – Age Group: 40-64 Yrs - Hr of Attendance

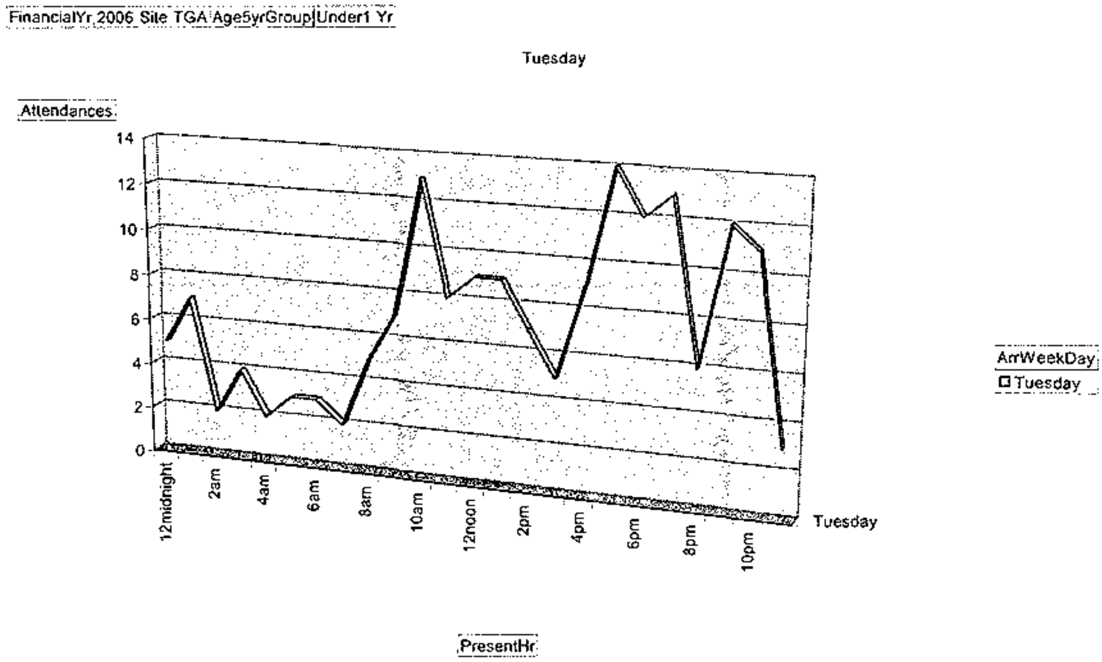


C7.3.22 Chart: Hosp T & Hosp W – FULL Fin Yr 2006 – Tuesdays only – Age Group: 65-84 Yrs - Hr of Attendance

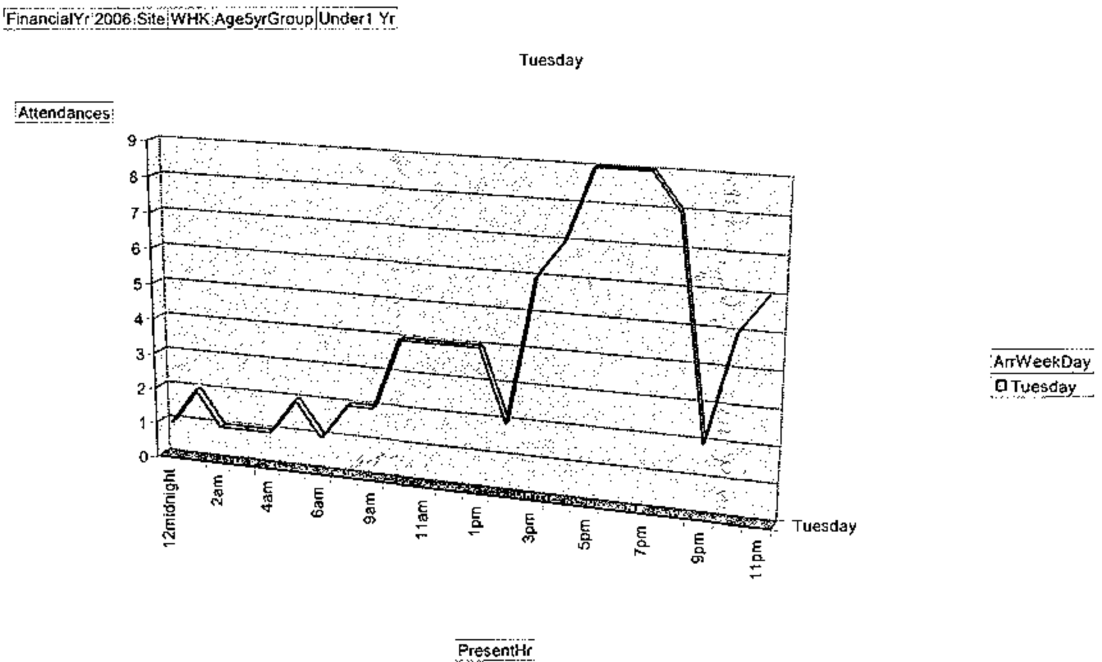


C7.3.23 Chart: Hosp T & Hosp W – FULL Fin Yr 2006 – Tuesdays only – Age Group: 85+ Yrs - Hr of Attendance

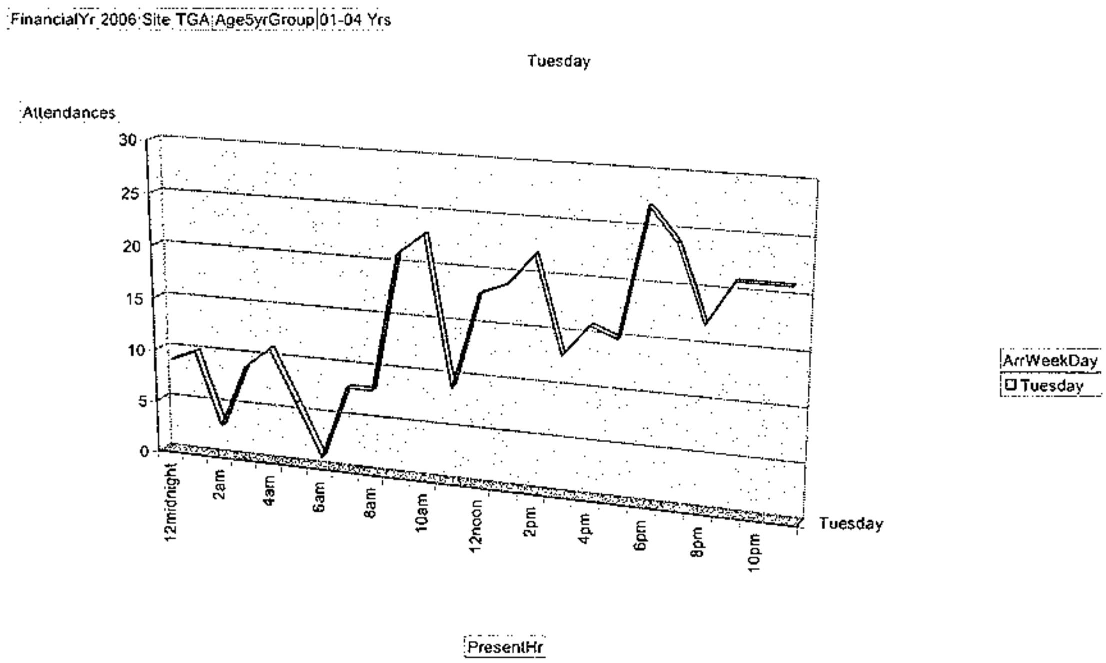
SEPERATE CHARTS OF HOSP T & HOSP W PER TIME OF DAY PERFORMANCE ON TUESDAYS FOR FIN YEAR 2006



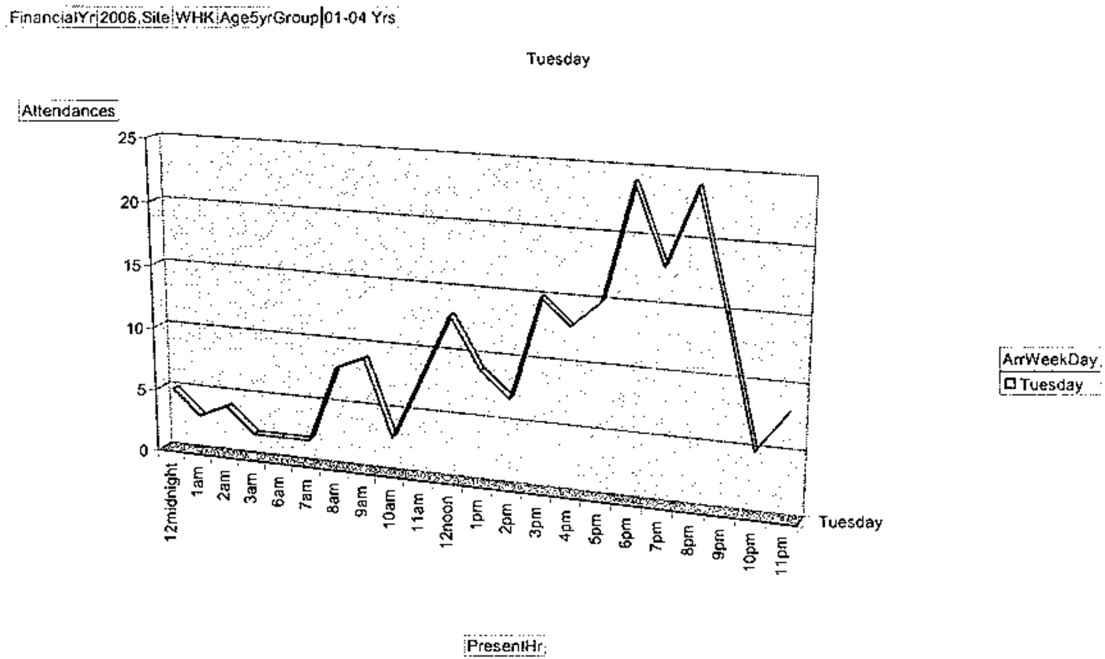
C7.3.24 Chart: Hosp T – FULL Fin Yr 2006 – Tuesdays only – Age Group: Under 1 Yr - Hr of Attendance



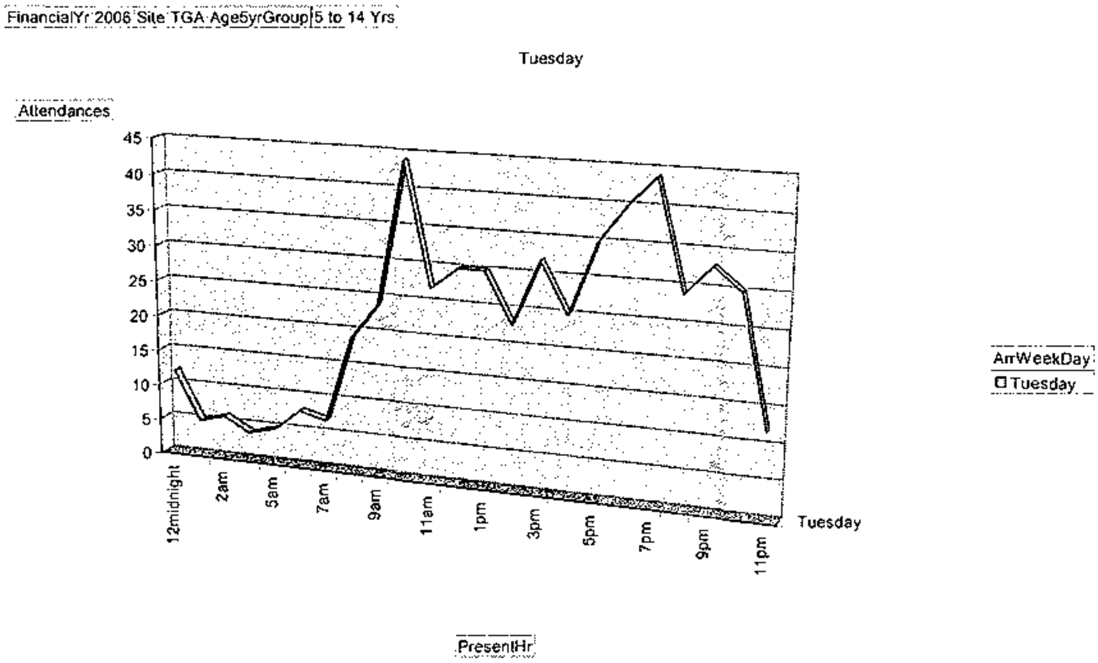
C7.3.25 Chart: Hosp W – FULL Fin Yr 2006 – Tuesdays only – Age Group: Under 1 Yr - Hr of Attendance



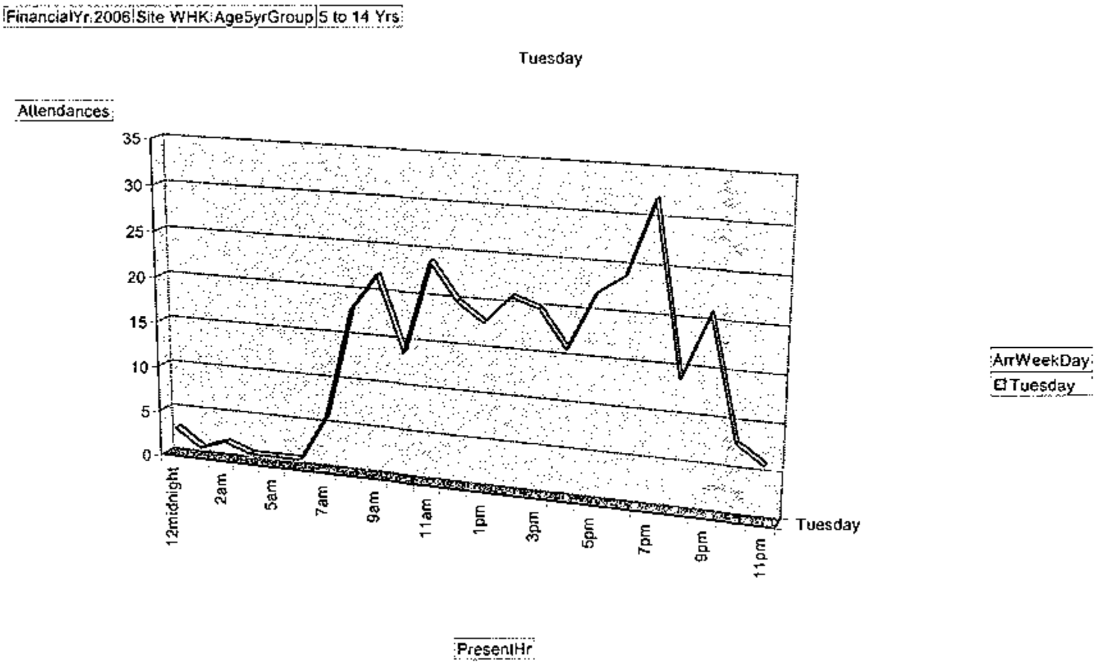
C7.3.26 Chart: Hosp T – FULL Fin Yr 2006 – Tuesdays only – Age Group: 1-4 Yrs - Hr of Attendance



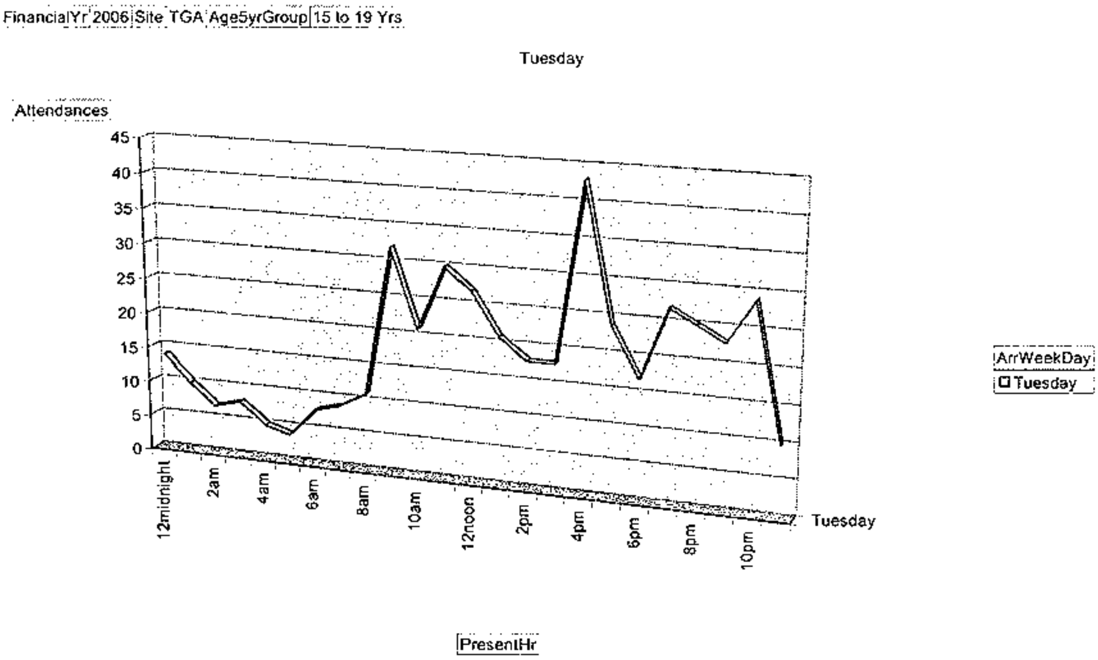
C7.3.27 Chart: Hosp W – FULL Fin Yr 2006 – Tuesdays only – Age Group: 1-4 Yrs - Hr of Attendance



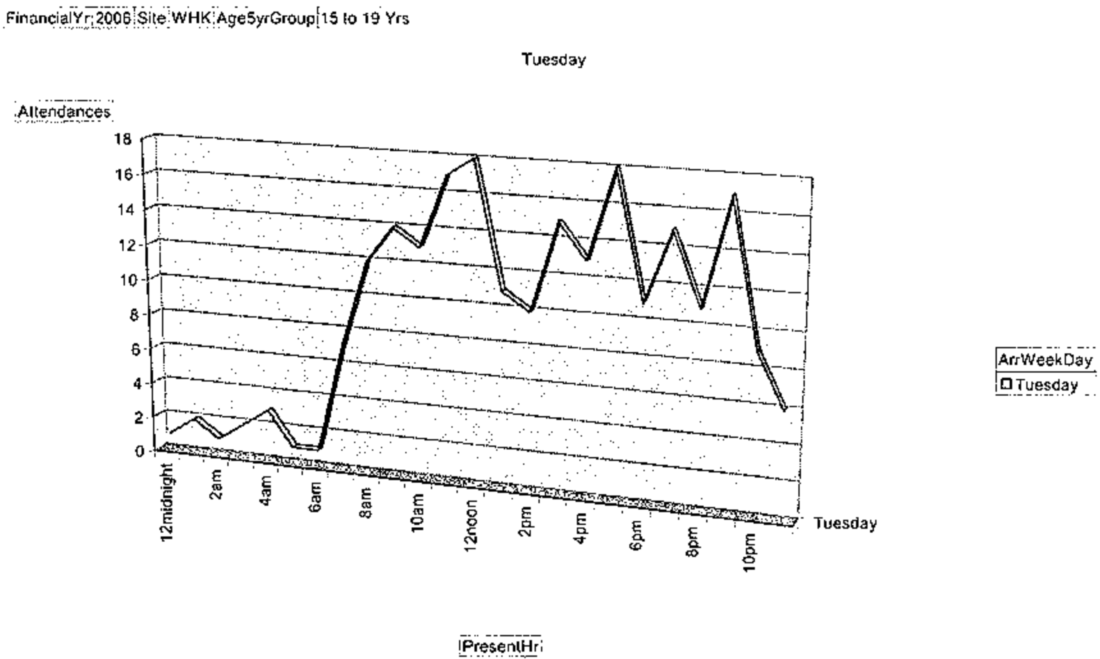
C7.3.28 Chart: Hosp T – FULL Fin Yr 2006 – Tuesdays only – Age Group: 5-14 Yrs - Hr of Attendance



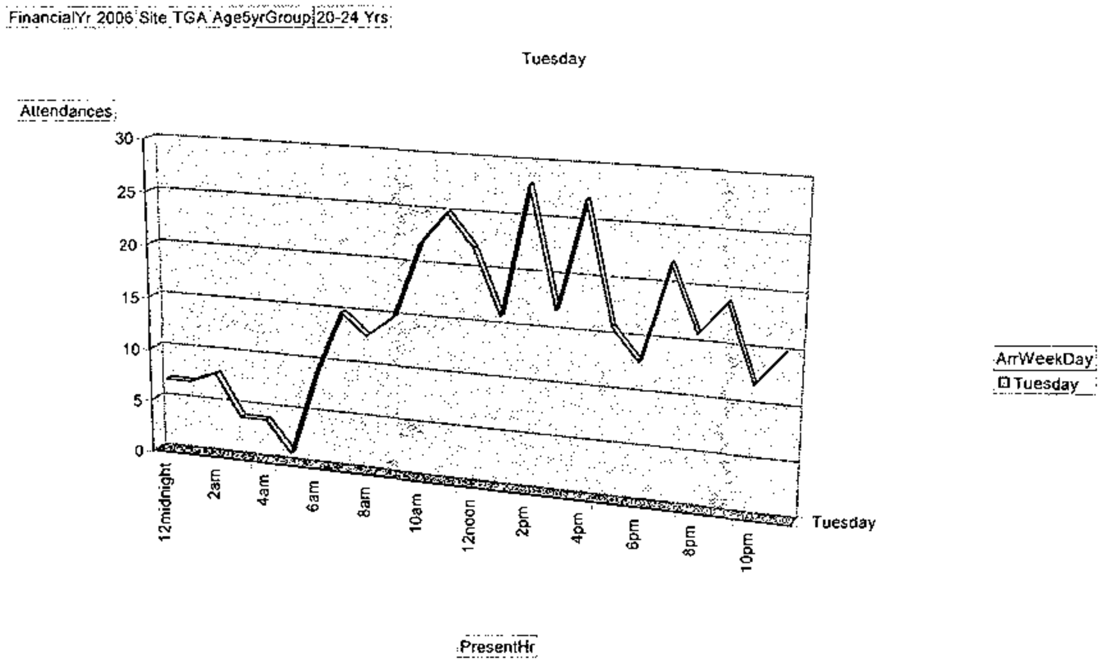
C7.3.29 Chart: Hosp W – FULL Fin Yr 2006 – Tuesdays only – Age Group: 5-14 Yrs - Hr of Attendance



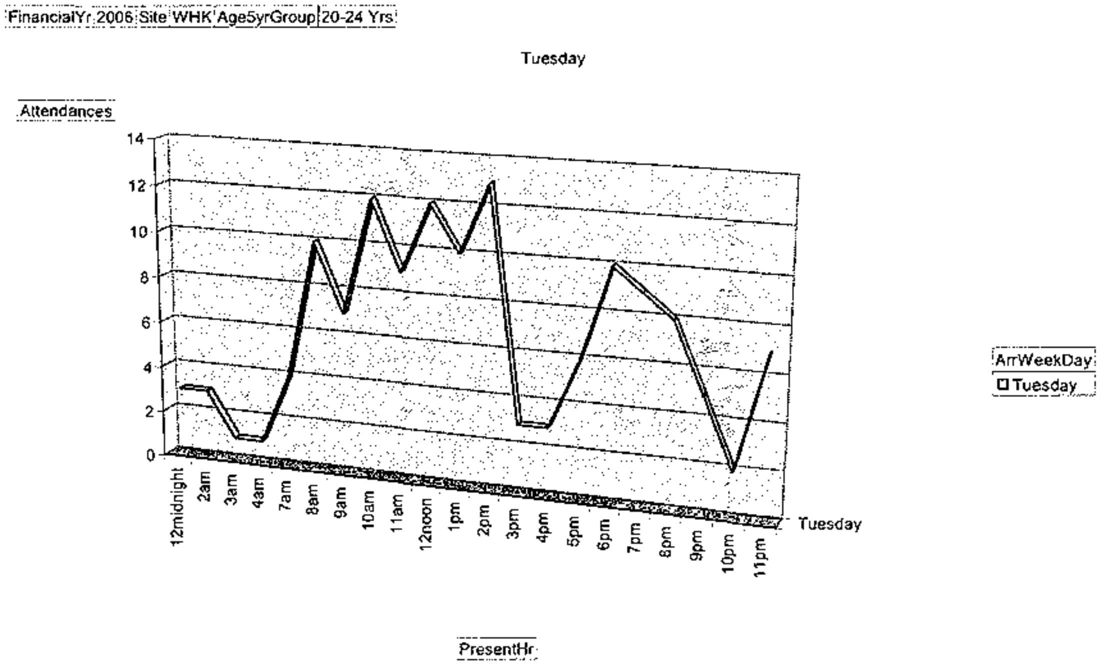
C7.3.30 Chart: Hosp T – FULL Fin Yr 2006 – Tuesdays only – Age Group: 15-19 Yrs - Hr of Attendance



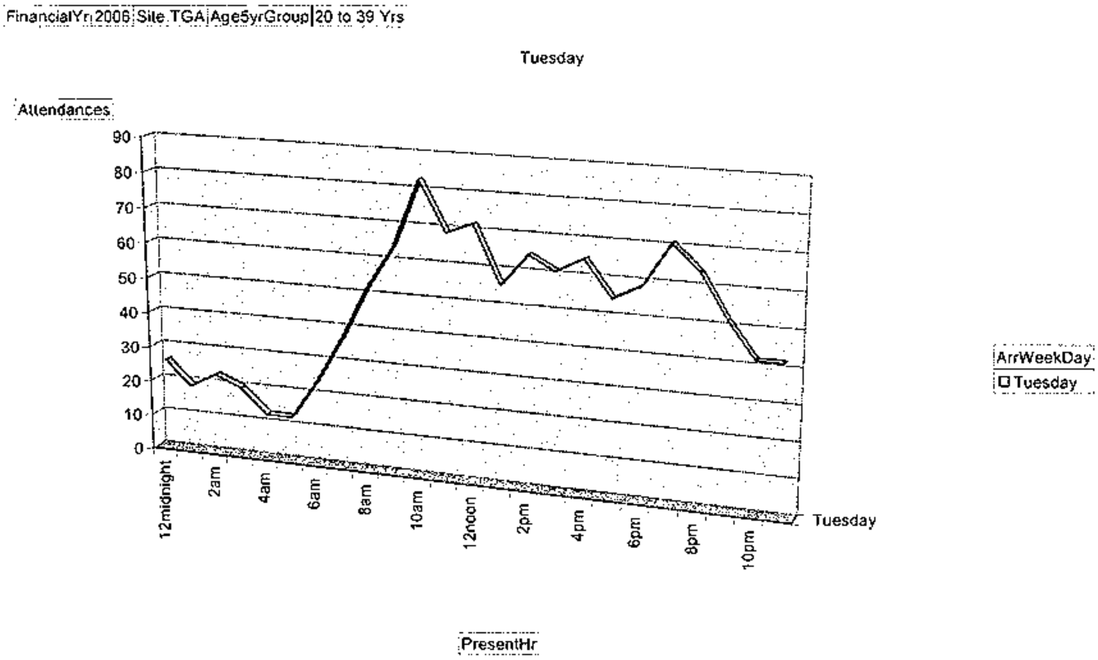
C7.3.31 Chart: Hosp W – FULL Fin Yr 2006 – Tuesdays only – Age Group: 15-19 Yrs - Hr of Attendance



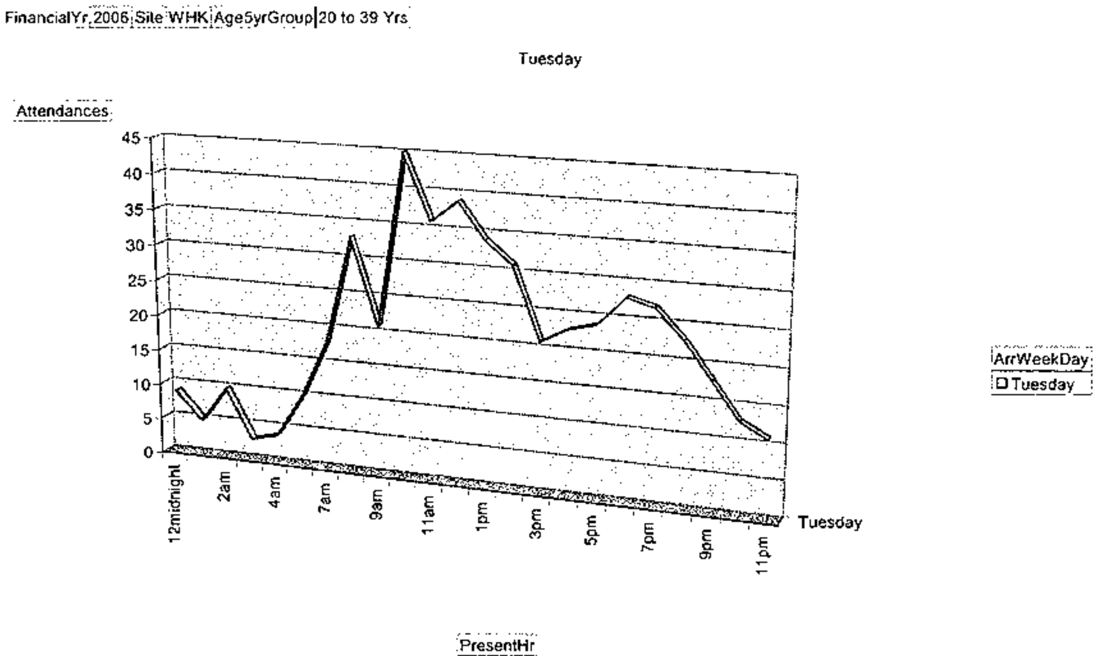
C7.3.32 Chart: Hosp T – FULL Fin Yr 2006 – Tuesdays only – Age Group: 20-24 Yrs - Hr of Attendance



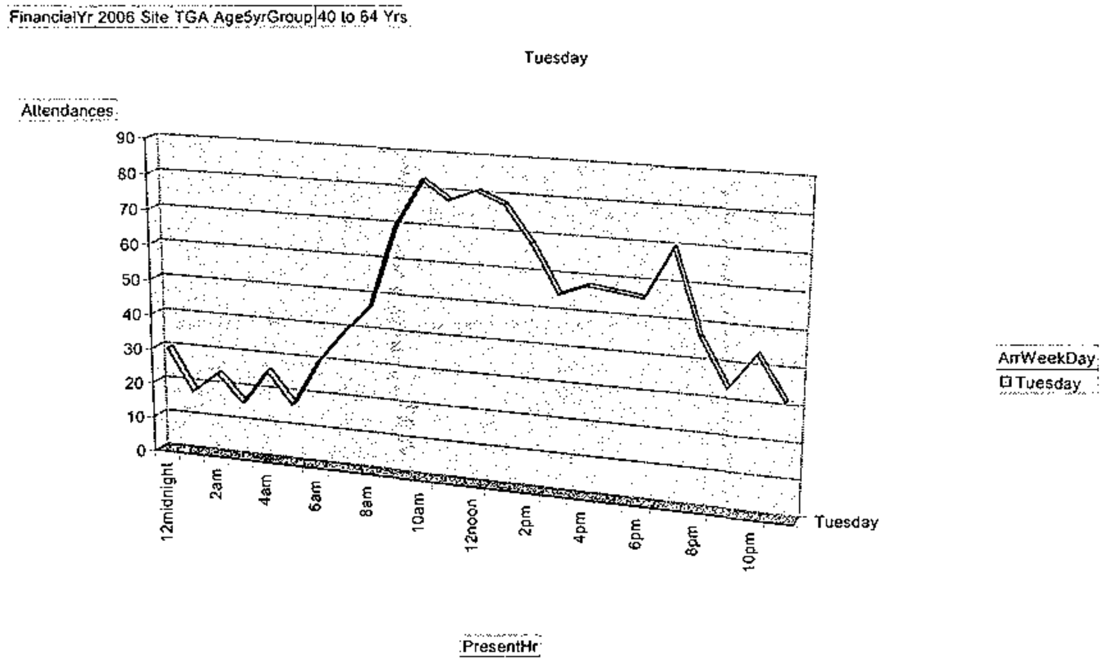
C7.3.33 Chart: Hosp W – FULL Fin Yr 2006 – Tuesdays only – Age Group: 20-24 Yrs - Hr of Attendance



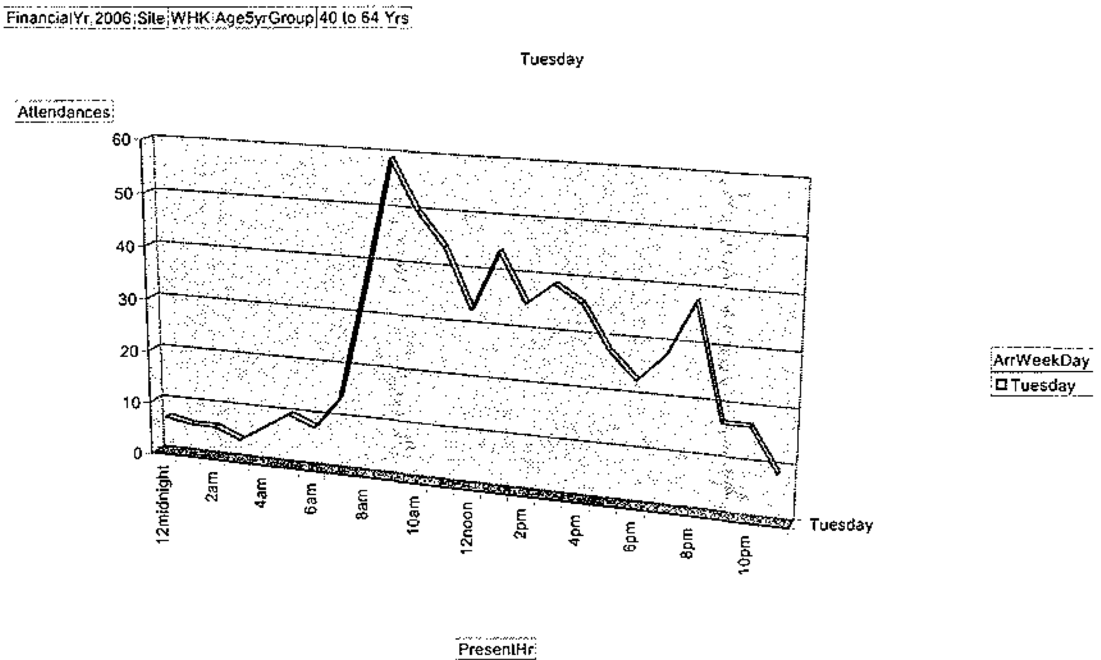
C7.3.34 Chart: Hosp T – FULL Fin Yr 2006 – Tuesdays only – Age Group: 20-39 Yrs - Hr of Attendance



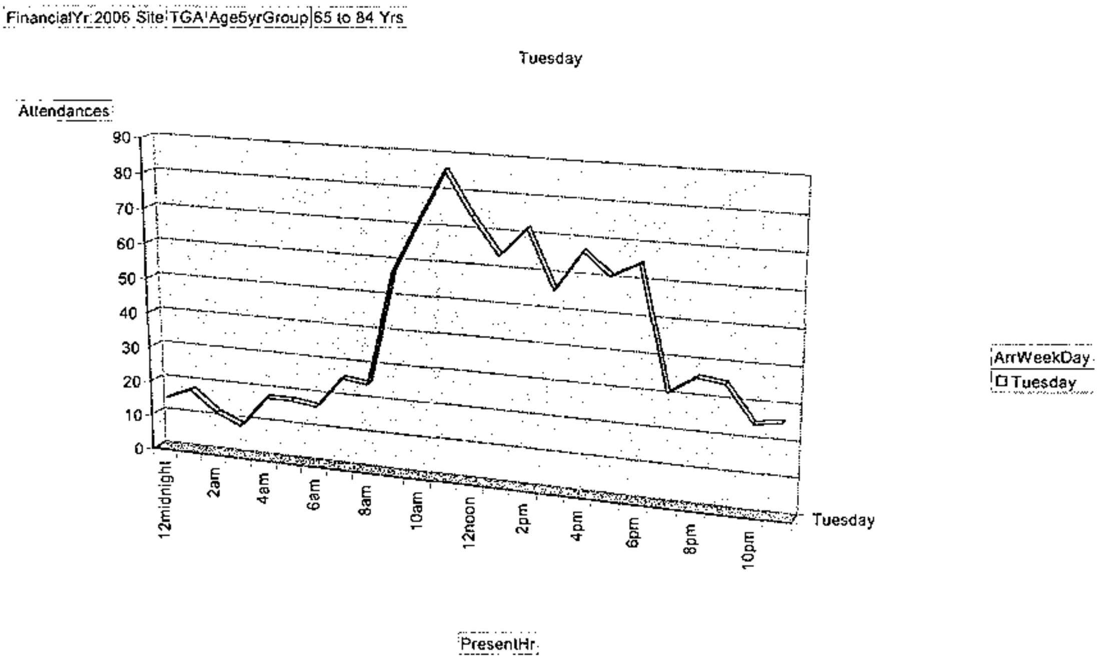
C7.3.35 Chart: Hosp W – FULL Fin Yr 2006 – Tuesdays only – Age Group: 20-39 Yrs - Hr of Attendance



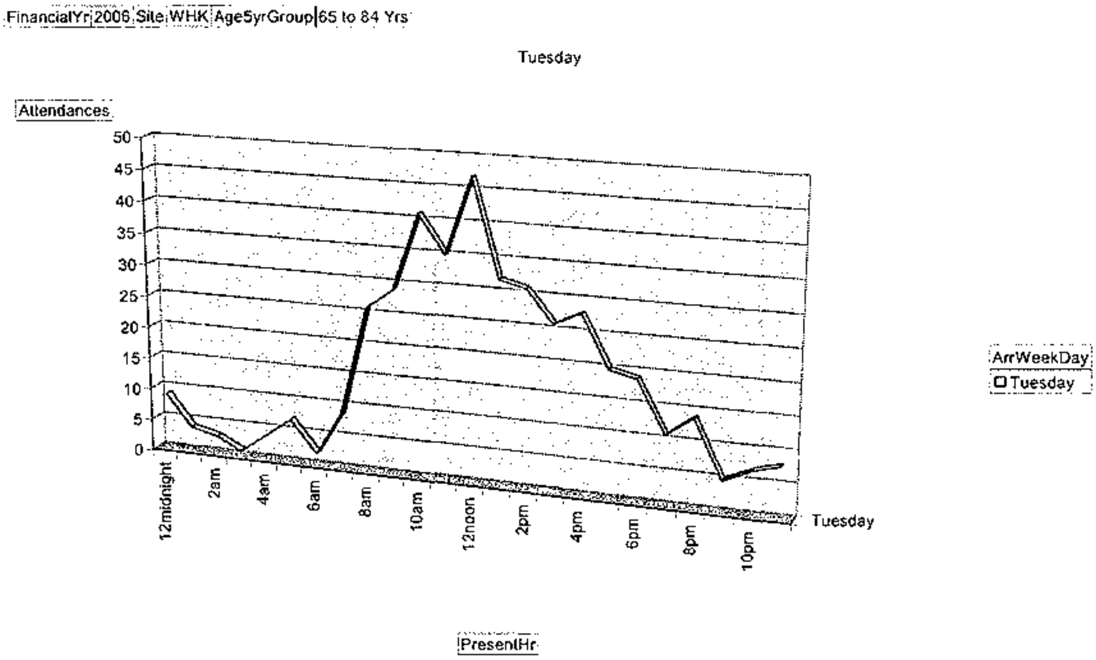
C7.3.36 Chart: Hosp T – FULL Fin Yr 2006 – Tuesdays only – Age Group: 40-64 Yrs - Hr of Attendance



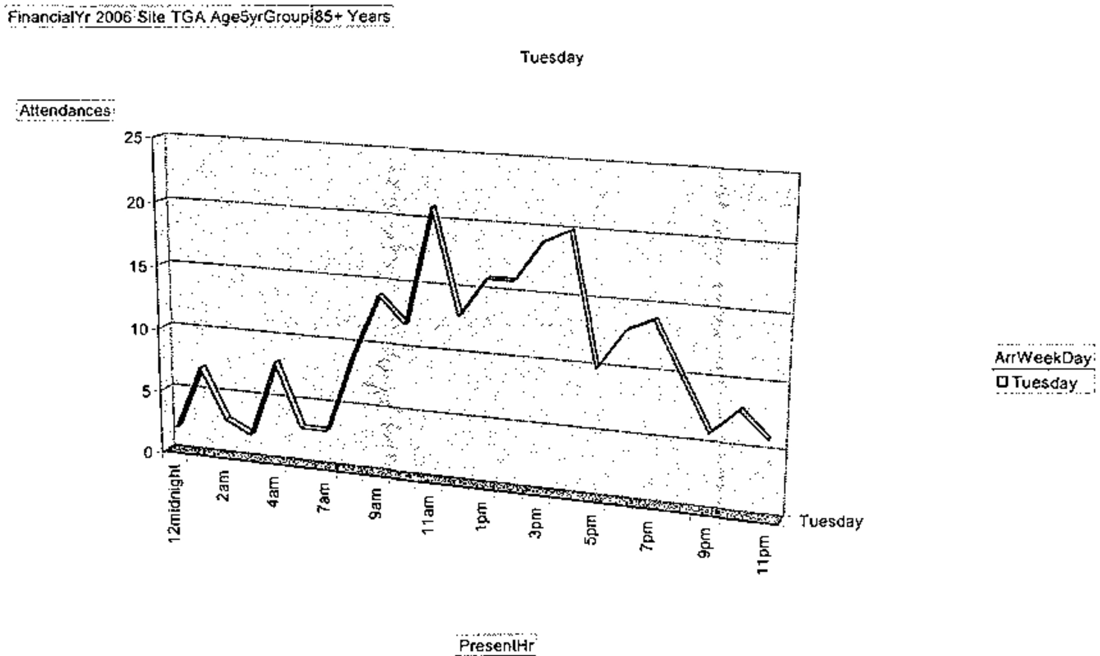
C7.3.37 Chart: Hosp W – FULL Fin Yr 2006 – Tuesdays only – Age Group: 40-64 Yrs - Hr of Attendance



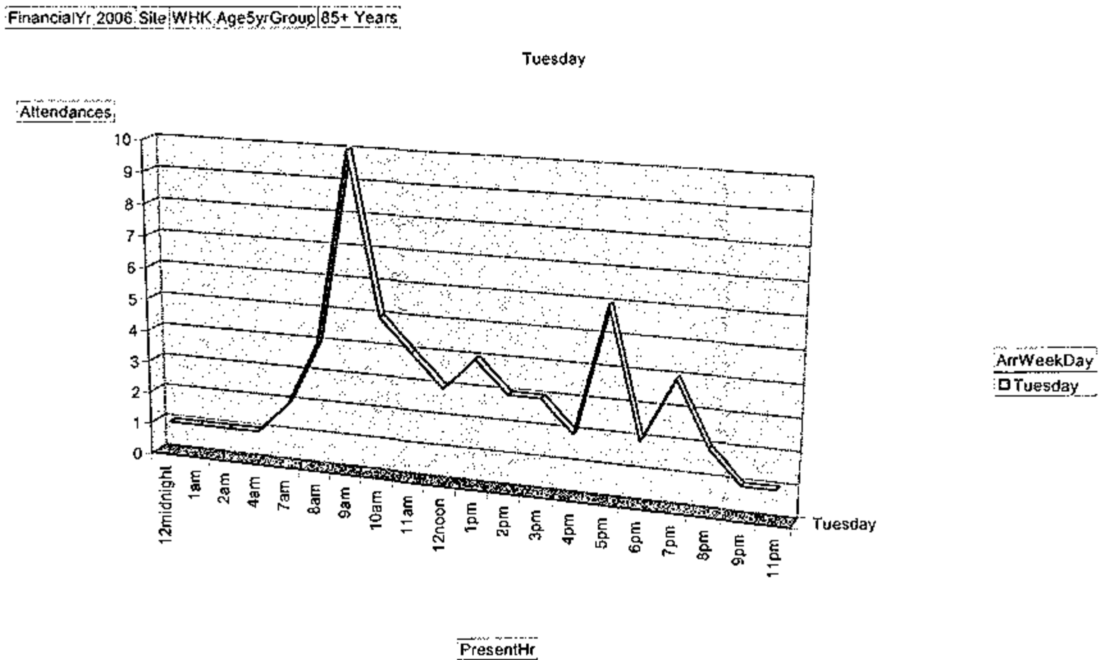
C7.3.38 Chart: Hosp T – FULL Fin Yr 2006 – Tuesdays only – Age Group: 65-84 Yrs - Hr of Attendance



C7.3.39 Chart: Hosp W – FULL Fin Yr 2006 – Tuesdays only – Age Group: 65-84 Yrs - Hr of Attendance



C7.3.40 Chart: Hosp T – FULL Fin Yr 2006 – Tuesdays only – Age Group: 85 Yrs Plus - Hr of Attendance



C7.3.41 Chart: Hosp W – FULL Fin Yr 2006 – Tuesdays only – Age Group: 85 Yrs Plus - Hr of Attendance

13.1 APPENDIX A4: RESULTS: CHAPTER 7.4

RESULTS HELD IN THIS APPENDIX

S7.4.1	**S7.4.2**				
C7.4.1	**C7.4.2**	**C7.4.3**	**C7.4.4**	**C7.4.5**	**C7.4.6**
C7.4.7	**C7.4.8**	**C7.4.9**	**C7.4.10**	**C7.4.11**	**C7.4.12**
C7.4.13	**C7.4.14**	**C7.4.15**	**C7.4.16**		

7.4 RESULTS: Using FULL DS: PER SEASON – PREVALENCE OF TRIAGE RATINGS PER DAY OF WEEK

- **(Postulate4)** Per Season: To determine prevalence of various **Triage** / "urgency" ratings **per Day of Week**

7.4.1 Using FULL DS: FINDINGS

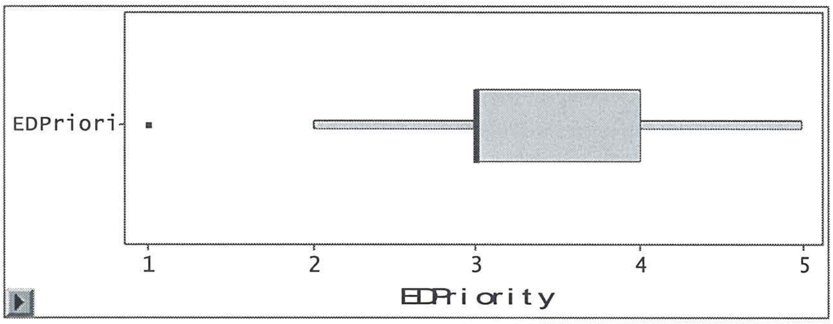
FINDINGS AND COMMENTS

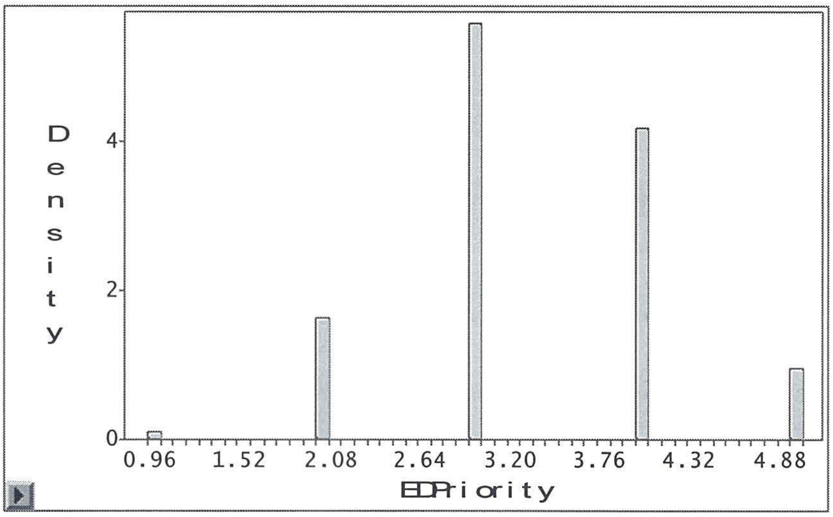
Cf. Earlier Pages **100 - 106**

7.4.2 Using FULL DS: SAS RESULTS

Hospital T: Triage

EDPriority





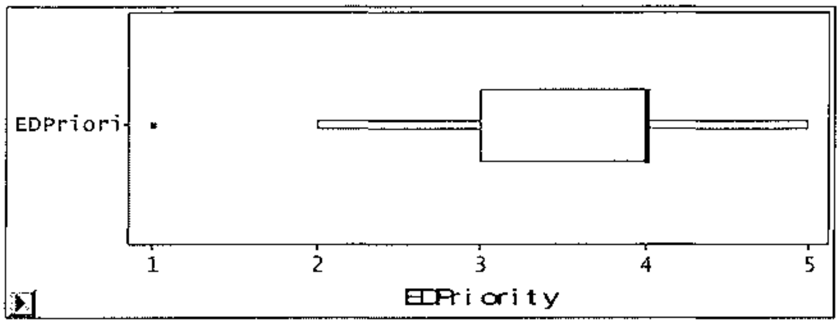
Moments			
N	35244.0000	Sum Wgts	35244.0000
Mean	3.3417	Sum	117776.000
Std Dev	0.8328	Variance	0.6935
Skewness	0.0023	Kurtosis	-0.2115
USS	418016.000	CSS	24440.1807
CV	24.9198	Std Mean	0.0044

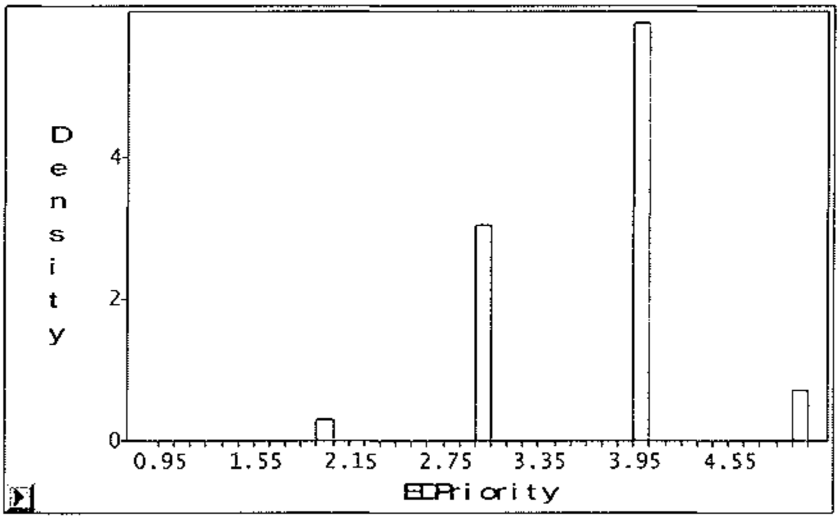
Quantiles			
100% Max	5.0000	99.0%	5.0000
75% Q3	4.0000	97.5%	5.0000
50% Med	3.0000	95.0%	5.0000
25% Q1	3.0000	90.0%	4.0000
0% Min	1.0000	10.0%	2.0000
Range	4.0000	5.0%	2.0000
Q3-Q1	1.0000	2.5%	2.0000
Mode	3.0000	1.0%	2.0000

S7.4.1 Box Plot: Triage Statistics for Hospital T for All of Financial Year 2006

Hospital W: Triage

EDPriority





Moments			
N	18053.0000	Sum Wgts	18053.0000
Mean	3.7025	Sum	66841.0000
Std Dev	0.6478	Variance	0.4196
Skewness	-0.3878	Kurtosis	0.3934
USS	255053.000	CSS	7575.0583
CV	17.4959	Std Mean	0.0048

Quantiles			
100% Max	5.0000	99.0%	5.0000
75% Q3	4.0000	97.5%	5.0000
50% Med	4.0000	95.0%	5.0000
25% Q1	3.0000	90.0%	4.0000
0% Min	1.0000	10.0%	3.0000
Range	4.0000	5.0%	3.0000
Q3-Q1	1.0000	2.5%	2.0000
Mode	4.0000	1.0%	2.0000

S7.4.2 <u>Box Plot</u>: Triage Statistics for Hospital W for All of Financial Year 2006

7.4.3 Using FULL DS: CUBE RESULTS

Site	TGA
FinancialYr	2006

Attendances		ArrWeekDay							
ArrMonth	TriageLevel	Sunday	Monday	Tuesday	Wednes	Thursda	Friday	Saturday	Grand Total
July	RESUSCITATION (IMME)	7	1	1	2	1	3	3	18
	EMERGENCY (10MINS)	64	60	45	44	43	59	59	374
	URGENT (30MINS)	247	165	172	197	193	248	229	1451
	SEMI-URGENT (60MINS)	144	108	110	74	129	118	137	820
	NON-URGENT (2HRS)	24	34	27	35	22	25	29	196
July Total		486	368	355	352	388	453	457	2859
August	RESUSCITATION (IMME)	3	6	5	7	2	4	6	33
	EMERGENCY (10MINS)	55	68	66	80	50	70	63	452
	URGENT (30MINS)	183	230	237	229	183	195	175	1432
	SEMI-URGENT (60MINS)	127	168	146	155	135	121	126	978
	NON-URGENT (2HRS)	36	40	22	29	33	22	20	202
August Total		404	512	476	500	403	412	390	3097
September	RESUSCITATION (IMME)	5	5	3	5	5	4	2	29
	EMERGENCY (10MINS)	48	61	47	42	49	44	55	346
	URGENT (30MINS)	167	170	164	190	202	224	188	1305
	SEMI-URGENT (60MINS)	143	124	124	106	132	179	125	933
	NON-URGENT (2HRS)	43	25	17	31	12	22	17	167
September Total		406	385	355	374	400	473	387	2780
October	RESUSCITATION (IMME)	5	5	2	4	3	6	4	29
	EMERGENCY (10MINS)	70	64	66	47	54	48	54	403
	URGENT (30MINS)	205	225	174	138	184	168	201	1295
	SEMI-URGENT (60MINS)	149	189	123	113	121	112	117	924
	NON-URGENT (2HRS)	45	20	32	43	17	32	23	212
October Total		474	503	397	345	379	366	399	2863
November	RESUSCITATION (IMME)	8	1	5	6		3	3	26
	EMERGENCY (10MINS)	61	47	63	57	48	58	60	394
	URGENT (30MINS)	170	178	226	229	156	167	175	1301
	SEMI-URGENT (60MINS)	137	137	156	145	115	114	121	925
	NON-URGENT (2HRS)	36	20	36	35	33	17	20	197
November Total		412	383	486	472	352	359	379	2843
December	RESUSCITATION (IMME)	3	3	6	3	4	3	4	26
	EMERGENCY (10MINS)	67	51	59	46	64	62	56	405
	URGENT (30MINS)	168	176	171	179	195	246	187	1322
	SEMI-URGENT (60MINS)	149	165	122	143	152	159	179	1069
	NON-URGENT (2HRS)	45	39	30	28	28	32	44	246
December Total		432	434	388	399	443	502	470	3068
January	RESUSCITATION (IMME)	7	3	3	5	2	7	4	31
	EMERGENCY (10MINS)	55	70	61	59	45	43	41	374
	URGENT (30MINS)	260	232	218	164	141	154	160	1329
	SEMI-URGENT (60MINS)	227	224	185	146	133	157	128	1200
	NON-URGENT (2HRS)	49	41	50	47	20	32	36	275
January Total		598	570	517	421	341	393	369	3209
February	RESUSCITATION (IMME)	4	6	3	1	2	4	2	22
	EMERGENCY (10MINS)	54	49	55	48	48	49	44	347
	URGENT (30MINS)	167	173	183	174	173	139	165	1174
	SEMI-URGENT (60MINS)	145	131	135	162	148	161	131	1013
	NON-URGENT (2HRS)	46	40	32	20	31	17	38	224
February Total		416	399	408	405	402	370	380	2780

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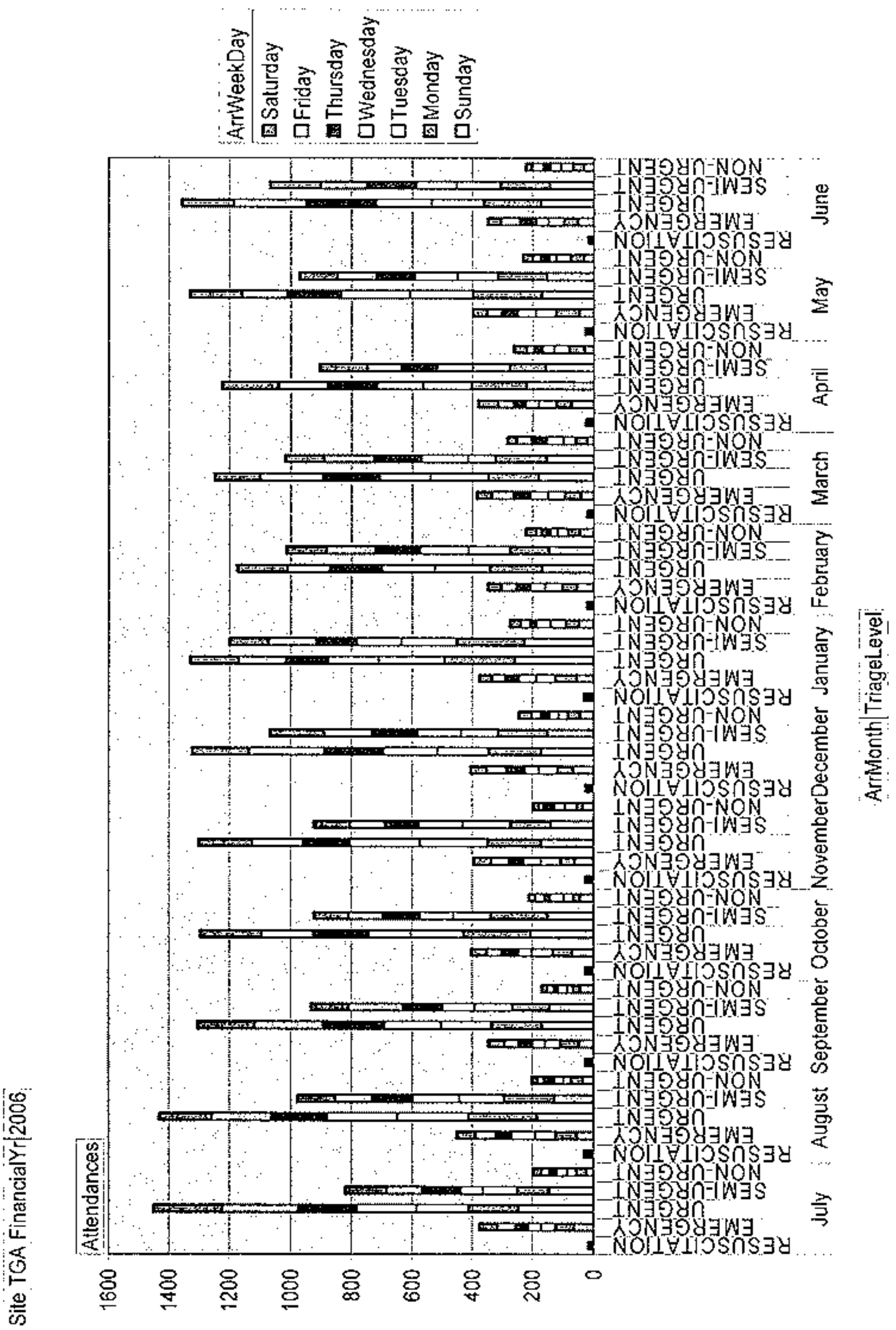
C7.4.1 Cube Pivot Table: Hosp T – FULL Fin Yr 2006 – Season by DOW by Triage (**Jul 2005 – Feb 2006**)

(...Continued from previous page)

Site	TGA
FinancialYr	2006

Attendances		ArrWeekDay							
ArrMonth	TriageLevel	Sunday	Monday	Tuesday	Wednes	Thursda	Friday	Saturday	Grand Total
March	RESUSCITATION (IMME)	6	3	4	3	1	2	3	22
	EMERGENCY (10MINS)	42	53	52	60	56	70	51	384
	URGENT (30MINS)	178	169	191	167	188	206	150	1249
	SEMI-URGENT (60MINS)	152	172	90	153	159	164	128	1018
	NON-URGENT (2HRS)	23	37	39	54	50	51	30	284
March Total		401	434	376	437	454	493	362	2957
April	RESUSCITATION (IMME)	6		4	3	3	3	8	27
	EMERGENCY (10MINS)	73	49	56	46	38	52	66	380
	URGENT (30MINS)	221	182	159	152	164	161	184	1223
	SEMI-URGENT (60MINS)	156	121	121	118	120	112	156	904
	NON-URGENT (2HRS)	30	51	48	35	30	26	42	262
April Total		486	403	388	354	355	354	456	2796
May	RESUSCITATION (IMME)	4	5	7	4	3		5	28
	EMERGENCY (10MINS)	47	76	66	60	52	49	48	398
	URGENT (30MINS)	168	231	208	226	176	150	171	1330
	SEMI-URGENT (60MINS)	151	163	135	142	126	128	126	971
	NON-URGENT (2HRS)	32	45	45	20	30	26	35	233
May Total		402	520	461	452	387	353	385	2960
June	RESUSCITATION (IMME)	1	2	2	3	7	2	2	19
	EMERGENCY (10MINS)	53	44	49	41	56	61	43	347
	URGENT (30MINS)	170	191	172	184	232	236	172	1357
	SEMI-URGENT (60MINS)	143	163	145	134	164	151	167	1067
	NON-URGENT (2HRS)	33	36	38	33	23	38	22	223
June Total		400	436	406	395	482	488	406	3013
Grand Total		5317	5347	5013	4906	4786	5016	4840	35225

C7.4.1 Cube Pivot Table: Hosp T – FULL Fin Yr 2006 – Season by DOW by Triage (**Mar 2006 – Jun 2006**)



C7.4.2 Graph: Hospital T – FULL Fin Yr 2006 – Season by DOW by Triage

Site	WHK								
FinancialYr	2006								
Attendances		ArrWeekDay							
ArrMonth	TriageLevel	Sunday	Monday	Tuesday	Wednes	Thursda	Friday	Saturday	Grand Total
July	RESUSCITATION (IMME)							1	1
	EMERGENCY (10MINS)	9	6	6	9	5	10	8	53
	URGENT (30MINS)	100	65	65	57	59	85	105	536
	SEMI-URGENT (60MINS)	166	101	85	66	77	106	136	737
	NON-URGENT (2HRS)	14	13	12	14	11	8	13	85
July Total		289	185	168	146	152	209	263	1412
August	RESUSCITATION (IMME)				3			1	4
	EMERGENCY (10MINS)	9	6	14	9	7	7	11	63
	URGENT (30MINS)	70	103	68	70	83	63	51	508
	SEMI-URGENT (60MINS)	135	139	115	111	88	113	120	821
	NON-URGENT (2HRS)	1	8	14	15	10	3	13	64
August Total		215	256	211	208	188	186	196	1460
September	RESUSCITATION (IMME)		1	1			2		4
	EMERGENCY (10MINS)	4	5	5	7	6	3	5	35
	URGENT (30MINS)	59	59	66	59	67	78	61	449
	SEMI-URGENT (60MINS)	134	125	88	79	131	130	121	808
	NON-URGENT (2HRS)	10	16	10	8	3	12	18	77
September Total		207	206	170	153	207	225	205	1373
October	EMERGENCY (10MINS)	13	7	8	5	5	4	6	48
	URGENT (30MINS)	77	77	56	56	64	60	70	460
	SEMI-URGENT (60MINS)	194	147	106	95	105	88	142	877
	NON-URGENT (2HRS)	14	22	11	15	8	11	14	95
October Total		298	253	181	171	182	163	232	1480
November	RESUSCITATION (IMME)	1				2			3
	EMERGENCY (10MINS)	12	3	11	9	3	4	9	51
	URGENT (30MINS)	59	64	73	74	63	57	53	443
	SEMI-URGENT (60MINS)	148	92	139	128	130	99	127	863
	NON-URGENT (2HRS)	12	17	11	9	15	13	12	89
November Total		232	176	234	220	213	173	201	1449
December	EMERGENCY (10MINS)	1	8	8	7	6	6	10	46
	URGENT (30MINS)	73	49	69	77	84	89	86	527
	SEMI-URGENT (60MINS)	142	119	118	121	152	157	190	999
	NON-URGENT (2HRS)	18	15	19	9	23	21	11	116
December Total		234	191	214	214	265	273	297	1688
January	RESUSCITATION (IMME)		1	1	1				3
	EMERGENCY (10MINS)	4	6	10	6	5	7	4	42
	URGENT (30MINS)	81	87	67	67	54	58	60	474
	SEMI-URGENT (60MINS)	192	213	174	103	130	119	144	1075
	NON-URGENT (2HRS)	41	29	20	20	28	21	23	182
January Total		318	336	272	197	217	205	231	1776
February	RESUSCITATION (IMME)					1			1
	EMERGENCY (10MINS)	2	12	4	2	4	9	1	34
	URGENT (30MINS)	79	62	60	54	57	60	54	426
	SEMI-URGENT (60MINS)	172	148	122	119	110	128	125	924
	NON-URGENT (2HRS)	17	18	12	14	11	15	10	97
February Total		270	240	198	189	183	212	190	1482

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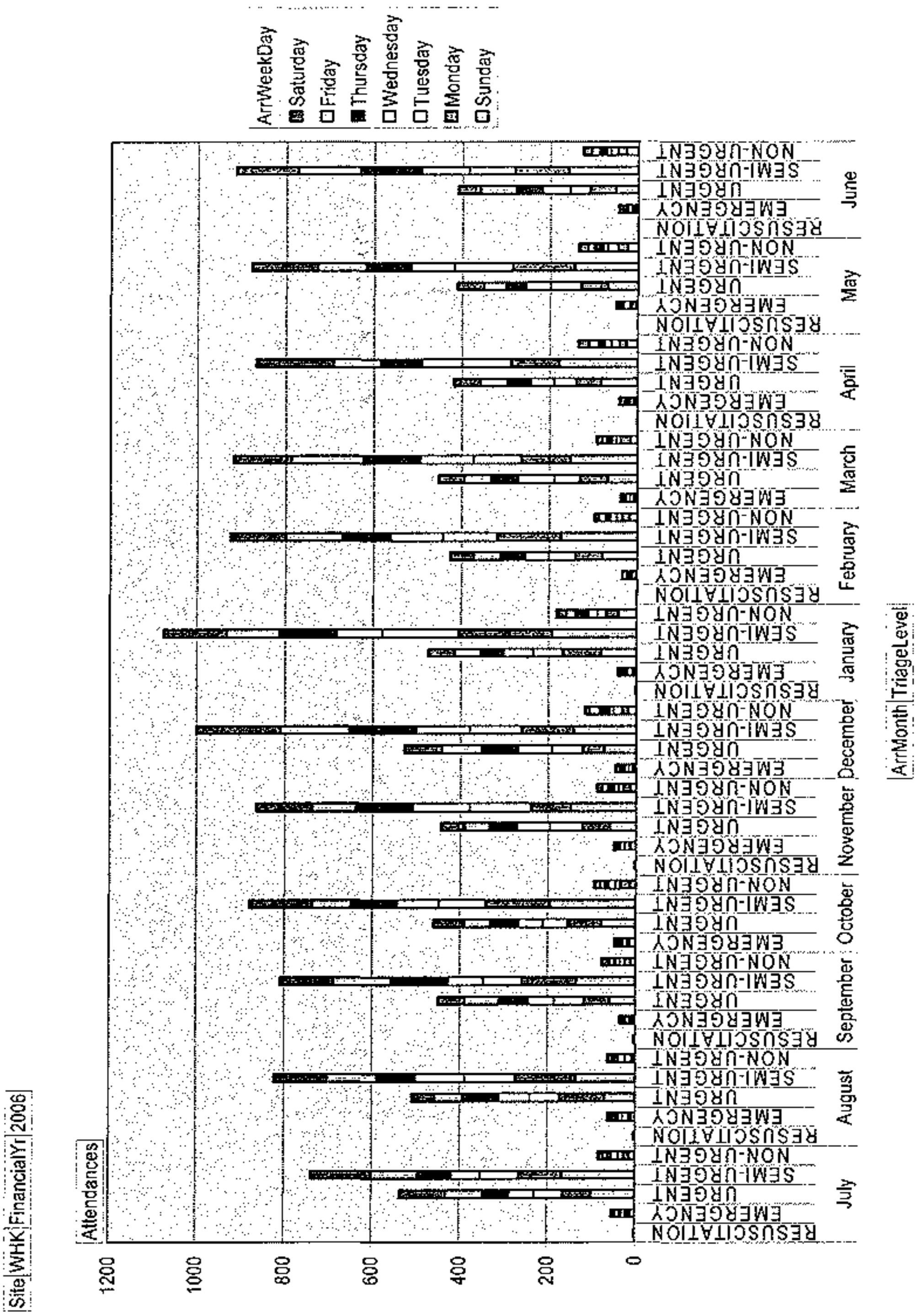
C7.4.3 Cube Pivot Table: Hosp W – FULL Fin Yr 2006 – Season by DOW by Triage (**Jul 2005 – Feb 2006**)

(...Continued from previous page)

Site	WHK								
FinancialYr	2006								
Attendances		ArrWeekDay							
ArrMonth	TriageLevel	Sunday	Monday	Tuesday	Wednes	Thursda	Friday	Saturday	Grand Total
March	EMERGENCY (10MINS)	5	5	7	9	3	2	7	38
	URGENT (30MINS)	68	64	56	84	61	60	60	453
	SEMI-URGENT (60MINS)	153	112	108	121	129	164	130	917
	NON-URGENT (2HRS)	16	23	9	9	13	9	14	93
March Total		242	204	180	223	206	235	211	1501
April	RESUSCITATION (IMME)			1				1	2
	EMERGENCY (10MINS)	6	4	6	3	5	4	13	41
	URGENT (30MINS)	84	56	50	53	53	61	61	418
	SEMI-URGENT (60MINS)	178	111	110	92	93	107	175	866
	NON-URGENT (2HRS)	26	16	18	15	15	21	24	135
April Total		294	187	185	163	166	193	274	1462
May	RESUSCITATION (IMME)		1						1
	EMERGENCY (10MINS)	4	10	5	12	7	6	5	49
	URGENT (30MINS)	69	62	68	56	46	50	60	411
	SEMI-URGENT (60MINS)	143	144	131	98	102	110	150	878
	NON-URGENT (2HRS)	24	22	24	9	21	13	22	135
May Total		240	239	228	175	176	179	237	1474
June	RESUSCITATION (IMME)		1				1		2
	EMERGENCY (10MINS)	2	7	6	8	13	6	2	44
	URGENT (30MINS)	51	60	44	62	61	81	50	409
	SEMI-URGENT (60MINS)	158	124	103	107	140	140	141	913
	NON-URGENT (2HRS)	27	21	15	10	15	18	20	126
June Total		238	213	168	187	229	246	213	1494
Grand Total		3077	2686	2409	2246	2384	2499	2750	18051

C7.4.3 Cube Pivot Table: Hosp W – FULL Fin Yr 2006 – Season by DOW by Triage (**Mar 2006 – Jun 2006**)



C7.4.4 Graph: Hospital W – FULL Fin Yr 2006 – Season by DOW by Triage

Site	OPO								
FinancialYr	2006								
Attendances		ArrWeekDay							
ArrMonth	TriageLevel	Sunday	Monday	Tuesday	Wednes	Thursda	Friday	Saturday	Grand Total
July	URGENT (30MINS)		1		2	1		1	5
	SEMI-URGENT (60MINS)	10	7	7	8	8	6	15	61
	NON-URGENT (2HRS)	17	5	5	6	2	12	22	69
July Total		27	13	12	16	11	18	38	135
August	URGENT (30MINS)	1							1
	SEMI-URGENT (60MINS)	1	1	2			1	1	6
	NON-URGENT (2HRS)	18	15	23	14	15	16	31	132
August Total		20	16	25	14	15	17	32	139
September	SEMI-URGENT (60MINS)	1	4	4	2		2		13
	NON-URGENT (2HRS)	22	18	15	10	13	19	30	127
September Total		23	22	19	12	13	21	30	140
October	EMERGENCY (10MINS)						1		1
	SEMI-URGENT (60MINS)	7	2	1	1	3	2	1	17
	NON-URGENT (2HRS)	39	25	15	12	13	13	36	153
October Total		46	27	16	13	16	16	37	171
November	URGENT (30MINS)		4	3	2		2	4	15
	SEMI-URGENT (60MINS)	12	10	16	24	14	13	12	101
	NON-URGENT (2HRS)	13	1	7	4	10	11	18	64
November Total		25	15	26	30	24	26	34	180
December	URGENT (30MINS)	4	1	3	4		4	4	20
	SEMI-URGENT (60MINS)	21	18	15	17	17	11	37	136
	NON-URGENT (2HRS)					3	2	2	7
December Total		25	19	18	21	20	17	43	163
January	RESUSCITATION (IMME)					1			1
	URGENT (30MINS)	11	4	6	2	3	2	7	35
	SEMI-URGENT (60MINS)	15	21	8	13	9	15	26	107
	NON-URGENT (2HRS)	1		4		3			8
January Total		27	25	18	15	16	17	33	151
February	URGENT (30MINS)	6	2	1	1		1	4	15
	SEMI-URGENT (60MINS)	13	8	10	13	4	11	15	74
	NON-URGENT (2HRS)	1	9	8	3	7	6	6	40
February Total		20	19	19	17	11	18	25	129
March	URGENT (30MINS)	3	4	2	1	1	3	2	16
	SEMI-URGENT (60MINS)	13	11	2	6	3	9	17	61
	NON-URGENT (2HRS)	4	4	8	6	9	6	7	44
March Total		20	19	12	13	13	18	26	121
April	URGENT (30MINS)		3	2		1	1	3	10
	SEMI-URGENT (60MINS)	21	12	12	7	6	9	25	92
	NON-URGENT (2HRS)	7	2	4	1	5	3	4	26
April Total		28	17	18	8	12	13	32	128
May	URGENT (30MINS)	3	3	5	1	1	2	6	21
	SEMI-URGENT (60MINS)	9	14	6	10		12	18	69
	NON-URGENT (2HRS)	6	5	2		6	1	4	24
May Total		18	22	13	11	7	15	28	114
June	URGENT (30MINS)	1	2	4	4	4	5	5	25
	SEMI-URGENT (60MINS)	25	6	11	8	9	20	26	105
	NON-URGENT (2HRS)		2						2
June Total		26	10	15	12	13	25	31	132
Grand Total		305	224	211	182	171	221	389	1703

C7.4.5 Cube Pivot Table: Hosp O – FULL Fin Yr 2006 – Season by DOW by Triage (**Jul 2005 – Jun 2006**)

Site	All Site								
FinancialYr	2006								
Attendances		ArrWeekDay							
ArrMonth	TriageLevel	Sunday	Monday	Tuesday	Wednes	Thursda	Friday	Saturday	Grand Total
July	RESUSCITATION (IMME)	7	1	1	2	1	3	4	19
	EMERGENCY (10MINS)	73	66	51	53	48	69	67	427
	URGENT (30MINS)	347	231	237	256	253	333	335	1992
	SEMI-URGENT (60MINS)	320	216	202	148	214	230	288	1618
	NON-URGENT (2HRS)	55	52	44	55	35	45	64	350
July Total		802	566	535	514	551	680	758	4406
August	RESUSCITATION (IMME)	3	6	5	10	2	4	7	37
	EMERGENCY (10MINS)	64	74	80	89	57	77	74	515
	URGENT (30MINS)	254	333	305	299	266	258	226	1941
	SEMI-URGENT (60MINS)	263	308	263	266	223	235	247	1805
	NON-URGENT (2HRS)	55	63	59	58	58	41	64	398
August Total		639	784	712	722	606	615	618	4696
September	RESUSCITATION (IMME)	5	6	4	5	5	6	2	33
	EMERGENCY (10MINS)	52	66	52	49	55	47	60	381
	URGENT (30MINS)	226	229	230	249	269	302	249	1754
	SEMI-URGENT (60MINS)	278	253	216	187	263	311	246	1754
	NON-URGENT (2HRS)	75	59	42	49	28	53	65	371
September Total		636	613	544	539	620	719	622	4293
October	RESUSCITATION (IMME)	5	5	2	4	3	6	4	29
	EMERGENCY (10MINS)	83	71	74	52	59	53	60	452
	URGENT (30MINS)	282	302	230	194	248	228	271	1755
	SEMI-URGENT (60MINS)	350	338	230	209	229	202	260	1818
	NON-URGENT (2HRS)	98	67	58	70	38	56	73	460
October Total		818	783	594	529	577	545	668	4514
November	RESUSCITATION (IMME)	9	1	5	6	2	3	3	29
	EMERGENCY (10MINS)	73	50	74	66	51	62	69	445
	URGENT (30MINS)	229	246	302	305	219	226	232	1759
	SEMI-URGENT (60MINS)	297	239	311	297	259	226	260	1889
	NON-URGENT (2HRS)	61	38	54	48	58	41	50	350
November Total		669	574	746	722	589	558	614	4472
December	RESUSCITATION (IMME)	3	3	6	3	4	3	4	26
	EMERGENCY (10MINS)	68	59	67	53	70	68	66	451
	URGENT (30MINS)	245	226	243	260	279	339	277	1869
	SEMI-URGENT (60MINS)	312	302	255	281	321	327	406	2204
	NON-URGENT (2HRS)	63	54	49	37	54	55	57	369
December Total		691	644	620	634	728	792	810	4919
January	RESUSCITATION (IMME)	7	4	4	6	3	7	4	35
	EMERGENCY (10MINS)	59	76	71	65	50	50	45	416
	URGENT (30MINS)	352	323	291	233	198	214	227	1838
	SEMI-URGENT (60MINS)	434	458	367	262	272	291	298	2382
	NON-URGENT (2HRS)	91	70	74	67	51	53	59	465
January Total		943	931	807	633	574	615	633	5136
February	RESUSCITATION (IMME)	4	6	3	1	3	4	2	23
	EMERGENCY (10MINS)	56	61	59	50	52	58	45	381
	URGENT (30MINS)	252	237	244	229	230	200	223	1615
	SEMI-URGENT (60MINS)	330	287	267	294	262	300	271	2011
	NON-URGENT (2HRS)	64	67	52	37	49	38	54	361
February Total		706	658	625	611	596	600	595	4391

(Continued on next page...)

C7.4.6 Cube Pivot Table: DHB District – FULL Fin Yr 2006 – Season by DOW by Triage (**Jul 2005 – Feb 2006**)

(...Continued from previous page)

Site	All Site
FinancialYr	2006

Attendances		ArrWeekDay							
ArrMonth	TriageLevel	Sunday	Monday	Tuesday	Wednes	Thursda	Friday	Saturday	Grand Total
March	RESUSCITATION (IMME)	6	3	4	3	1	2	3	22
	EMERGENCY (10MINS)	47	58	59	69	59	72	58	422
	URGENT (30MINS)	249	237	249	252	250	269	212	1718
	SEMI-URGENT (60MINS)	318	295	200	280	291	337	275	1996
	NON-URGENT (2HRS)	43	64	56	69	72	66	51	421
March Total		663	657	568	673	673	746	599	4579
April	RESUSCITATION (IMME)	6		5	3	3	3	9	29
	EMERGENCY (10MINS)	79	53	62	49	43	56	79	421
	URGENT (30MINS)	305	241	211	205	218	223	248	1651
	SEMI-URGENT (60MINS)	355	244	243	217	219	228	356	1862
	NON-URGENT (2HRS)	63	69	70	51	50	50	70	423
April Total		808	607	591	525	533	560	762	4386
May	RESUSCITATION (IMME)	4	6	7	4	3		5	29
	EMERGENCY (10MINS)	51	86	71	72	59	55	53	447
	URGENT (30MINS)	240	296	281	283	223	202	237	1762
	SEMI-URGENT (60MINS)	303	321	272	250	228	250	294	1918
	NON-URGENT (2HRS)	62	72	71	29	57	40	61	392
May Total		660	781	702	638	570	547	650	4548
June	RESUSCITATION (IMME)	1	3	2	3	7	3	2	21
	EMERGENCY (10MINS)	55	51	55	49	69	67	45	391
	URGENT (30MINS)	222	253	220	250	297	322	227	1791
	SEMI-URGENT (60MINS)	326	293	259	249	313	311	334	2085
	NON-URGENT (2HRS)	60	59	53	43	38	56	42	351
June Total		664	659	589	594	724	759	650	4639
Grand Total		8699	8257	7633	7334	7341	7736	7979	54979

C7.4.6 Cube Pivot Table: DHB District – FULL Fin Yr 2006 – Season by DOW by Triage (**Mar 2006 – Jun 2006**)

TGA: PER MONTH PER DAY AVERAGE TRIAGE

Site	TGA
FinancialYr	2006
Presentation	(Multiple Items)

Attendances				ArrWe. Day									
ArrFinY	ArrFinQuarter	ArrMon	TriageLevel	Sunday	Monday	Tuesday	Wednesd	Thursday	Friday	Saturday	Grand Total	Weighting	Weighted Result
2006	Q1_2006	July	RESUSCITATION (IMM	7	1	1	2	1	3	3	18	X 1	18
			EMERGENCY (10MINS)	64	60	45	44	43	59	59	374	X 2	748
			URGENT (30MINS)	247	165	172	194	190	248	228	1444	X 3	4332
			SEMI-URGENT (60MINS	143	108	110	72	125	118	137	813	X 4	3252
			NON-URGENT (2HRS)	24	33	27	35	22	25	29	195	X 5	975
		July Total		485	367	355	347	381	453	456	2844		9325
								Weighted Average Triage for Seasonal Timef:					3.2788

Site	TGA
FinancialYr	2006
Presentation	(Multiple Items)

Attendances				ArrWe. Day									
ArrFinY	ArrFinQuarter	ArrMon	TriageLevel	Sunday	Monday	Tuesday	Wednesd	Thursday	Friday	Saturday	Grand Total	Weighting	Weighted Result
2006	Q1_2006	August	RESUSCITATION (IMM	3	6	5	7	2	4	6	33	X 1	33
			EMERGENCY (10MINS)	55	68	66	80	50	70	63	452	X 2	904
			URGENT (30MINS)	183	229	237	228	183	195	174	1429	X 3	4287
			SEMI-URGENT (60MINS	126	167	146	155	134	121	125	974	X 4	3896
			NON-URGENT (2HRS)	36	40	22	29	33	22	20	202	X 5	1010
		August Total		403	510	476	499	402	412	388	3090		10130
								Weighted Average Triage for Seasonal Timef:					3.2783

Site	TGA
FinancialYr	2006
Presentation	(Multiple Items)

Attendances				ArrWe. Day									
ArrFinY	ArrFinQuarter	ArrMon	TriageLevel	Sunday	Monday	Tuesday	Wednesd	Thursday	Friday	Saturday	Grand Total	Weighting	Weighted Result
2006	Q1_2006	Septem	RESUSCITATION (IMM	5	5	3	5	5	4	2	29	X 1	29
			EMERGENCY (10MINS)	48	61	47	42	49	44	55	346	X 2	692
			URGENT (30MINS)	167	169	164	190	202	224	188	1304	X 3	3912
			SEMI-URGENT (60MINS	143	124	124	104	131	179	123	928	X 4	3712
			NON-URGENT (2HRS)	41	25	17	30	12	22	17	164	X 5	820
		September Total		404	384	355	371	399	473	385	2771		9165
								Weighted Average Triage for Seasonal Timef:					3.3075

Site	TGA
FinancialYr	2006
Presentation	(Multiple Items)

Attendances				ArrWe. Day									
ArrFinY	ArrFinQuarter	ArrMon	TriageLevel	Sunday	Monday	Tuesday	Wednesd	Thursday	Friday	Saturday	Grand Total	Weighting	Weighted Result
2006	Q2_2006	Octobe	RESUSCITATION (IMM	5	5	2	4	3	6	4	29	X 1	29
			EMERGENCY (10MINS)	70	64	66	47	54	48	54	403	X 2	806
			URGENT (30MINS)	205	225	174	138	184	168	201	1295	X 3	3885
			SEMI-URGENT (60MINS	148	189	123	113	121	112	117	923	X 4	3692
			NON-URGENT (2HRS)	45	20	32	43	17	32	23	212	X 5	1060
		October Total		473	503	397	345	379	366	399	2862		9472
								Weighted Average Triage for Seasonal Timef:					3.3096

Site	TGA
FinancialYr	2006
Presentation	(Multiple Items)

Attendances				ArrWe. Day									
ArrFinY	ArrFinQuarter	ArrMon	TriageLevel	Sunday	Monday	Tuesday	Wednesd	Thursday	Friday	Saturday	Grand Total	Weighting	Weighted Result
2006	Q2_2006	Novem	RESUSCITATION (IMM	8	1	5	6		3	3	26	X 1	26
			EMERGENCY (10MINS)	61	47	63	57	48	58	60	394	X 2	788
			URGENT (30MINS)	170	178	226	228	156	167	175	1300	X 3	3900
			SEMI-URGENT (60MINS	137	137	156	142	115	114	121	922	X 4	3688
			NON-URGENT (2HRS)	36	20	36	33	33	17	20	195	X 5	975
		November Total		412	383	486	466	352	359	379	2837		9377
								Weighted Average Triage for Seasonal Timef:					3.3053

Site	TGA
FinancialYr	2006
Presentation	(Multiple Items)

Attendances				ArrWe. Day									
ArrFinY	ArrFinQuarter	ArrMon	TriageLevel	Sunday	Monday	Tuesday	Wednesd	Thursday	Friday	Saturday	Grand Total	Weighting	Weighted Result
2006	Q2_2006	Decem	RESUSCITATION (IMM	3	3	6	3	4	3	4	26	X 1	26
			EMERGENCY (10MINS)	67	51	59	46	64	62	56	405	X 2	810
			URGENT (30MINS)	168	176	170	179	194	246	186	1319	X 3	3957
			SEMI-URGENT (60MINS	149	164	122	143	152	156	177	1063	X 4	4252
			NON-URGENT (2HRS)	45	39	30	28	28	31	43	244	X 5	1220
		December Total		432	433	387	399	442	498	466	3057		10265
								Weighted Average Triage for Seasonal Timef:					3.3579

C7.4.7 Cube Pivot Tables: Hosp T – FULL Fin Year 2006 – Weighted Triage classification (**Jul – Dec 2005**)

(...Continued from previous page)

Site	TGA
FinancialYr	2006
Presentation	(Multiple Items)

Attendances				ArrWe Day									
ArrFirstY	ArrFirstQuarter	ArrMn	TriageLevel	Sunday	Monday	Tuesday	Wednesd	Thursday	Friday	Saturday	Grand Total	Weighting	Weighted Result
2006	Q3_2006	Januar	RESUSCITATION (IMMI	7	3	3	5	2	7	4	31	x 1	31
			EMERGENCY (10MINS)	54	70	61	59	45	43	41	373	x 2	746
			URGENT (30MINS)	257	232	217	163	141	154	159	1323	x 3	3969
			SEMI-URGENT (60MINS	218	222	182	144	132	156	126	1180	x 4	4720
			NON-URGENT (2HRS)	47	41	50	46	20	32	34	270	x 5	1350
		January Total		583	568	513	417	340	392	364	3177		10816
							Weighted Average Triage for Seasonal Timef:						3.4045

Site	TGA
FinancialYr	2006
Presentation	(Multiple Items)

Attendances				ArrWe Day									
ArrFirstY	ArrFirstQuarter	ArrMn	TriageLevel	Sunday	Monday	Tuesday	Wednesd	Thursday	Friday	Saturday	Grand Total	Weighting	Weighted Result
2006	Q3_2006	Februa	RESUSCITATION (IMMI	4	6	3	1	2	4	2	22	x 1	22
			EMERGENCY (10MINS)	54	49	55	48	48	49	44	347	x 2	694
			URGENT (30MINS)	167	172	183	174	172	138	165	1171	x 3	3513
			SEMI-URGENT (60MINS	145	129	131	161	145	160	131	1002	x 4	4008
			NON-URGENT (2HRS)	46	36	31	20	29	17	38	217	x 5	1085
		February Total		416	392	403	404	396	368	380	2759		9322
							Weighted Average Triage for Seasonal Timef:						3.3788

Site	TGA
FinancialYr	2006
Presentation	(Multiple Items)

Attendances				ArrWe Day									
ArrFirstY	ArrFirstQuarter	ArrMn	TriageLevel	Sunday	Monday	Tuesday	Wednesd	Thursday	Friday	Saturday	Grand Total	Weighting	Weighted Result
2006	Q3_2006	March	RESUSCITATION (IMMI	6	3	4	3	1	2	3	22	x 1	22
			EMERGENCY (10MINS)	42	53	52	60	56	70	51	384	x 2	768
			URGENT (30MINS)	178	169	191	167	188	206	150	1249	x 3	3747
			SEMI-URGENT (60MINS	152	172	90	153	159	164	128	1018	x 4	4072
			NON-URGENT (2HRS)	23	37	39	54	50	51	30	284	x 5	1420
		March Total		401	434	376	437	454	493	362	2957		10029
							Weighted Average Triage for Seasonal Timef:						3.3916

Site	TGA
FinancialYr	2006
Presentation	(Multiple Items)

Attendances				ArrWe Day									
ArrFirstY	ArrFirstQuarter	ArrMn	TriageLevel	Sunday	Monday	Tuesday	Wednesd	Thursday	Friday	Saturday	Grand Total	Weighting	Weighted Result
2006	Q4_2006	April	RESUSCITATION (IMMI	6		4	3	3	3	8	27	x 1	27
			EMERGENCY (10MINS)	73	49	56	46	38	52	66	380	x 2	760
			URGENT (30MINS)	219	181	159	152	164	161	183	1219	x 3	3657
			SEMI-URGENT (60MINS	155	118	120	118	120	112	155	898	x 4	3592
			NON-URGENT (2HRS)	30	49	48	35	30	26	42	260	x 5	1300
		April Total		483	397	387	354	355	354	454	2784		9336
							Weighted Average Triage for Seasonal Timef:						3.3534

Site	TGA
FinancialYr	2006
Presentation	(Multiple Items)

Attendances				ArrWe Day									
ArrFirstY	ArrFirstQuarter	ArrMn	TriageLevel	Sunday	Monday	Tuesday	Wednesd	Thursday	Friday	Saturday	Grand Total	Weighting	Weighted Result
2006	Q4_2006	May	RESUSCITATION (IMMI	4	5	7	4	3		5	28	x 1	28
			EMERGENCY (10MINS)	47	76	66	60	52	49	48	398	x 2	796
			URGENT (30MINS)	167	229	208	224	176	150	171	1325	x 3	3975
			SEMI-URGENT (60MINS	148	160	134	139	125	128	126	960	x 4	3840
			NON-URGENT (2HRS)	31	44	45	20	30	26	35	231	x 5	1155
		May Total		397	514	460	447	386	353	385	2942		9794
							Weighted Average Triage for Seasonal Timef:						3.3290

Site	TGA
FinancialYr	2006
Presentation	(Multiple Items)

Attendances				ArrWe Day									
ArrFirstY	ArrFirstQuarter	ArrMn	TriageLevel	Sunday	Monday	Tuesday	Wednesd	Thursday	Friday	Saturday	Grand Total	Weighting	Weighted Result
2006	Q4_2006	June	RESUSCITATION (IMMI	1	2	2	3	7	2	2	19	x 1	19
			EMERGENCY (10MINS)	53	44	49	41	56	61	43	347	x 2	694
			URGENT (30MINS)	170	191	172	184	232	236	172	1357	x 3	4071
			SEMI-URGENT (60MINS	143	162	143	133	164	151	167	1063	x 4	4252
			NON-URGENT (2HRS)	33	36	36	33	23	38	22	221	x 5	1105
		June Total		400	435	402	394	482	488	406	3007		10141
							Weighted Average Triage for Seasonal Timef:						3.3725

C7.4.7 Cube Pivot Tables: Hosp T – FULL Fin Year 2006 – Weighted Triage classification (**Jan – Jun 2006**)

WHK: PER MONTH PER DAY AVERAGE TRIAGE

Site	WHK
FinancialYr	2006
Presentation	(Multiple Items)

ArrFirstY	ArrFirstQuarter	ArrMo	TriageLevel	Sunday	Monday	Tuesday	Wednesd	Thursday	Friday	Saturday	Grand Total	Weighting	Weighted Result
2006	Q1_2006	July	RESUSCITATION (IMME)							1	1	×1	1
			EMERGENCY (10MINS)	9	6	6	9	5	10	8	53	×2	106
			URGENT (30MINS)	100	65	65	57	59	85	105	536	×3	1608
			SEMI-URGENT (60MINS	166	101	85	66	77	106	136	737	×4	2948
			NON-URGENT (2HRS)	14	13	12	14	11	8	13	85	×5	425
		July Total		289	185	168	146	152	209	263	1412		5088
								Weighted Average Triage for Seasonal Timefr					3.6034

Site	WHK
FinancialYr	2006
Presentation	(Multiple Items)

ArrFirstY	ArrFirstQuarter	ArrMo	TriageLevel	Sunday	Monday	Tuesday	Wednesd	Thursday	Friday	Saturday	Grand Total	Weighting	Weighted Result
2006	Q1_2006	August	RESUSCITATION (IMME)				3			1	4	×1	4
			EMERGENCY (10MINS)	9	6	14	9	7	7	11	63	×2	126
			URGENT (30MINS)	70	103	68	70	83	63	51	508	×3	1524
			SEMI-URGENT (60MINS	135	139	115	111	88	113	120	821	×4	3284
			NON-URGENT (2HRS)	1	8	14	15	10	3	13	64	×5	320
		August Total		215	256	211	208	188	186	196	1460		5258
								Weighted Average Triage for Seasonal Timefr					3.6014

Site	WHK
FinancialYr	2006
Presentation	(Multiple Items)

ArrFirstY	ArrFirstQuarter	ArrMo	TriageLevel	Sunday	Monday	Tuesday	Wednesd	Thursday	Friday	Saturday	Grand Total	Weighting	Weighted Result
2006	Q1_2006	Septe	RESUSCITATION (IMME)		1	1			2		4	×1	4
			EMERGENCY (10MINS)	4	5	5	7	6	3	5	35	×2	70
			URGENT (30MINS)	59	59	66	59	67	78	61	449	×3	1347
			SEMI-URGENT (60MINS	134	125	88	79	131	130	121	808	×4	3232
			NON-URGENT (2HRS)	10	16	10	8	3	12	18	77	×5	385
		September Total		207	206	170	153	207	225	205	1373		5038
								Weighted Average Triage for Seasonal Timefr					3.6693

Site	WHK
FinancialYr	2006
Presentation	(Multiple Items)

ArrFirstY	ArrFirstQuarter	ArrMo	TriageLevel	Sunday	Monday	Tuesday	Wednesd	Thursday	Friday	Saturday	Grand Total	Weighting	Weighted Result
2006	Q2_2006	Octobe	EMERGENCY (10MINS)	13	7	8	5	5	4	6	48	×2	96
			URGENT (30MINS)	77	77	56	56	64	60	70	460	×3	1380
			SEMI-URGENT (60MINS	194	147	106	95	105	88	142	877	×4	3508
			NON-URGENT (2HRS)	14	22	11	15	8	11	14	95	×5	475
		October Total		298	253	181	171	182	163	232	1480		
													5459
								Weighted Average Triage for Seasonal Timefr					3.6885

Site	WHK
FinancialYr	2006
Presentation	(Multiple Items)

ArrFirstY	ArrFirstQuarter	ArrMo	TriageLevel	Sunday	Monday	Tuesday	Wednesd	Thursday	Friday	Saturday	Grand Total	Weighting	Weighted Result
2006	Q2_2006	Novem	RESUSCITATION (IMM	1				2			3	×1	3
			EMERGENCY (10MINS)	12	3	11	9	3	4	9	51	×2	102
			URGENT (30MINS)	59	64	73	74	63	57	53	443	×3	1329
			SEMI-URGENT (60MINS	148	92	139	128	130	99	127	863	×4	3452
			NON-URGENT (2HRS)	12	17	11	9	15	13	12	89	×5	445
		November Total		232	176	234	220	213	173	201	1449		5331
								Weighted Average Triage for Seasonal Timefr					3.6791

Site	WHK
FinancialYr	2006
Presentation	(Multiple Items)

ArrFirstY	ArrFirstQuarter	ArrMo	TriageLevel	Sunday	Monday	Tuesday	Wednesd	Thursday	Friday	Saturday	Grand Total	Weighting	Weighted Result
2006	Q2_2006	Decem	EMERGENCY (10MINS)	1	8	8	7	6	6	10	46	×2	92
			URGENT (30MINS)	73	49	69	77	84	89	86	527	×3	1581
			SEMI-URGENT (60MINS	142	119	118	121	152	157	190	999	×4	3996
			NON-URGENT (2HRS)	18	15	19	9	23	21	11	116	×5	580
		December Total		234	191	214	214	265	273	297	1688		
													6249
								Weighted Average Triage for Seasonal Timefr					3.7020

C7.4.8 Cube Pivot Tables: Hosp W – FULL Fin Year 2006 – Weighted Triage classification (**Jul – Dec 2005**)

(...Continued from previous page)

Site	WHK
FinancialYr	2006
Presentation	(Multiple Items)

Attendances				ArrWe... Day									
ArrFiscYr	ArrFiscQuarter	ArrMth	TriageLevel	Sunday	Monday	Tuesday	Wednesd	Thursday	Friday	Saturday	Grand Total	Weighting	Weighted Result
2006	Q3_2006	January	RESUSCITATION (IMME)		1	1	1				3	x 1	3
			EMERGENCY (10MINS)	4	6	10	6	5	7	4	42	x 2	84
			URGENT (30MINS)	81	87	67	67	54	58	60	474	x 3	1422
			SEMI-URGENT (60MINS	192	213	174	103	130	119	144	1075	x 4	4300
			NON-URGENT (2HRS)	41	29	20	20	28	21	23	182	x 5	910
		January Total		318	336	272	197	217	205	231	1776		6719
								Weighted Average Triage for Seasonal Timeframe					3.7832

Site	WHK
FinancialYr	2006
Presentation	(Multiple Items)

Attendances				ArrWe... Day									
ArrFiscYr	ArrFiscQuarter	ArrMth	TriageLevel	Sunday	Monday	Tuesday	Wednesd	Thursday	Friday	Saturday	Grand Total	Weighting	Weighted Result
2006	Q3_2006	February	RESUSCITATION (IMME)					1			1	x 1	1
			EMERGENCY (10MINS)	2	12	4	2	4	9	1	34	x 2	68
			URGENT (30MINS)	79	62	60	56	57	60	54	426	x 3	1278
			SEMI-URGENT (60MINS	172	148	122	119	110	128	125	924	x 4	3696
			NON-URGENT (2HRS)	17	18	12	14	11	15	10	97	x 5	485
		February Total		270	240	198	189	183	212	190	1482		5528
								Weighted Average Triage for Seasonal Timeframe					3.7301

Site	WHK
FinancialYr	2006
Presentation	(Multiple Items)

Attendances				ArrWe... Day									
ArrFiscYr	ArrFiscQuarter	ArrMth	TriageLevel	Sunday	Monday	Tuesday	Wednesd	Thursday	Friday	Saturday	Grand Total	Weighting	Weighted Result
2006	Q3_2006	March	EMERGENCY (10MINS)	5	5	7	9	3	2	7	38	x 2	76
			URGENT (30MINS)	68	64	56	84	61	60	60	453	x 3	1359
			SEMI-URGENT (60MINS	153	112	108	121	129	164	130	917	x 4	3668
			NON-URGENT (2HRS)	16	23	9	9	13	9	14	93	x 5	465
		March Total		242	204	186	223	206	235	211	1501		
													5568
								Weighted Average Triage for Seasonal Timeframe					3.7095

Site	WHK
FinancialYr	2006
Presentation	(Multiple Items)

Attendances				ArrWe... Day									
ArrFiscYr	ArrFiscQuarter	ArrMth	TriageLevel	Sunday	Monday	Tuesday	Wednesd	Thursday	Friday	Saturday	Grand Total	Weighting	Weighted Result
2006	Q4_2006	April	RESUSCITATION (IMME)			1				1	2	x 1	2
			EMERGENCY (10MINS)	6	4	6	3	5	4	13	41	x 2	82
			URGENT (30MINS)	84	56	50	53	53	61	61	418	x 3	1254
			SEMI-URGENT (60MINS	178	111	110	92	93	107	175	866	x 4	3464
			NON-URGENT (2HRS)	26	16	18	14	15	21	24	134	x 5	670
		April Total		294	187	185	162	166	193	274	1461		5472
								Weighted Average Triage for Seasonal Timeframe					3.7454

Site	WHK
FinancialYr	2006
Presentation	(Multiple Items)

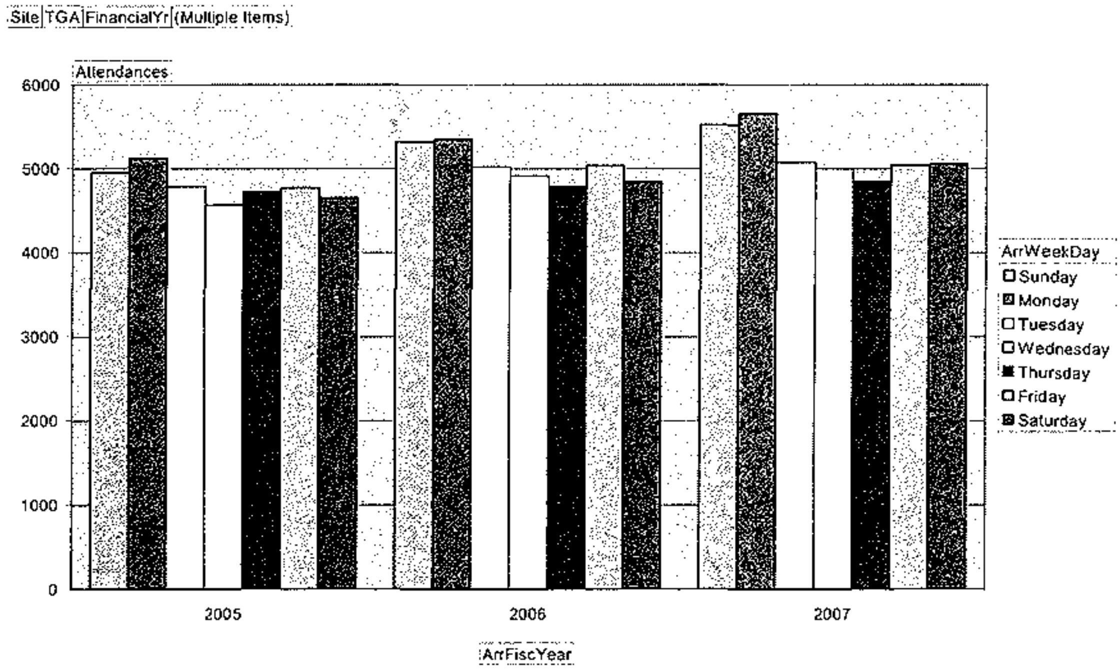
Attendances				ArrWe... Day									
ArrFiscYr	ArrFiscQuarter	ArrMth	TriageLevel	Sunday	Monday	Tuesday	Wednesd	Thursday	Friday	Saturday	Grand Total	Weighting	Weighted Result
2006	Q4_2006	May	RESUSCITATION (IMME)		1						1	x 1	1
			EMERGENCY (10MINS)	4	10	5	12	7	6	5	49	x 2	98
			URGENT (30MINS)	69	62	68	56	46	50	60	411	x 3	1233
			SEMI-URGENT (60MINS	141	144	131	98	102	110	149	875	x 4	3500
			NON-URGENT (2HRS)	23	22	24	9	21	13	20	132	x 5	660
		May Total		237	239	228	175	176	179	234	1468		5492
								Weighted Average Triage for Seasonal Timeframe					3.7411

Site	WHK
FinancialYr	2006
Presentation	(Multiple Items)

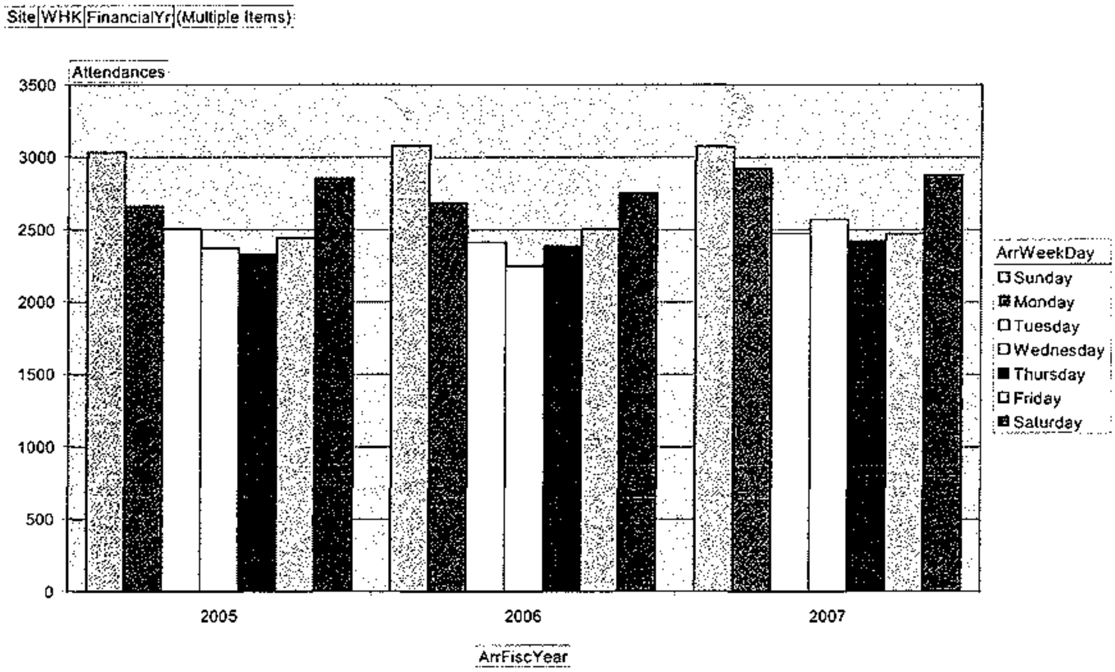
Attendances				ArrWe... Day									
ArrFiscYr	ArrFiscQuarter	ArrMth	TriageLevel	Sunday	Monday	Tuesday	Wednesd	Thursday	Friday	Saturday	Grand Total	Weighting	Weighted Result
2006	Q4_2006	June	RESUSCITATION (IMME)		1				1		2	x 1	2
			EMERGENCY (10MINS)	2	7	6	8	13	6	2	44	x 2	88
			URGENT (30MINS)	51	60	44	62	61	81	50	409	x 3	1227
			SEMI-URGENT (60MINS	158	124	103	107	140	140	141	913	x 4	3652
			NON-URGENT (2HRS)	27	21	15	10	15	18	20	126	x 5	630
		June Total		238	213	168	187	229	246	213	1494		5599
								Weighted Average Triage for Seasonal Timeframe					3.7477

C7.4.8 Cube Pivot Tables: Hosp W – FULL Fin Year 2006 – Weighted Triage classification (**Jan – Jun 2006**)

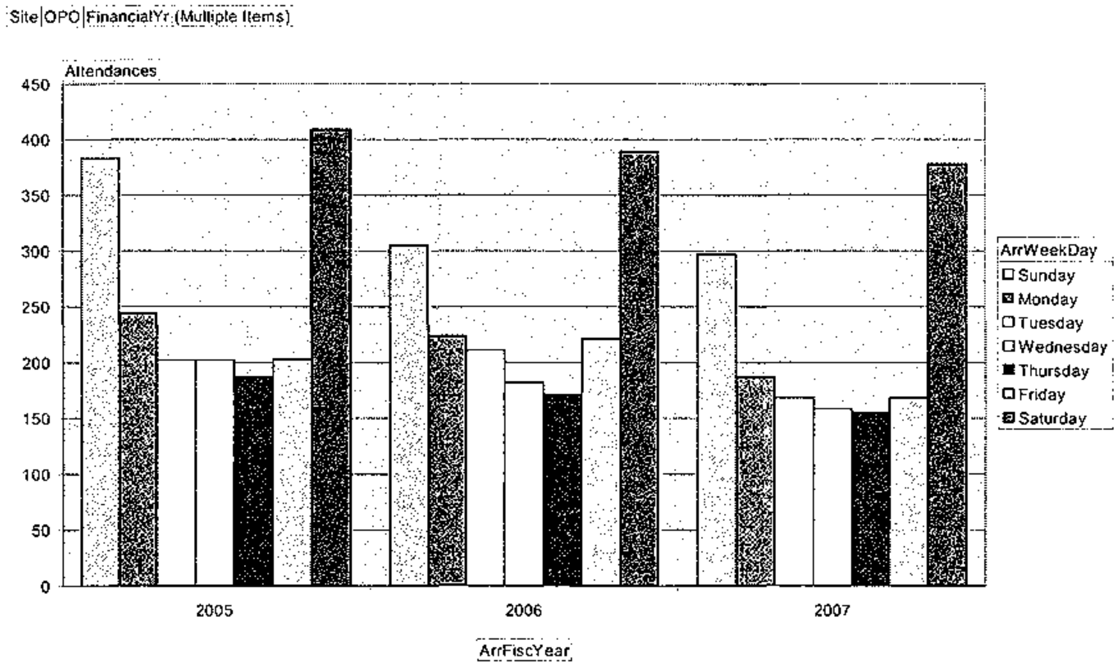
SIMPLISTIC DOW PROFILES / FOOTPRINTS FOR FULL FIN YEARS 2005, 2006 & 2007



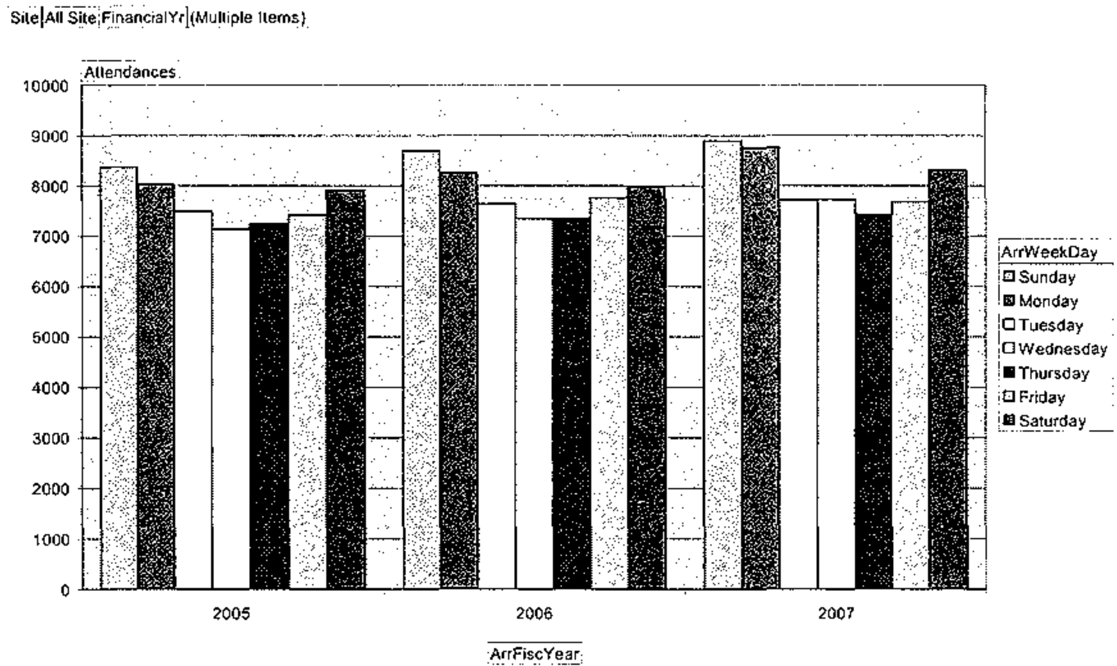
C7.4.9 Graph: Simplistic DOW Profiles for Hosp T for Three FULL Fin Years



C7.4.10 Graph: Simplistic DOW Profiles for Hosp W for Three FULL Fin Years

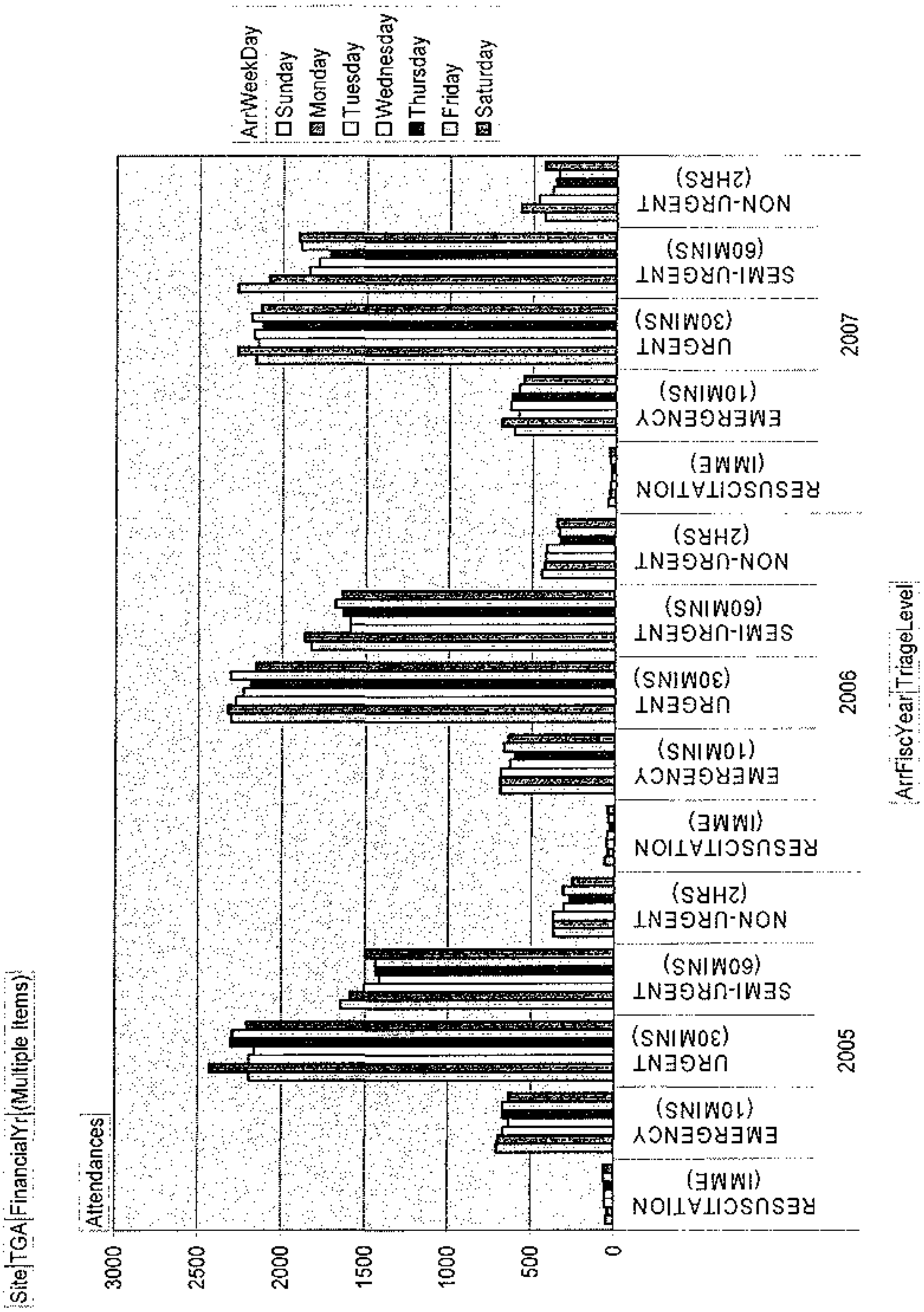


C7.4.11 Graph: Simplistic DOW Profiles for Hosp O for Three FULL Fin Years

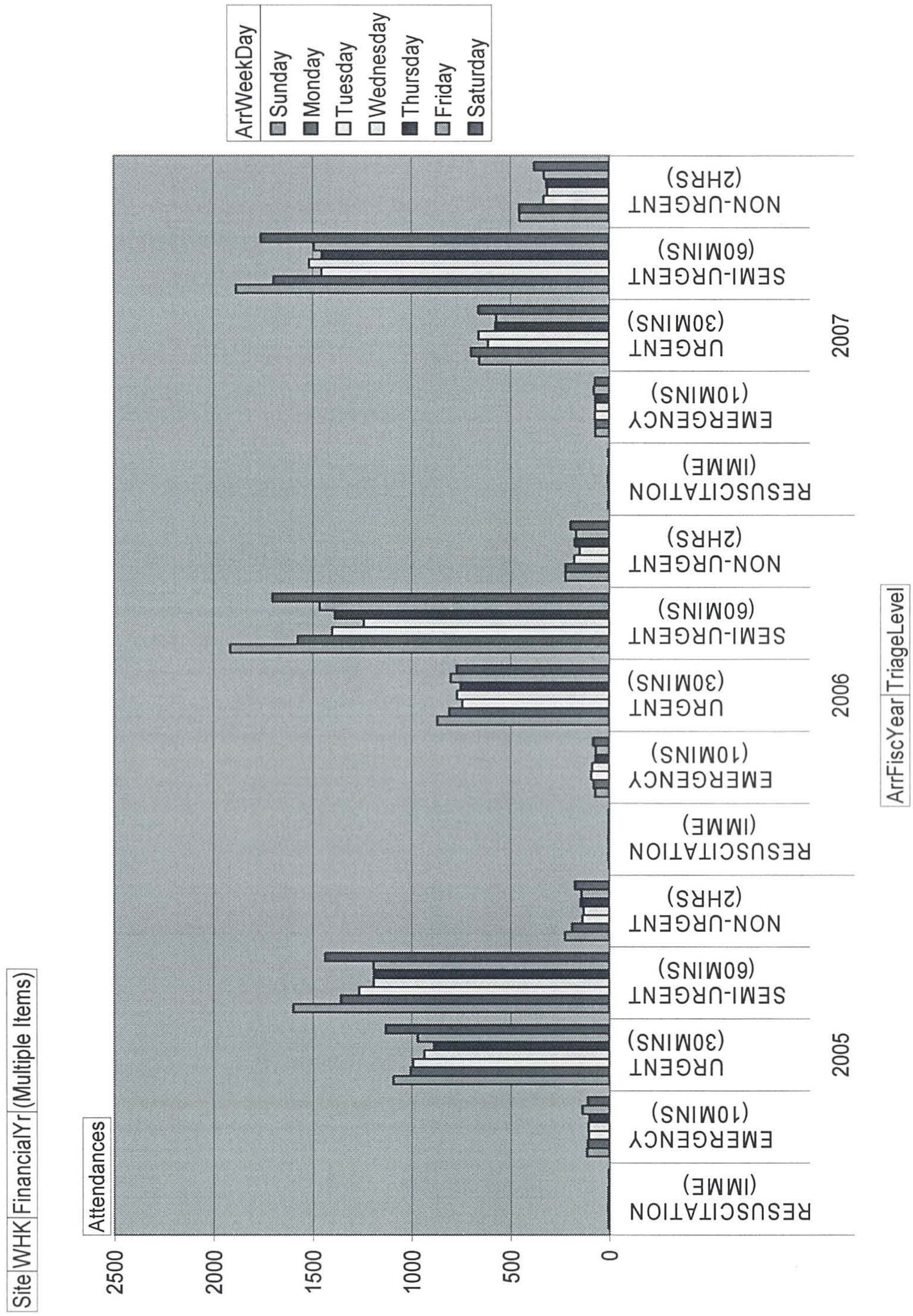


C7.4.12 Graph: Simplistic DOW Profiles for DHB District for Three FULL Fin Years

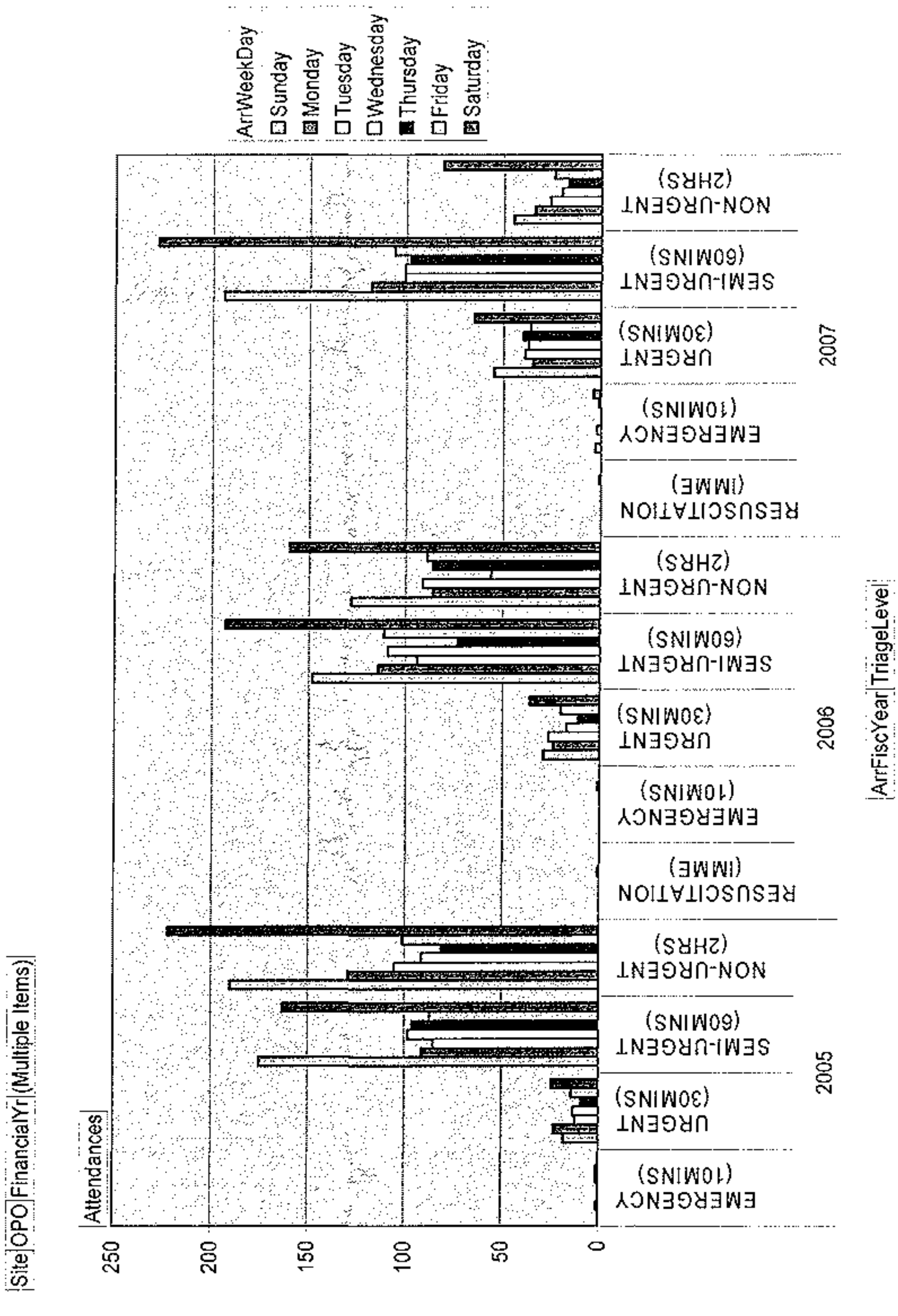
SIMPLISTIC TRIAGE PER DOW PROFILES / FOOTPRINTS FOR FULL FIN YEARS 2005, 2006 & 2007



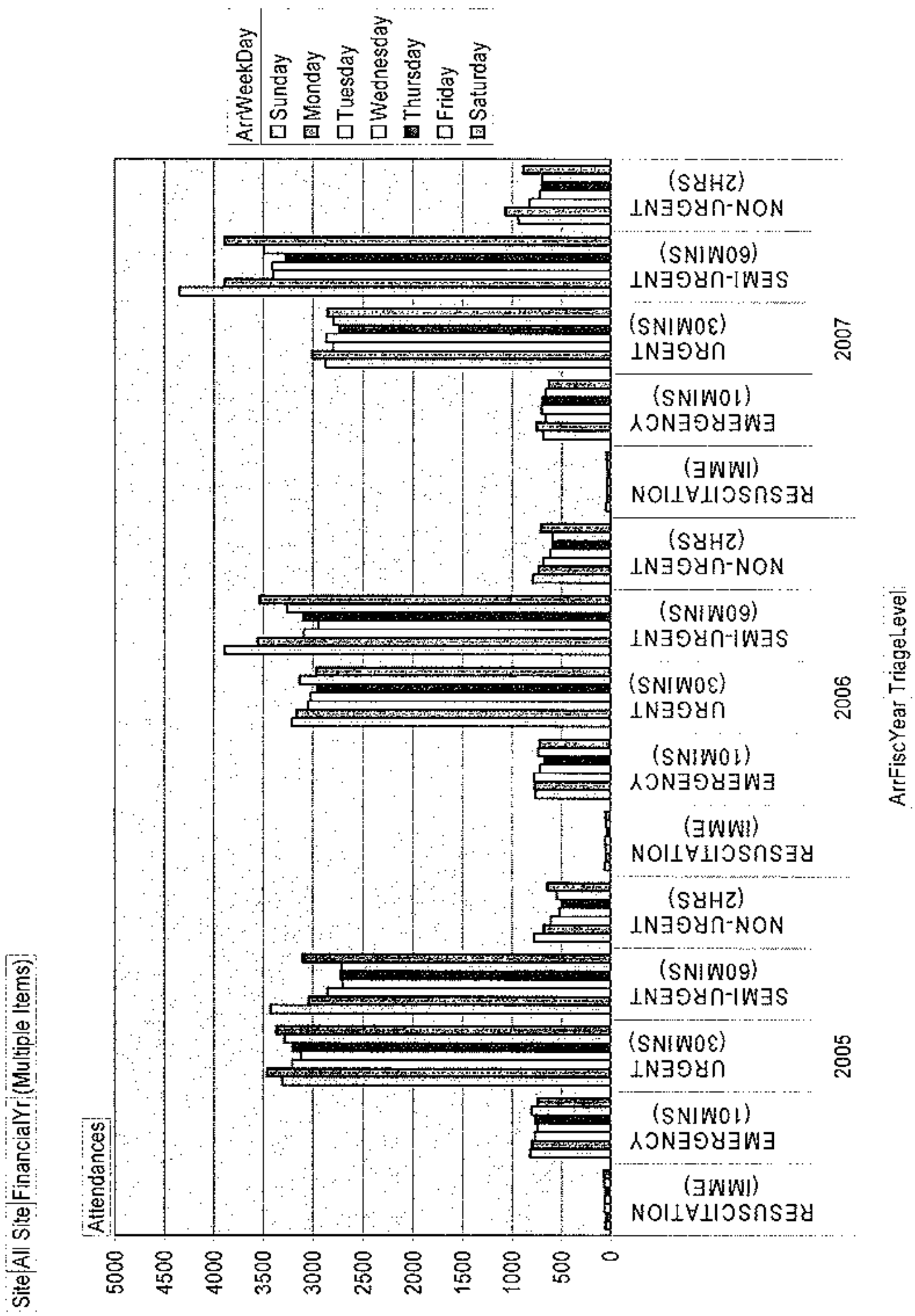
C7.4.13 Graph: Simplistic Triage per DOW Profiles for Hosp T for Three FULL Fin Years



C7.4.14 Graph: Simplistic Triage per DOW Profiles for Hosp W for Three FULL Fin Years



C7.4.15 Graph: Simplistic Triage per DOW Profiles for Hosp O for Three FULL Fin Years



C7.4.16 Graph: Simplistic DOW Profiles for DHB District for Three FULL Fin Years

13.1 APPENDIX A5: RESULTS: CHAPTER 7.5

RESULTS HELD IN THIS APPENDIX

C7.5.1 C7.5.2 C7.5.3

7.5 RESULTS: Using FULL DS: PER DAY OF WEEK – PREVALENCE OF TRIAGE RATINGS PER TIME OF DAY

- **(Postulate5)** Per Day of Week: To determine prevalence of various **Triage** / "urgency" ratings **per Time of Day**

7.5.1 Using FULL DS: FINDINGS

FINDINGS AND COMMENTS

Cf. Earlier Pages **107 - 109**

7.5.2 Using FULL DS: CUBE RESULTS

FinancialYr 2005

Attendances			Site				PROPORTIONS		
Fisc Year	Discl	TriageLevel	OPO	TGA	WHK	Grand Total	TGA	WHK	BOP DHB
2005	12midni	RESUSCITATION (IMME)		13	2	15	0.88	0.40	0.75
		EMERGENCY (10MINS)		159	25	184	10.79	5.05	9.21
		URGENT (30MINS)	3	759	261	1023	51.49	52.73	51.23
		SEMI-URGENT (60MINS)	13	471	200	684	31.95	40.40	34.25
		NON-URGENT (2HRS)	12	72	7	91	4.88	1.41	4.56
	12midnight Total		28	1474	495	1997			
	1am	RESUSCITATION (IMME)		11	2	13	0.81	0.49	0.72
		EMERGENCY (10MINS)		182	18	200	13.36	4.38	11.10
		URGENT (30MINS)	3	695	224	922	51.03	54.50	51.19
		SEMI-URGENT (60MINS)	12	416	157	585	30.54	38.20	32.48
		NON-URGENT (2HRS)	13	58	10	81	4.26	2.43	4.50
	1am Total		28	1362	411	1801			
	2am	RESUSCITATION (IMME)		10		10	1.01	0.00	0.78
		EMERGENCY (10MINS)		130	19	149	13.17	6.69	11.60
		URGENT (30MINS)	1	527	157	685	53.39	55.28	53.31
		SEMI-URGENT (60MINS)	7	291	95	393	29.48	33.45	30.58
		NON-URGENT (2HRS)	6	29	13	48	2.94	4.58	3.74
	2am Total		14	987	284	1285			
	3am	RESUSCITATION (IMME)		7		7	0.93	0.00	0.71
		EMERGENCY (10MINS)		96	13	109	12.80	5.70	11.11
		URGENT (30MINS)		396	141	537	52.80	61.84	54.74
		SEMI-URGENT (60MINS)	1	219	68	288	29.20	29.82	29.36
		NON-URGENT (2HRS)	2	32	6	40	4.27	2.63	4.08
	3am Total		3	750	228	981			
	4am	RESUSCITATION (IMME)		7	1	8	1.14	0.53	0.99
		EMERGENCY (10MINS)		74	10	84	12.09	5.32	10.34
		URGENT (30MINS)		312	126	438	50.98	67.02	53.94
		SEMI-URGENT (60MINS)	5	196	49	250	32.03	26.06	30.79
		NON-URGENT (2HRS)	7	23	2	32	3.76	1.06	3.94
	4am Total		12	612	188	812			
	5am	RESUSCITATION (IMME)		4	1	5	0.80	0.68	0.77
		EMERGENCY (10MINS)		94	12	106	18.91	8.16	16.23
		URGENT (30MINS)	1	263	76	340	52.92	51.70	52.07
		SEMI-URGENT (60MINS)	1	119	53	173	23.94	36.05	26.49
		NON-URGENT (2HRS)	7	17	5	29	3.42	3.40	4.44
	5am Total		9	497	147	653			
	6am	RESUSCITATION (IMME)		5		5	1.12	0.00	0.84
		EMERGENCY (10MINS)		76	10	86	17.08	7.41	14.48
		URGENT (30MINS)	2	220	82	304	49.44	60.74	51.18
		SEMI-URGENT (60MINS)	6	121	37	164	27.19	27.41	27.61
		NON-URGENT (2HRS)	6	23	6	35	5.17	4.44	5.89
	6am Total		14	445	135	594			
	7am	RESUSCITATION (IMME)		6	3	9	1.18	1.86	1.29
		EMERGENCY (10MINS)		90	13	103	17.68	8.07	14.78
		URGENT (30MINS)	5	246	87	338	48.33	54.04	48.49
		SEMI-URGENT (60MINS)	6	125	51	182	24.56	31.68	26.11
		NON-URGENT (2HRS)	16	42	7	65	8.25	4.35	9.33
	7am Total		27	509	161	697			

C7.5.1 Cube Pivot Tables: Hosp T & Hosp W – FULL Fin Year 2005 – Triage classification proportions per Hour of Day (**12 midnight – 7 am**)

(...Continued from previous page)

FinancialYr: 2005

Attendances			Site				PROPORTIONS		
Fisc Year	Discl	TriageLevel	OPO	TGA	WHK	Grand Total	TGA	WHK	BOP DHB
	8am	RESUSCITATION (IMME)		6	1	7	0.84	0.34	0.67
		EMERGENCY (10MINS)		130	16	146	18.21	5.39	13.88
		URGENT (30MINS)	3	287	87	377	40.20	29.29	35.84
		SEMI-URGENT (60MINS)	22	203	151	376	28.43	50.84	35.74
		NON-URGENT (2HRS)	16	88	42	146	12.32	14.14	13.88
	8am Total		41	714	297	1052			
	9am	RESUSCITATION (IMME)		11	1	12	1.24	0.16	0.76
		EMERGENCY (10MINS)		152	17	169	17.18	2.70	10.64
		URGENT (30MINS)	4	338	128	470	38.19	20.32	29.58
		SEMI-URGENT (60MINS)	35	282	404	721	31.86	64.13	45.37
		NON-URGENT (2HRS)	35	102	80	217	11.53	12.70	13.66
	9am Total		74	885	630	1589			
	10am	RESUSCITATION (IMME)		10		10	0.86	0.00	0.48
		EMERGENCY (10MINS)		138	20	158	11.86	2.40	7.56
		URGENT (30MINS)	1	447	178	626	38.40	21.32	29.95
		SEMI-URGENT (60MINS)	35	419	542	996	36.00	64.91	47.66
		NON-URGENT (2HRS)	55	150	95	300	12.89	11.38	14.35
	10am Total		91	1164	835	2090			
	11am	RESUSCITATION (IMME)		14	1	15	1.04	0.11	0.63
		EMERGENCY (10MINS)	1	136	43	180	10.07	4.56	7.52
		URGENT (30MINS)	1	528	232	761	39.11	24.60	31.77
		SEMI-URGENT (60MINS)	38	497	576	1111	36.81	61.08	46.39
		NON-URGENT (2HRS)	62	175	91	328	12.96	9.65	13.70
	11am Total		102	1350	943	2395			
	12noon	RESUSCITATION (IMME)		23	1	24	1.64	0.09	0.94
		EMERGENCY (10MINS)		186	45	231	13.29	4.17	9.06
		URGENT (30MINS)	3	520	340	863	37.14	31.48	33.83
		SEMI-URGENT (60MINS)	24	513	600	1137	36.64	55.56	44.57
		NON-URGENT (2HRS)	44	158	94	296	11.29	8.70	11.60
	12noon Total		71	1400	1080	2551			
	1pm	RESUSCITATION (IMME)		25	3	28	1.66	0.27	1.03
		EMERGENCY (10MINS)		199	44	243	13.19	3.95	8.94
		URGENT (30MINS)	9	661	383	1053	43.80	34.35	38.73
		SEMI-URGENT (60MINS)	46	490	607	1143	32.47	54.44	42.04
		NON-URGENT (2HRS)	40	134	78	252	8.88	7.00	9.27
	1pm Total		95	1509	1115	2719			
	2pm	RESUSCITATION (IMME)		23	1	24	1.33	0.08	0.79
		EMERGENCY (10MINS)	1	240	53	294	13.85	4.37	9.73
		URGENT (30MINS)	5	792	452	1249	45.70	37.23	41.34
		SEMI-URGENT (60MINS)	29	547	617	1193	31.56	50.82	39.49
		NON-URGENT (2HRS)	39	131	91	261	7.56	7.50	8.64
	2pm Total		74	1733	1214	3021			
	3pm	RESUSCITATION (IMME)		17	3	20	0.85	0.24	0.60
		EMERGENCY (10MINS)		264	57	321	13.23	4.47	9.57
		URGENT (30MINS)	7	939	469	1415	47.04	36.76	42.18
		SEMI-URGENT (60MINS)	39	649	664	1352	32.52	52.04	40.30
		NON-URGENT (2HRS)	37	127	83	247	6.36	6.50	7.36
	3pm Total		83	1996	1276	3355			

C7.5.1 Cube Pivot Tables: Hosp T & Hosp W – FULL Fin Year 2005 – Triage classification proportions per Hour of Day (**8 am – 3 pm**)

(…Continued from previous page)

FinancialYr 2005

Attendances			Site					PROPORTIONS		
Fisc Year	Discl	TriageLevel	OPO	TGA	WHK	Grand Total		TGA	WHK	BOP DHB
	3pm Total		83	1996	1276	3355				
	4pm	RESUSCITATION (IMME)		19	1	20		0.89	0.07	0.57
		EMERGENCY (10MINS)		306	41	347		14.38	3.06	9.82
		URGENT (30MINS)	4	1053	502	1559		49.48	37.52	44.13
		SEMI-URGENT (60MINS)	35	620	707	1362		29.14	52.84	38.55
		NON-URGENT (2HRS)	28	130	87	245		6.11	6.50	6.93
	4pm Total		67	2128	1338	3533				
	5pm	RESUSCITATION (IMME)		26	1	27		1.24	0.08	0.78
		EMERGENCY (10MINS)		305	43	348		14.58	3.60	10.01
		URGENT (30MINS)	14	1032	452	1498		49.33	37.89	43.10
		SEMI-URGENT (60MINS)	80	605	634	1319		28.92	53.14	37.95
		NON-URGENT (2HRS)	97	124	63	284		5.93	5.28	8.17
	5pm Total		191	2092	1193	3476				
	6pm	RESUSCITATION (IMME)		20	3	23		1.06	0.25	0.70
		EMERGENCY (10MINS)		237	41	278		12.61	3.47	8.43
		URGENT (30MINS)	15	925	478	1418		49.23	40.41	42.98
		SEMI-URGENT (60MINS)	86	579	588	1253		30.81	49.70	37.98
		NON-URGENT (2HRS)	136	118	73	327		6.28	6.17	9.91
	6pm Total		237	1879	1183	3299				
	7pm	RESUSCITATION (IMME)		17	2	19		0.89	0.17	0.59
		EMERGENCY (10MINS)		266	45	311		14.00	3.88	9.60
		URGENT (30MINS)	9	907	479	1395		47.74	41.29	43.07
		SEMI-URGENT (60MINS)	81	626	578	1285		32.95	49.83	39.67
		NON-URGENT (2HRS)	89	84	56	229		4.42	4.83	7.07
	7pm Total		179	1900	1160	3239				
	8pm	RESUSCITATION (IMME)		24	2	26		1.18	0.18	0.79
		EMERGENCY (10MINS)		302	43	345		14.83	3.89	10.42
		URGENT (30MINS)	5	978	439	1422		48.04	39.76	42.93
		SEMI-URGENT (60MINS)	88	621	566	1275		30.50	51.27	38.50
		NON-URGENT (2HRS)	79	111	54	244		5.45	4.89	7.37
	8pm Total		172	2036	1104	3312				
	9pm	RESUSCITATION (IMME)		29	2	31		1.39	0.18	0.95
		EMERGENCY (10MINS)	1	351	53	405		16.79	4.86	12.37
		URGENT (30MINS)	4	963	463	1430		46.08	42.48	43.66
		SEMI-URGENT (60MINS)	43	644	528	1215		30.81	48.44	37.10
		NON-URGENT (2HRS)	47	103	44	194		4.93	4.04	5.92
	9pm Total		95	2090	1090	3275				
	10pm	RESUSCITATION (IMME)		22	2	24		1.09	0.22	0.80
		EMERGENCY (10MINS)		285	53	338		14.13	5.82	11.26
		URGENT (30MINS)	9	1003	399	1411		49.73	43.80	47.00
		SEMI-URGENT (60MINS)	37	611	439	1087		30.29	48.19	36.21
		NON-URGENT (2HRS)	28	96	18	142		4.76	1.98	4.73
	10pm Total		74	2017	911	3002				
	11pm	RESUSCITATION (IMME)		16	3	19		0.79	0.39	0.67
		EMERGENCY (10MINS)		272	38	310		13.39	4.95	10.89
		URGENT (30MINS)	4	986	387	1377		48.55	50.46	48.38
		SEMI-URGENT (60MINS)	26	653	321	1000		32.15	41.85	35.14
		NON-URGENT (2HRS)	18	104	18	140		5.12	2.35	4.92
	11pm Total		48	2031	767	2846				
2005 Total			1829	33560	18185	53574				

C7.5.1 Cube Pivot Tables: Hosp T & Hosp W – FULL Fin Year 2005 – Triage classification proportions per Hour of Day (**4 pm – 11 pm**)

FinancialYr 2006

Attendances			Site				PROPORTIONS		
Fisc Year	Discl	TriageLevel	OPO	TGA	WHK	Grand Total	TGA	WHK	BOP DHB
2006	12midn	RESUSCITATION (IMME)		14	1	15	0.82	0.24	0.70
		EMERGENCY (10MINS)		195	14	209	11.46	3.38	9.78
		URGENT (30MINS)	3	747	175	925	43.92	42.27	43.31
		SEMI-URGENT (60MINS)	8	640	207	855	37.62	50.00	40.03
		NON-URGENT (2HRS)	10	105	17	132	6.17	4.11	6.18
	12midnight Total		21	1701	414	2136			
	1am	RESUSCITATION (IMME)		11	1	12	0.75	0.26	0.64
		EMERGENCY (10MINS)		178	14	192	12.14	3.62	10.28
		URGENT (30MINS)	2	730	164	896	49.80	42.38	47.99
		SEMI-URGENT (60MINS)	6	483	193	682	32.95	49.87	36.53
		NON-URGENT (2HRS)	6	64	15	85	4.37	3.88	4.55
	1am Total		14	1466	387	1867			
	2am	RESUSCITATION (IMME)		9	1	10	0.77	0.35	0.69
		EMERGENCY (10MINS)		144	13	157	12.38	4.55	10.76
		URGENT (30MINS)	2	582	138	722	50.04	48.25	49.49
		SEMI-URGENT (60MINS)	5	385	115	505	33.10	40.21	34.61
		NON-URGENT (2HRS)	3	43	19	65	3.70	6.64	4.46
	2am Total		10	1163	286	1459			
	3am	RESUSCITATION (IMME)		9		9	1.02	0.00	0.80
		EMERGENCY (10MINS)		134	10	144	15.21	4.39	12.82
		URGENT (30MINS)	2	405	122	529	45.97	53.51	47.11
		SEMI-URGENT (60MINS)	6	304	87	397	34.51	38.16	35.35
		NON-URGENT (2HRS)	6	29	9	44	3.29	3.95	3.92
	3am Total		14	881	228	1123			
	4am	RESUSCITATION (IMME)		11		11	1.57	0.00	1.20
		EMERGENCY (10MINS)		90	9	99	12.84	4.37	10.77
		URGENT (30MINS)	5	336	102	443	47.93	49.51	48.20
		SEMI-URGENT (60MINS)	7	234	92	333	33.38	44.66	36.24
		NON-URGENT (2HRS)		30	3	33	4.28	1.46	3.59
	4am Total		12	701	206	919			
	5am	RESUSCITATION (IMME)		7	1	8	1.31	0.64	1.13
		EMERGENCY (10MINS)		80	6	86	14.98	3.82	12.18
		URGENT (30MINS)	4	276	75	355	51.69	47.77	50.28
		SEMI-URGENT (60MINS)	4	151	68	223	28.28	43.31	31.59
		NON-URGENT (2HRS)	7	20	7	34	3.75	4.46	4.82
	5am Total		15	534	157	706			
	6am	RESUSCITATION (IMME)		7		7	1.44	0.00	1.08
		EMERGENCY (10MINS)		70	6	76	14.37	4.17	11.71
		URGENT (30MINS)		250	73	323	51.33	50.69	49.77
		SEMI-URGENT (60MINS)	11	140	58	209	28.75	40.28	32.20
		NON-URGENT (2HRS)	7	20	7	34	4.11	4.86	5.24
	6am Total		18	487	144	649			
	7am	RESUSCITATION (IMME)		8		8	1.46	0.00	1.10
		EMERGENCY (10MINS)		86	6	92	15.66	4.00	12.62
		URGENT (30MINS)	2	244	59	305	44.44	39.33	41.84
		SEMI-URGENT (60MINS)	17	163	70	250	29.69	46.67	34.29
		NON-URGENT (2HRS)	11	48	15	74	8.74	10.00	10.15
	7am Total		30	549	150	729			

C7.5.2 Cube Pivot Tables: Hosp T & Hosp W – FULL Fin Year 2006 – Triage classification proportions per Hour of Day (**12 midnight – 7 am**)

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FinancialYr 2006

Attendances			Site				PROPORTIONS		
Fisc Year	Disc	TriageLevel	OPO	TGA	WHK	Grand Total	TGA	WHK	BOP DHB
	8am	RESUSCITATION (IMME)		9		9	1.24	0.00	0.84
		EMERGENCY (10MINS)		110	12	122	15.11	3.82	11.33
		URGENT (30MINS)	6	289	83	378	39.70	26.43	35.10
		SEMI-URGENT (60MINS)	15	223	177	415	30.63	56.37	38.53
		NON-URGENT (2HRS)	14	97	42	153	13.32	13.38	14.21
	8am Total		35	728	314	1077			
	9am	RESUSCITATION (IMME)		7	1	8	0.75	0.16	0.49
		EMERGENCY (10MINS)		108	16	124	11.50	2.58	7.60
		URGENT (30MINS)	10	372	102	484	39.62	16.48	29.66
		SEMI-URGENT (60MINS)	30	299	409	738	31.84	66.07	45.22
		NON-URGENT (2HRS)	34	153	91	278	16.29	14.70	17.03
	9am Total		74	939	619	1632			
	10am	RESUSCITATION (IMME)		12		12	1.06	0.00	0.58
		EMERGENCY (10MINS)		133	25	158	11.71	2.97	7.57
		URGENT (30MINS)	13	455	171	639	40.05	20.28	30.63
		SEMI-URGENT (60MINS)	44	369	547	960	32.48	64.89	46.02
		NON-URGENT (2HRS)	50	167	100	317	14.70	11.86	15.20
	10am Total		107	1136	843	2086			
	11am	RESUSCITATION (IMME)		12	1	13	0.88	0.10	0.53
		EMERGENCY (10MINS)		170	28	198	12.46	2.78	8.13
		URGENT (30MINS)	9	518	200	727	37.98	19.86	29.86
		SEMI-URGENT (60MINS)	25	479	652	1156	35.12	64.75	47.47
		NON-URGENT (2HRS)	30	185	126	341	13.56	12.51	14.00
	11am Total		64	1364	1007	2435			
	12noon	RESUSCITATION (IMME)		6	1	7	0.42	0.09	0.27
		EMERGENCY (10MINS)		191	33	224	13.32	3.06	8.75
		URGENT (30MINS)	4	564	248	816	39.33	22.96	31.86
		SEMI-URGENT (60MINS)	22	497	682	1201	34.66	63.15	46.90
		NON-URGENT (2HRS)	21	176	116	313	12.27	10.74	12.22
	12noon Total		47	1434	1080	2561			
	1pm	RESUSCITATION (IMME)		11	2	13	0.64	0.19	0.46
		EMERGENCY (10MINS)		235	26	261	13.68	2.53	9.29
		URGENT (30MINS)	5	683	261	949	39.76	25.36	33.78
		SEMI-URGENT (60MINS)	34	616	648	1298	35.86	62.97	46.21
		NON-URGENT (2HRS)	23	173	92	288	10.07	8.94	10.25
	1pm Total		62	1718	1029	2809			
	2pm	RESUSCITATION (IMME)		16		16	0.86	0.00	0.50
		EMERGENCY (10MINS)		252	44	296	13.47	3.57	9.31
		URGENT (30MINS)	10	802	340	1152	42.86	27.55	36.23
		SEMI-URGENT (60MINS)	37	666	780	1483	35.60	63.21	46.64
		NON-URGENT (2HRS)	28	135	70	233	7.22	5.67	7.33
	2pm Total		75	1871	1234	3180			
	3pm	RESUSCITATION (IMME)		18	1	19	0.84	0.08	0.54
		EMERGENCY (10MINS)		285	48	333	13.23	3.76	9.50
		URGENT (30MINS)	9	937	374	1320	43.50	29.29	37.67
		SEMI-URGENT (60MINS)	37	754	761	1552	35.00	59.59	44.29
		NON-URGENT (2HRS)	27	160	93	280	7.43	7.28	7.99
	3pm Total		73	2154	1277	3504			

C7.5.2 Cube Pivot Tables: Hosp T & Hosp W – FULL Fin Year 2006 – Triage classification proportions per Hour of Day (**8 am – 3 pm**)

(...Continued from previous page)

FinancialYr 2006

Attendances			Site				PROPORTIONS		
Fisc Year	Discl	TriageLevel	OPO	TGA	WHK	Grand Total	TGA	WHK	BOP DHB
	4pm	RESUSCITATION (IMME)	1	19	2	22	0.89	0.15	0.62
		EMERGENCY (10MINS)		272	38	310	12.69	2.83	8.71
		URGENT (30MINS)	9	985	404	1398	45.94	30.06	39.27
		SEMI-URGENT (60MINS)	34	696	810	1540	32.46	60.27	43.26
		NON-URGENT (2HRS)	28	172	90	290	8.02	6.70	8.15
	4pm Total		72	2144	1344	3560			
	5pm	RESUSCITATION (IMME)		15	1	16	0.70	0.08	0.45
		EMERGENCY (10MINS)	1	279	34	314	13.04	2.78	8.84
		URGENT (30MINS)	12	974	384	1370	45.51	31.37	38.57
		SEMI-URGENT (60MINS)	101	723	733	1557	33.79	59.89	43.83
		NON-URGENT (2HRS)	74	149	72	295	6.96	5.88	8.31
	5pm Total		188	2140	1224	3552			
	6pm	RESUSCITATION (IMME)		21	1	22	1.09	0.09	0.69
		EMERGENCY (10MINS)		235	19	254	12.21	1.75	7.91
		URGENT (30MINS)	12	909	344	1265	47.22	31.76	39.40
		SEMI-URGENT (60MINS)	113	617	661	1391	32.05	61.03	43.32
		NON-URGENT (2HRS)	78	143	58	279	7.43	5.36	8.69
	6pm Total		203	1925	1083	3211			
	7pm	RESUSCITATION (IMME)		20	1	21	1.01	0.09	0.64
		EMERGENCY (10MINS)		259	31	290	13.13	2.75	8.81
		URGENT (30MINS)	16	893	343	1252	45.28	30.38	38.03
		SEMI-URGENT (60MINS)	103	662	682	1447	33.57	60.41	43.96
		NON-URGENT (2HRS)	72	138	72	282	7.00	6.38	8.57
	7pm Total		191	1972	1129	3292			
	8pm	RESUSCITATION (IMME)		15	2	17	0.70	0.18	0.49
		EMERGENCY (10MINS)		303	24	327	14.10	2.10	9.46
		URGENT (30MINS)	14	987	367	1368	45.93	32.14	39.56
		SEMI-URGENT (60MINS)	75	694	693	1462	32.29	60.68	42.28
		NON-URGENT (2HRS)	78	150	56	284	6.98	4.90	8.21
	8pm Total		167	2149	1142	3458			
	9pm	RESUSCITATION (IMME)		16	2	18	0.74	0.18	0.54
		EMERGENCY (10MINS)		292	34	326	13.55	3.13	9.77
		URGENT (30MINS)	8	1043	369	1420	48.40	33.92	42.57
		SEMI-URGENT (60MINS)	48	677	629	1354	31.42	57.81	40.59
		NON-URGENT (2HRS)	37	127	54	218	5.89	4.96	6.53
	9pm Total		93	2155	1088	3336			
	10pm	RESUSCITATION (IMME)		19	1	20	0.90	0.11	0.65
		EMERGENCY (10MINS)		268	28	296	12.76	3.09	9.66
		URGENT (30MINS)	4	981	299	1284	46.71	33.00	41.91
		SEMI-URGENT (60MINS)	33	705	530	1268	33.57	58.50	41.38
		NON-URGENT (2HRS)	21	127	48	196	6.05	5.30	6.40
	10pm Total		58	2100	906	3064			
	11pm	RESUSCITATION (IMME)		18	1	19	0.99	0.13	0.72
		EMERGENCY (10MINS)		238	27	265	13.03	3.53	9.99
		URGENT (30MINS)	3	812	320	1135	44.44	41.83	42.78
		SEMI-URGENT (60MINS)	27	649	395	1071	35.52	51.63	40.37
		NON-URGENT (2HRS)	31	110	22	163	6.02	2.88	6.14
	11pm Total		61	1827	765	2653			
2006 Total			1704	35238	18056	54998			

C7.5.2 Cube Pivot Tables: Hosp T & Hosp W – FULL Fin Year 2006 – Triage classification proportions per Hour of Day (**4 pm – 11 pm**)

FinancialYr 2007

Attendances			Site				PROPORTIONS		
Fisc Year	Discl	TriageLevel	OPO	TGA	WHK	Grand Total	TGA	WHK	BOP DHB
2007	12midni	RESUSCITATION (IMME)		11	1	12	0.73	0.23	0.61
		EMERGENCY (10MINS)		179	20	199	11.93	4.62	10.17
		URGENT (30MINS)	11	699	138	848	46.60	31.87	43.33
		SEMI-URGENT (60MINS)	13	534	252	799	35.60	58.20	40.83
		NON-URGENT (2HRS)		77	22	99	5.13	5.08	5.06
	12midnight Total		24	1500	433	1957			
	1am	RESUSCITATION (IMME)		11		11	0.77	0.00	0.61
		EMERGENCY (10MINS)		150	9	159	10.50	2.54	8.80
		URGENT (30MINS)	5	690	116	811	48.29	32.68	44.91
		SEMI-URGENT (60MINS)	14	513	208	735	35.90	58.59	40.70
		NON-URGENT (2HRS)	3	65	22	90	4.55	6.20	4.98
	1am Total		22	1429	355	1806			
	2am	RESUSCITATION (IMME)		10	1	11	0.85	0.41	0.76
		EMERGENCY (10MINS)		141	15	156	12.05	6.12	10.85
		URGENT (30MINS)	11	541	97	649	46.24	39.59	45.13
		SEMI-URGENT (60MINS)	11	431	118	560	36.84	48.16	38.94
		NON-URGENT (2HRS)	1	47	14	62	4.02	5.71	4.31
	2am Total		23	1170	245	1438			
	3am	RESUSCITATION (IMME)		6	1	7	0.67	0.50	0.63
		EMERGENCY (10MINS)		109	7	116	12.21	3.47	10.40
		URGENT (30MINS)	4	403	87	494	45.13	43.07	44.30
		SEMI-URGENT (60MINS)	15	339	94	448	37.96	46.53	40.18
		NON-URGENT (2HRS)	1	36	13	50	4.03	6.44	4.48
	3am Total		20	893	202	1115			
	4am	RESUSCITATION (IMME)		15	1	16	2.08	0.61	1.78
		EMERGENCY (10MINS)		97	10	107	13.47	6.10	11.93
		URGENT (30MINS)	5	341	70	416	47.36	42.68	46.38
		SEMI-URGENT (60MINS)	7	233	77	317	32.36	46.95	35.34
		NON-URGENT (2HRS)	1	34	6	41	4.72	3.66	4.57
	4am Total		13	720	164	897			
	5am	RESUSCITATION (IMME)		4		4	0.77	0.00	0.60
		EMERGENCY (10MINS)		67	6	73	12.88	4.11	10.88
		URGENT (30MINS)	2	251	61	314	48.27	41.78	46.80
		SEMI-URGENT (60MINS)	3	184	70	257	35.38	47.95	38.30
		NON-URGENT (2HRS)		14	9	23	2.69	6.16	3.43
	5am Total		5	520	146	671			
	6am	RESUSCITATION (IMME)		5		5	1.00	0.00	0.76
		EMERGENCY (10MINS)		73	10	83	14.60	6.71	12.56
		URGENT (30MINS)	5	257	64	326	51.40	42.95	49.32
		SEMI-URGENT (60MINS)	7	143	65	215	28.60	43.62	32.53
		NON-URGENT (2HRS)		22	10	32	4.40	6.71	4.84
	6am Total		12	500	149	661			
	7am	RESUSCITATION (IMME)		5	2	7	0.87	1.10	0.90
		EMERGENCY (10MINS)		88	14	102	15.38	7.69	13.11
		URGENT (30MINS)	6	273	57	336	47.73	31.32	43.19
		SEMI-URGENT (60MINS)	13	168	84	265	29.37	46.15	34.06
		NON-URGENT (2HRS)	5	38	25	68	6.64	13.74	8.74
	7am Total		24	572	182	778			

C7.5.3 Cube Pivot Tables: Hosp T & Hosp W – FULL Fin Year 2007 – Triage classification proportions per Hour of Day (**12 midnight – 7 am**)

(...Continued from previous page)

FinancialYr 2007

Attendances			Site				PROPORTIONS		
Fisc Year	Discl	TriageLevel	OPO	TGA	WHK	Grand Total	TGA	WHK	BOP DHB
	8am	RESUSCITATION (IMME)		9	1	10	1.10	0.26	0.80
		EMERGENCY (10MINS)		110	18	128	13.45	4.74	10.30
		URGENT (30MINS)	8	324	67	399	39.61	17.63	32.10
		SEMI-URGENT (60MINS)	31	254	193	478	31.05	50.79	38.46
		NON-URGENT (2HRS)	6	121	101	228	14.79	26.58	18.34
	8am Total		45	818	380	1243			
	9am	RESUSCITATION (IMME)		7	3	10	0.71	0.41	0.56
		EMERGENCY (10MINS)		100	16	116	10.16	2.17	6.54
		URGENT (30MINS)	12	316	79	407	32.11	10.73	22.94
		SEMI-URGENT (60MINS)	28	387	428	843	39.33	58.15	47.52
		NON-URGENT (2HRS)	14	174	210	398	17.68	28.53	22.44
	9am Total		54	984	736	1774			
	10am	RESUSCITATION (IMME)		10	1	11	0.81	0.11	0.49
		EMERGENCY (10MINS)	1	124	14	139	9.98	1.48	6.17
		URGENT (30MINS)	17	370	127	514	29.79	13.44	22.80
		SEMI-URGENT (60MINS)	35	524	570	1129	42.19	60.32	50.09
		NON-URGENT (2HRS)	14	214	233	461	17.23	24.66	20.45
	10am Total		67	1242	945	2254			
	11am	RESUSCITATION (IMME)		7	1	8	0.48	0.09	0.30
		EMERGENCY (10MINS)		161	20	181	10.96	1.78	6.83
		URGENT (30MINS)	4	499	178	681	33.97	15.88	25.71
		SEMI-URGENT (60MINS)	32	595	643	1270	40.50	57.36	47.94
		NON-URGENT (2HRS)	23	207	279	509	14.09	24.89	19.21
	11am Total		59	1469	1121	2649			
	12noon	RESUSCITATION (IMME)		12	4	16	0.79	0.34	0.58
		EMERGENCY (10MINS)		181	31	212	11.86	2.67	7.72
		URGENT (30MINS)	11	517	235	763	33.88	20.22	27.79
		SEMI-URGENT (60MINS)	35	597	691	1323	39.12	59.47	48.18
		NON-URGENT (2HRS)	12	219	201	432	14.35	17.30	15.73
	12noon Total		58	1526	1162	2746			
	1pm	RESUSCITATION (IMME)		16	2	18	0.87	0.16	0.56
		EMERGENCY (10MINS)	1	232	34	267	12.62	2.65	8.30
		URGENT (30MINS)	20	677	299	996	36.83	23.32	30.98
		SEMI-URGENT (60MINS)	52	721	761	1534	39.23	59.36	47.71
		NON-URGENT (2HRS)	22	192	186	400	10.45	14.51	12.44
	1pm Total		95	1838	1282	3215			
	2pm	RESUSCITATION (IMME)	1	16	1	18	0.80	0.08	0.54
		EMERGENCY (10MINS)		226	33	259	11.35	2.63	7.84
		URGENT (30MINS)	8	812	296	1116	40.78	23.62	33.79
		SEMI-URGENT (60MINS)	41	757	755	1553	38.02	60.26	47.02
		NON-URGENT (2HRS)	9	180	168	357	9.04	13.41	10.81
	2pm Total		59	1991	1253	3303			
	3pm	RESUSCITATION (IMME)		11		11	0.53	0.00	0.31
		EMERGENCY (10MINS)	1	255	37	293	12.23	2.70	8.32
		URGENT (30MINS)	10	882	311	1203	42.30	22.73	34.18
		SEMI-URGENT (60MINS)	45	761	825	1631	36.50	60.31	46.34
		NON-URGENT (2HRS)	11	176	195	382	8.44	14.25	10.85
	3pm Total		67	2085	1368	3520			

C7.5.3 Cube Pivot Tables: Hosp T & Hosp W – FULL Fin Year 2007 – Triage classification proportions per Hour of Day (**8 am – 3 pm**)

(... Continued from previous page)

FinancialYr: 2007

Attendances			Site				PROPORTIONS		
Fisc Year	Discl	TriageLevel	OPO	TGA	WHK	Grand Total	TGA	WHK	BOP DHB
	4pm	RESUSCITATION (IMME)		12	2	14	0.51	0.14	0.36
		EMERGENCY (10MINS)	2	270	26	298	11.57	1.77	7.73
		URGENT (30MINS)	10	953	338	1301	40.85	23.01	33.77
		SEMI-URGENT (60MINS)	28	912	903	1843	39.09	61.47	47.83
		NON-URGENT (2HRS)	11	186	200	397	7.97	13.61	10.30
	4pm Total		51	2333	1469	3853			
	5pm	RESUSCITATION (IMME)		5	1	6	0.23	0.08	0.17
		EMERGENCY (10MINS)	1	266	29	296	12.30	2.26	8.24
		URGENT (30MINS)	30	952	279	1261	44.03	21.76	35.09
		SEMI-URGENT (60MINS)	97	778	842	1717	35.99	65.68	47.77
		NON-URGENT (2HRS)	22	161	131	314	7.45	10.22	8.74
	5pm Total		150	2162	1282	3594			
	6pm	RESUSCITATION (IMME)		9		9	0.45	0.00	0.28
		EMERGENCY (10MINS)	1	235	23	259	11.80	2.11	7.92
		URGENT (30MINS)	27	833	261	1121	41.82	23.90	34.26
		SEMI-URGENT (60MINS)	126	743	692	1561	37.30	63.37	47.71
		NON-URGENT (2HRS)	34	172	116	322	8.63	10.62	9.84
	6pm Total		188	1992	1092	3272			
	7pm	RESUSCITATION (IMME)		14	1	15	0.67	0.09	0.44
		EMERGENCY (10MINS)	1	257	34	292	12.24	2.96	8.57
		URGENT (30MINS)	24	932	280	1236	44.40	24.37	36.26
		SEMI-URGENT (60MINS)	118	757	707	1582	36.06	61.53	46.41
		NON-URGENT (2HRS)	18	139	127	284	6.62	11.05	8.33
	7pm Total		161	2099	1149	3409			
	8pm	RESUSCITATION (IMME)		16	2	18	0.73	0.18	0.53
		EMERGENCY (10MINS)		235	35	270	10.69	3.19	7.89
		URGENT (30MINS)	28	958	244	1230	43.59	22.22	35.94
		SEMI-URGENT (60MINS)	77	840	714	1631	38.22	65.03	47.66
		NON-URGENT (2HRS)	21	149	103	273	6.78	9.38	7.98
	8pm Total		126	2198	1098	3422			
	9pm	RESUSCITATION (IMME)		16	1	17	0.70	0.10	0.50
		EMERGENCY (10MINS)	1	277	24	302	12.11	2.32	8.86
		URGENT (30MINS)	20	1041	265	1326	45.52	25.65	38.92
		SEMI-URGENT (60MINS)	59	805	654	1518	35.20	63.31	44.56
		NON-URGENT (2HRS)	7	148	89	244	6.47	8.62	7.16
	9pm Total		87	2287	1033	3407			
	10pm	RESUSCITATION (IMME)		9	1	10	0.45	0.12	0.34
		EMERGENCY (10MINS)	1	230	17	248	11.39	2.02	8.53
		URGENT (30MINS)	10	869	253	1132	43.04	30.08	38.91
		SEMI-URGENT (60MINS)	29	776	506	1311	38.43	60.17	45.07
		NON-URGENT (2HRS)	9	135	64	208	6.69	7.61	7.15
	10pm Total		49	2019	841	2909			
	11pm	RESUSCITATION (IMME)		5	1	6	0.27	0.14	0.23
		EMERGENCY (10MINS)		209	21	230	11.29	2.94	8.79
		URGENT (30MINS)	19	802	239	1060	43.33	33.43	40.49
		SEMI-URGENT (60MINS)	30	739	402	1171	39.92	56.22	44.73
		NON-URGENT (2HRS)	3	96	52	151	5.19	7.27	5.77
	11pm Total		52	1851	715	2618			
2007 Total			1511	36198	18802	56511			

C7.5.3 Cube Pivot Tables: Hosp T & Hosp W – FULL Fin Year 2007 – Triage classification proportions per Hour of Day (**4 pm – 11 pm**)

13.1 APPENDIX A6: RESULTS: CHAPTER 7.6

RESULTS HELD IN THIS APPENDIX

C7.6.1	**C7.6.2**	**C7.6.3**	**C7.6.4**	**C7.6.5**	**C7.6.6**
C7.6.7	**C7.6.8**	**c7.6.9**			

7.6 RESULTS: Using FULL DS: PER ANNUM – DEMAND OVER SEVERAL FINANCIAL YEARS

- **(Postulate6)** Per Annum: To determine comparative per annum demand over several "Financial Years" – to see if there is a trend "for better or worse" over the years

7.6.1 Using FULL DS: FINDINGS

FINDINGS AND COMMENTS

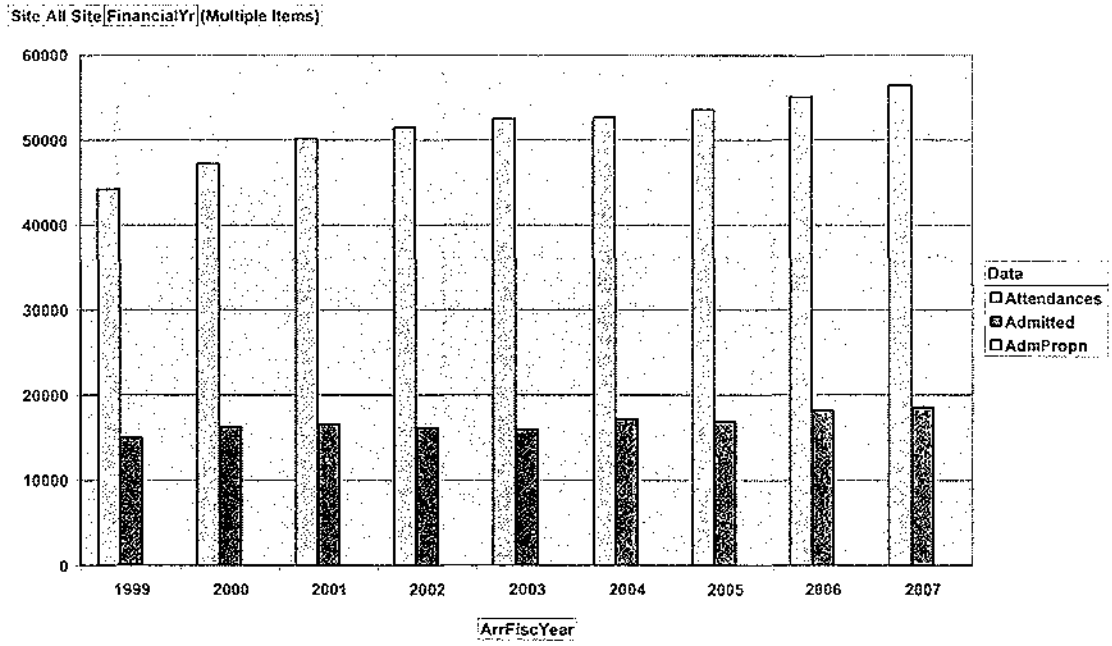
Cf. Earlier Pages **110 - 119**

7.6.2 Using FULL DS: CUBE RESULTS

PER ED CUBE RESULTS ACROSS NINE FINANCIAL YEARS

Site	All Site				% Growth from prev yr
FinancialYr	(Multiple Items)				
	Data				
ArrFiscYear	Attendances	Admitted	AdmPropn		
1999	44243	14998	0.34		
2000	47219	16222	0.34		6.73
2001	50189	16562	0.33		6.29
2002	51491	16176	0.31		2.59
2003	52484	15947	0.30		1.93
2004	52678	17136	0.33		0.37
2005	53585	16946	0.32		1.72
2006	55000	18192	0.33		2.64
2007	56490	18609	0.33		2.71

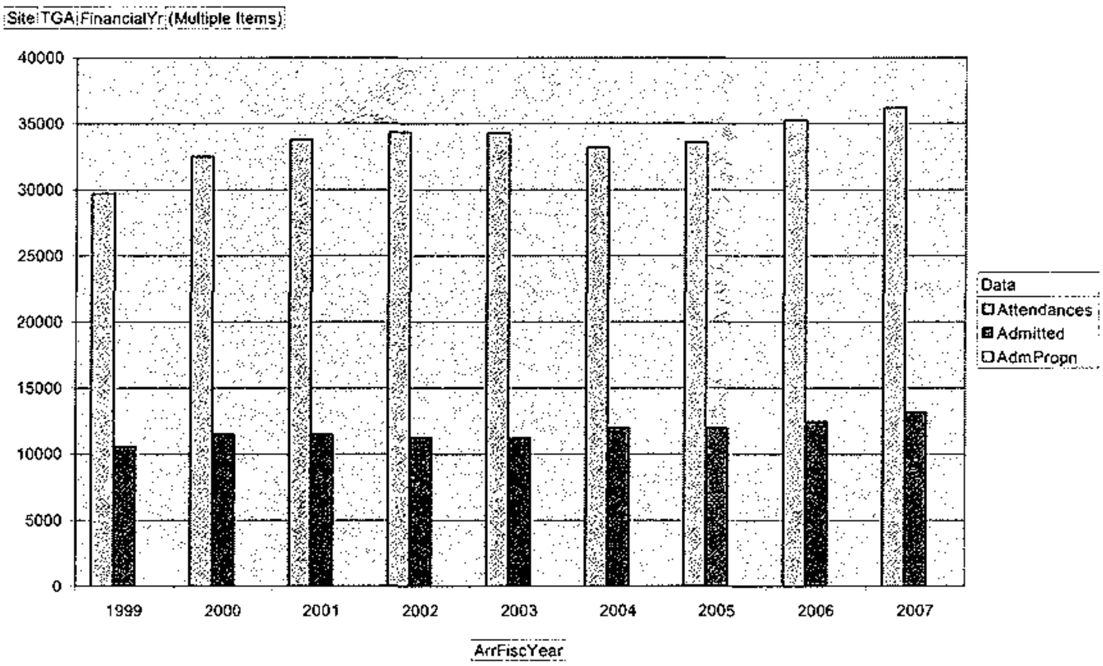
C7.6.1 Cube Pivot Table: BOP DHB - Total presentations per annum & annual growth



C7.6.2 Chart: BOP DHB - Total presentations per annum

Site	TGA				
FinancialYr	(Multiple Items)				
	Data				% Growth from prev yr
ArrFiscYear	Attendances	Admitted	AdmPropn		
1999	29732	10567	0.36		
2000	32500	11513	0.35		9.31
2001	33759	11495	0.34		3.87
2002	34360	11254	0.33		1.78
2003	34302	11198	0.33		-0.17
2004	33171	12001	0.36		-3.30
2005	33568	11982	0.36		1.20
2006	35244	12452	0.35		4.99
2007	36179	13168	0.36		2.65

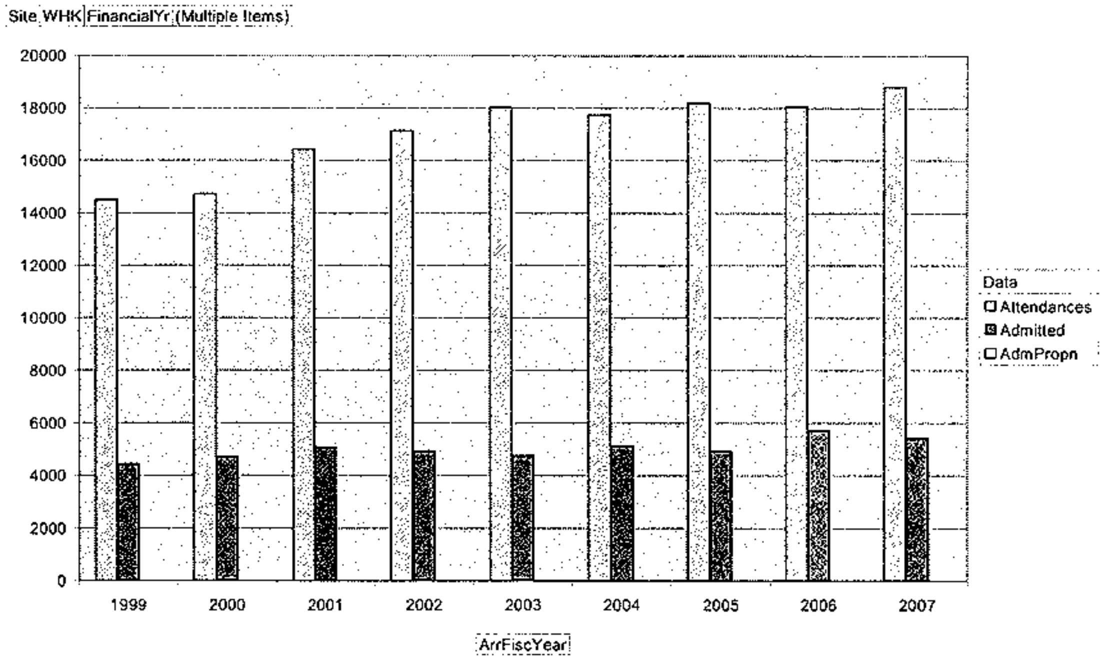
C7.6.3 Cube Pivot Table: Hospital T – Total presentations per annum & annual growth



C7.6.4 Chart: Hospital T - Total presentations per annum

Site	WHK				
FinancialYr	(Multiple Items)				
	Data				% Growth from prev yr
ArrFiscYear	Attendances	Admitted	AdmPropn		
1999	14511	4431	0.31		
2000	14719	4709	0.32		**1.43**
2001	16430	5067	0.31		**11.62**
2002	17131	4922	0.29		**4.27**
2003	18033	4748	0.26		**5.27**
2004	17724	5118	0.29		**-1.71**
2005	18187	4943	0.27		**2.61**
2006	18053	5726	0.32		**-0.74**
2007	18800	5422	0.29		**4.14**

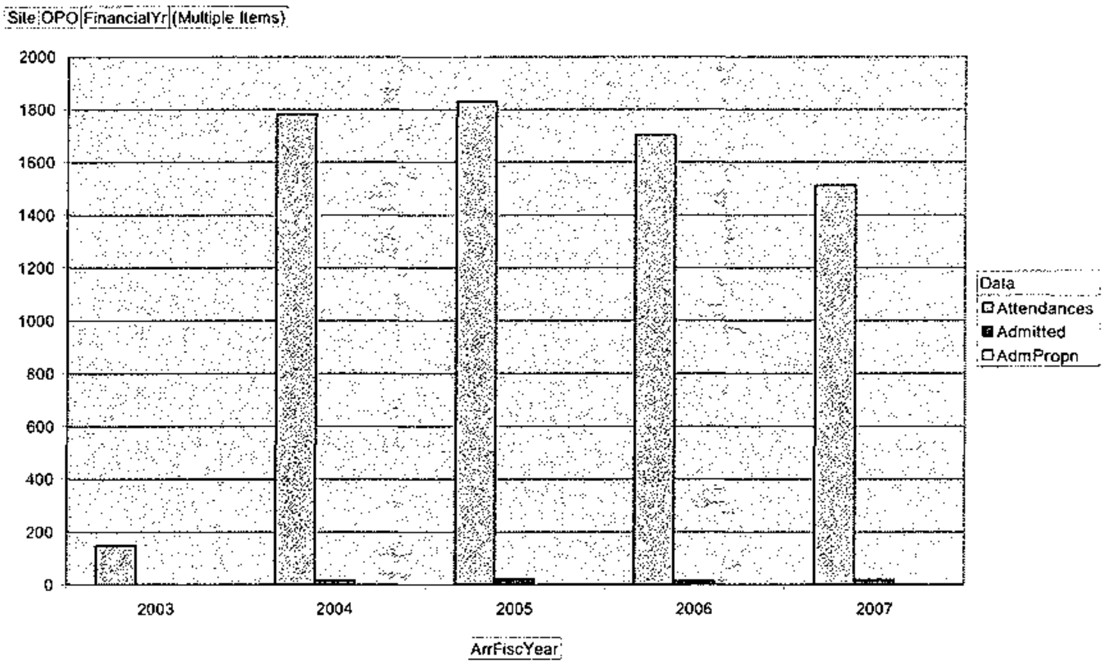
C7.6.5 Cube Pivot Table: Hospital W – Total presentations per annum & annual growth



C7.6.6 Chart: Hospital W - Total presentations per annum

Site	OPO				
FinancialYr	(Multiple Items)				
	Data				% Growth from prev yr
ArrFiscYear	Attendances	Admitted	AdmPropn		
2003	149	1	0.01		
2004	1783	17	0.01		~~1096.64~~
2005	1830	21	0.01		2.64
2006	1703	14	0.01		-6.94
2007	1511	19	0.01		-11.27

C7.6.7 Cube Pivot Table: Hospital O – Total presentations per annum & annual growth



C7.6.8 Chart: Hospital O - Total presentations per annum

COMPOSITE OF CUBE RESULTS ACROSS NINE FINANCIAL YEARS

C7.6.9 Cube Pivot Table: BOP DHB Composite – Showing All E Departments

FinancialYr	(Mutiple It ▼s)											
	Site ▼	Data ▼										
	OPO			TGA			WHK			Total Attend	Total Admitte	Total AdmPrc
ArrFiscYear ▼	Attendances	Admitted	AdmPropn	Attendances	Admitted	AdmPropn	Attendances	Admitted	AdmPropn			
1999				29732	10567	0.36	14511	4431	0.31	44243	14998	0.34
2000				32500	11513	0.35	14719	4709	0.32	47219	16222	0.34
2001				33759	11495	0.34	16430	5067	0.31	50189	16562	0.33
2002				34360	11254	0.33	17131	4922	0.29	51491	16176	0.31
2003	149	1	0.01	34302	11198	0.33	18033	4748	0.26	52484	15947	0.30
2004	1783	17	0.01	33171	12001	0.36	17724	5118	0.29	52678	17136	0.33
2005	1830	21	0.01	33568	11982	0.36	18187	4943	0.27	53585	16946	0.32
2006	1703	14	0.01	35244	12452	0.35	18053	5726	0.32	55000	18192	0.33
2007	1511	19	0.01	38179	13168	0.36	18800	5422	0.29	56490	18609	0.33
% Growth 1999-2007	**-15.26**	**11.76**	0.04	**21.68**	**24.61**	3.14	**29.56**	**22.37**	2.65	**27.68**	**24.08**	2.93
Ave Prop 1999-2007			**0.01**			**0.35**			**0.29**			**0.33**

For OPO: % Growth & Ave Prop 2004-2007

13.2 APPENDICES B: RESULTS: CHAPTER 9

APPENDICES B*

RESULTS FOR CHAPTER 9

APPENDIX **B1**
APPENDIX **B2**
APPENDIX **B3**
APPENDIX **B4**
APPENDIX **B5**

13.2 APPENDIX B1: RESULTS: CHAPTER 9.1

RESULTS HELD IN THIS APPENDIX

S9.1.1	**S9.1.2**	**S9.1.3**	**S9.1.4**	**S9.1.5**	**S9.1.6**
S9.1.7	**S9.1.8**	**S9.1.9**	**S9.1.10**	**S9.1.11**	**S9.1.12**
S9.1.13	**S9.1.14**	**S9.1.15**			

C9.1.1	**C9.1.2**	**C9.1.3**

9. RESULTS: TGA USING PARTITIONED DATA SETS (I.E. TRAINING, VALIDATION & TEST) VS SOME WHK

9.1 RESULTS: Using PART DS: PER SEASON – DEMAND OVER 12 MONTHS

- **(Postulate1)** Per Season: To determine seasonal demand over 12 month periods running from July to June (inclusive).

9.1.1 Using PART DS: FINDINGS

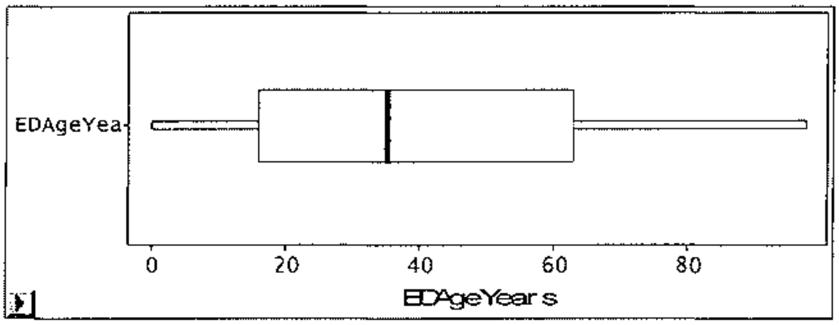
FINDINGS AND COMMENTS

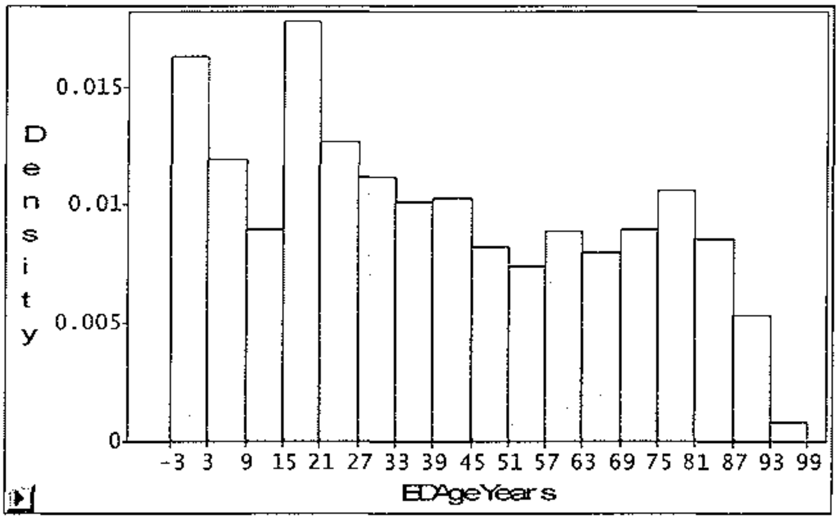
Cf. Earlier Pages **128 - 132**

9.1.2 Using PART DS: SAS RESULTS

TGA: AGE by T, V & T
EDData200507
TRAINING:

EDAgeYears





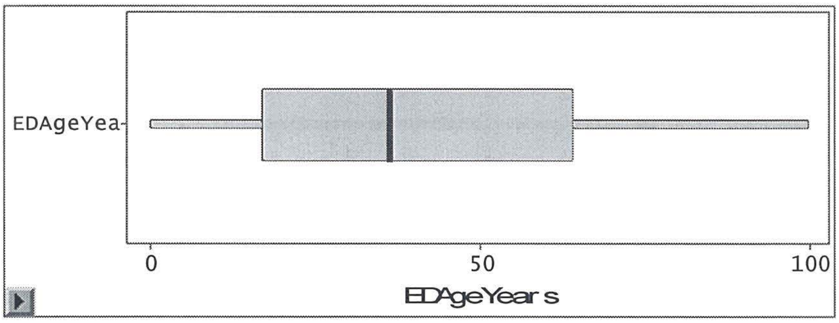
Moments			
N	1144.0000	Sum Wgts	1144.0000
Mean	39.0105	Sum	44628.0000
Std Dev	27.7264	Variance	768.7505
Skewness	0.2734	Kurtosis	-1.1849
USS	2619642.00	CSS	878681.874
CV	71.0741	Std Mean	0.8197

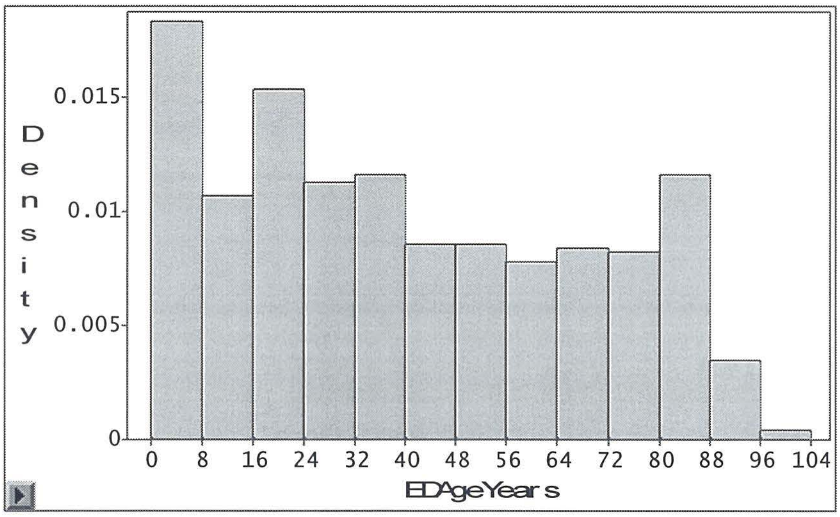
Quantiles			
100% Max	98.0000	99.0%	91.0000
75% Q3	63.0000	97.5%	88.0000
50% Med	35.0000	95.0%	85.0000
25% Q1	16.0000	90.0%	80.0000
0% Min	0	10.0%	3.0000
Range	98.0000	5.0%	1.0000
Q3-Q1	47.0000	2.5%	0
Mode	0	1.0%	0

S9.1.1 Box Plot & Distribution: TGA TRN DS - JUL 2005 Age dist of ED Present's

TGA: AGE by T, V & T
EDData200507
VALIDATION:

EDAgeYears





Moments

N	858.0000	Sum Wgts	858.0000
Mean	40.1224	Sum	34425.0000
Std Dev	27.8058	Variance	773.1600
Skewness	0.2632	Kurtosis	-1.1691
USS	2043811.00	CSS	662598.150
CV	69.3024	Std Mean	0.9493

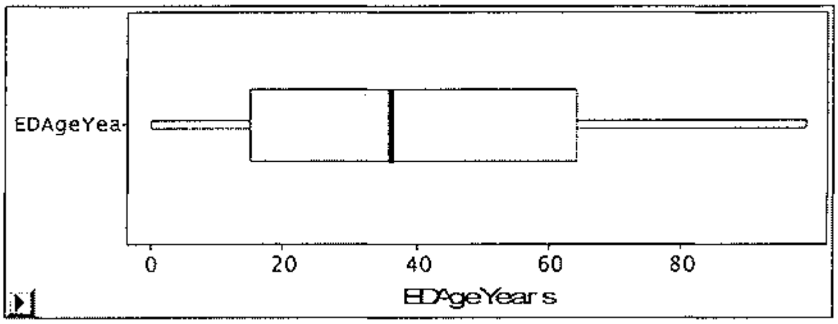
Quantiles

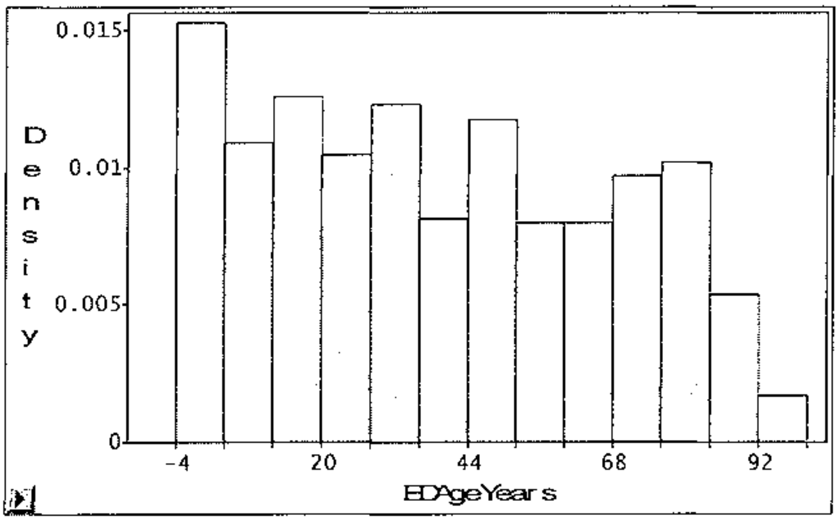
100% Max	100.0000	99.0%	93.0000
75% Q3	64.0000	97.5%	89.0000
50% Med	36.0000	95.0%	86.0000
25% Q1	17.0000	90.0%	82.0000
0% Min	0	10.0%	4.0000
Range	100.0000	5.0%	1.0000
Q3-Q1	47.0000	2.5%	0
Mode	0	1.0%	0

S9.1.2 Box Plot & Distribution: TGA VAL DS - JUL 2005 Age dist of ED Present's

TGA: AGE by T, V & T
EDData200507
TEST:

EDAgeYears





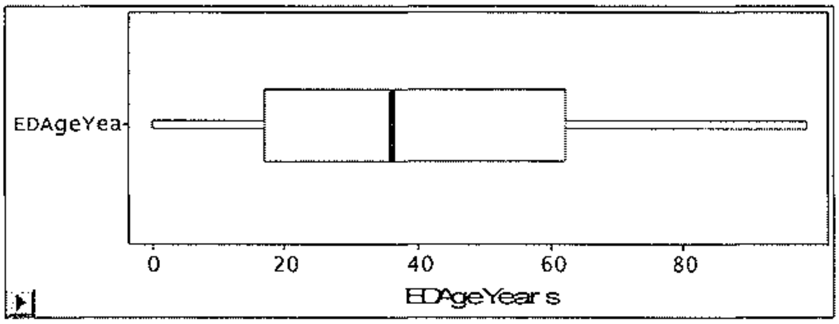
Moments			
N	857.0000	Sum Wgts	857.0000
Mean	39.3839	Sum	33752.0000
Std Dev	27.8488	Variance	775.5569
Skewness	0.2220	Kurtosis	-1.1895
USS	1993162.00	CSS	663876.698
CV	70.7112	Std Mean	0.9513

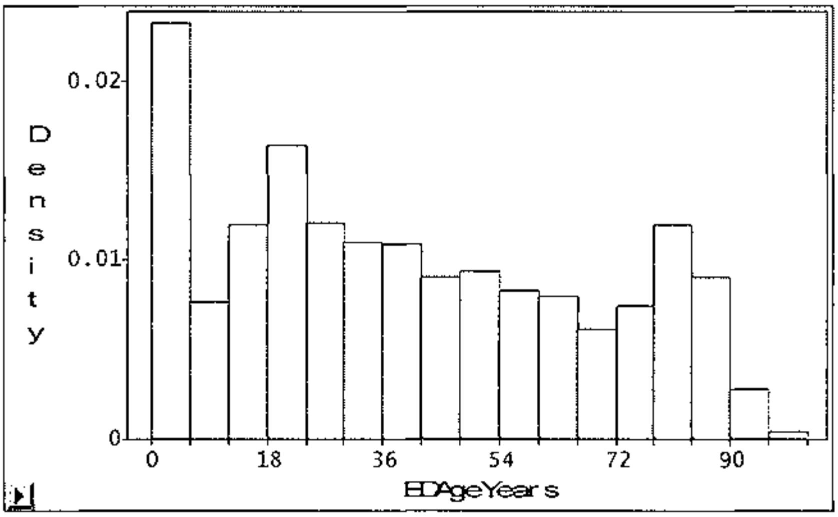
Quantiles			
100% Max	99.0000	99.0%	93.0000
75% Q3	64.0000	97.5%	88.0000
50% Med	36.0000	95.0%	84.0000
25% Q1	15.0000	90.0%	80.0000
0% Min	0	10.0%	2.0000
Range	99.0000	5.0%	1.0000
Q3-Q1	49.0000	2.5%	0
Mode	0	1.0%	0

S9.1.3 Box Plot & Distribution: TGA TST DS - JUL 2005 Age dist of ED Present's

TGA: AGE by T, V & T
EDData200607
TRAINING:

EDAgeYears





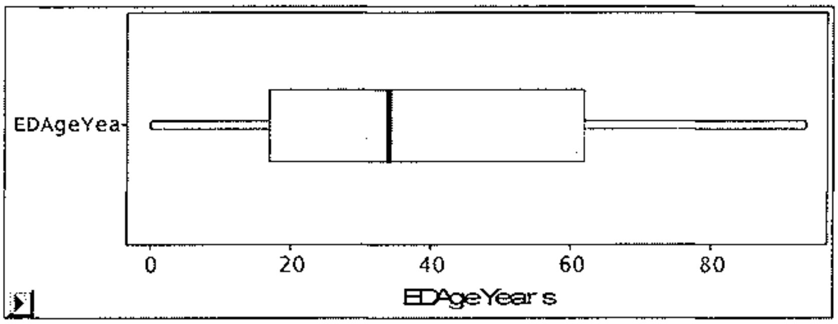
Moments			
N	1238.0000	Sum Wgts	1238.0000
Mean	39.7771	Sum	49244.0000
Std Dev	27.8711	Variance	776.7975
Skewness	0.2701	Kurtosis	-1.1444
USS	2919680.00	CSS	960898.468
CV	70.0682	Std Mean	0.7921

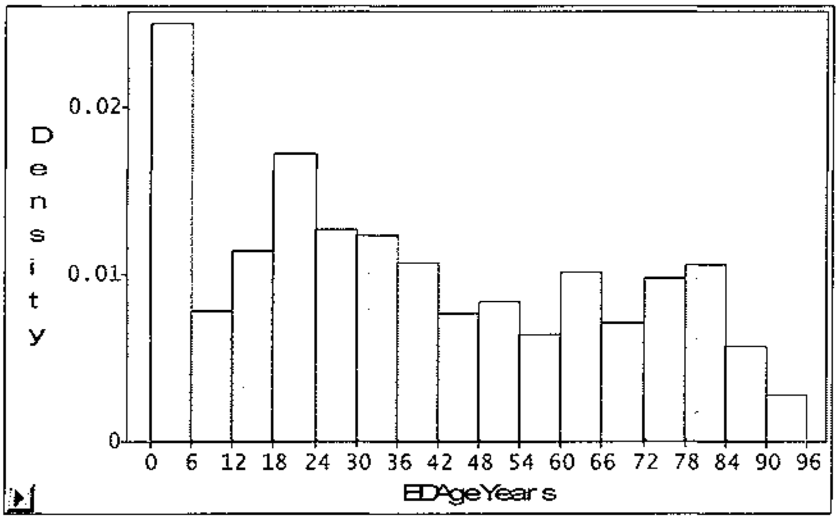
Quantiles			
100% Max	99.0000	99.0%	92.0000
75% Q3	62.0000	97.5%	89.0000
50% Med	36.0000	95.0%	86.0000
25% Q1	17.0000	90.0%	82.0000
0% Min	0	10.0%	3.0000
Range	99.0000	5.0%	1.0000
Q3-Q1	45.0000	2.5%	0
Mode	0	1.0%	0

S9.1.4 Box Plot & Distribution: TGA TRN DS - JUL 2006 Age dist of ED Present's

TGA AGE by T, V & T
EDData200607
VALIDATION:

EDAgeYears





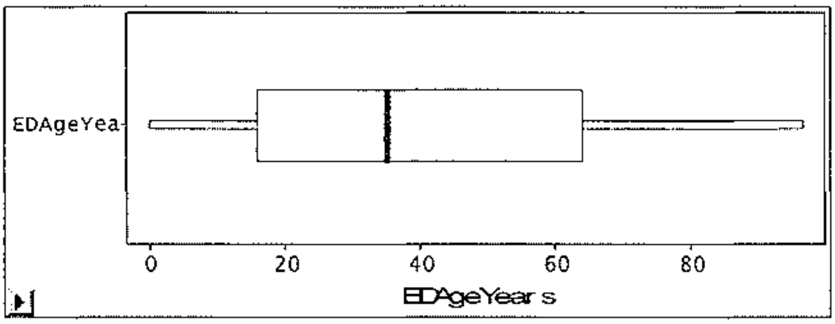
Moments			
N	929.0000	Sum Wgts	929.0000
Mean	38.2853	Sum	35567.0000
Std Dev	27.3591	Variance	748.5188
Skewness	0.2830	Kurtosis	-1.1396
USS	2056317.00	CSS	694625.408
CV	71.4611	Std Mean	0.8976

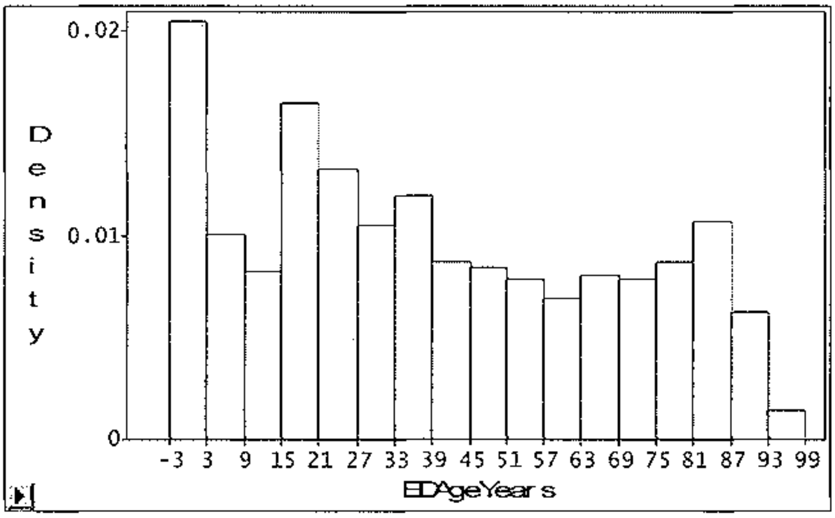
Quantiles			
100% Max	94.0000	99.0%	91.0000
75% Q3	62.0000	97.5%	87.0000
50% Med	34.0000	95.0%	84.0000
25% Q1	17.0000	90.0%	80.0000
0% Min	0	10.0%	1.0000
Range	94.0000	5.0%	0
Q3-Q1	45.0000	2.5%	0
Mode	0	1.0%	0

S9.1.5 Box Plot & Distribution: TGA VAL DS - JUL 2006 Age dist of ED Present's

TGA: AGE by T, V & T
EDData200607
TEST:

EDAgeYears





Moments

N	928.0000	Sum Wgts	928.0000
Mean	38.9170	Sum	36115.0000
Std Dev	28.3723	Variance	804.9866
Skewness	0.2950	Kurtosis	-1.1658
USS	2151711.00	CSS	746222.611
CV	72.9046	Std Mean	0.9314

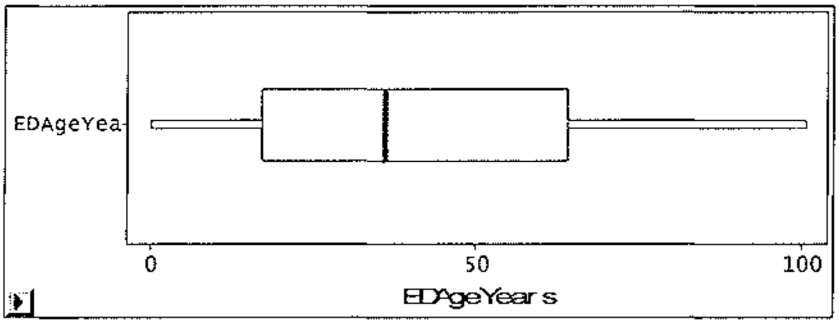
Quantiles

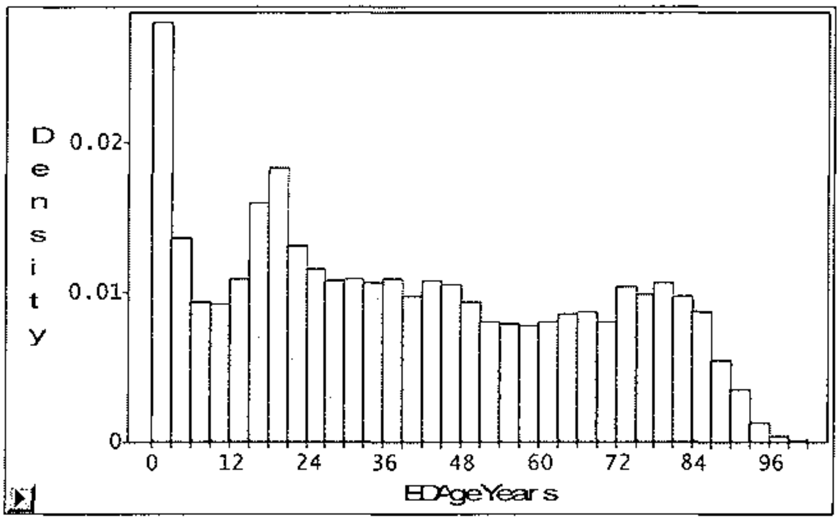
100% Max	97.0000	99.0%	92.0000
75% Q3	64.0000	97.5%	89.0000
50% Med	35.0000	95.0%	86.0000
25% Q1	16.0000	90.0%	81.0000
0% Min	0	10.0%	2.0000
Range	97.0000	5.0%	0
Q3-Q1	48.0000	2.5%	0
Mode	0	1.0%	0

S9.1.6 Box Plot & Distribution: TGA TST DS - JUL 2006 Age dist of ED Present's

TGA: AGE by T, V & T
EDDataFinYr2006
TRAINING:

EDAgeYears





Moments

N	14098.0000	Sum Wgts	14098.0000
Mean	39.6797	Sum	559404.000
Std Dev	27.2517	Variance	742.6524
Skewness	0.2472	Kurtosis	-1.1678
USS	32666138.0	CSS	10469171.4
CV	68.6791	Std Mean	0.2295

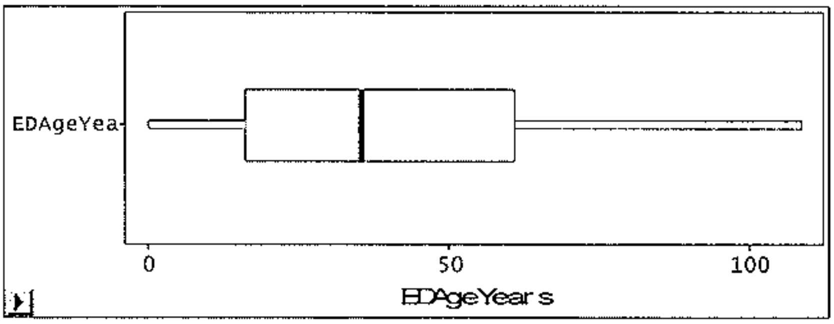
Quantiles

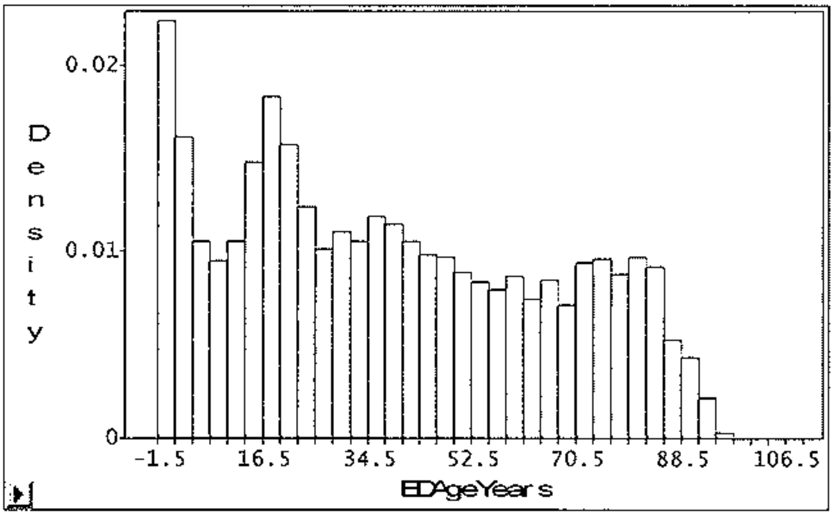
100% Max	101.0000	99.0%	91.0000
75% Q3	64.0000	97.5%	88.0000
50% Med	36.0000	95.0%	85.0000
25% Q1	17.0000	90.0%	80.0000
0% Min	0	10.0%	4.0000
Range	101.0000	5.0%	1.0000
Q3-Q1	47.0000	2.5%	0
Mode	0	1.0%	0

S9.1.7 Box Plot & Dist: TGA TRN DS – Fin Yr 2006 Age dist of ED Present's

TGA: AGE by T, V & T
EDDataFinYr2006
VALIDATION:

EDAgeYears





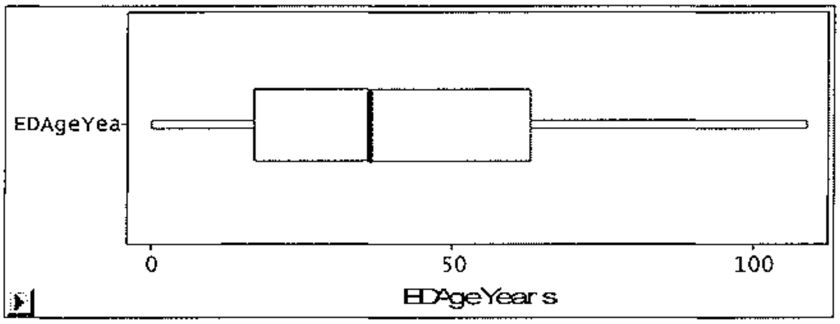
Moments			
N	10573.0000	Sum Wgts	10573.0000
Mean	38.7438	Sum	409638.000
Std Dev	26.9246	Variance	724.9343
Skewness	0.2904	Kurtosis	-1.1128
USS	23534930.0	CSS	7664004.90
CV	69.4940	Std Mean	0.2618

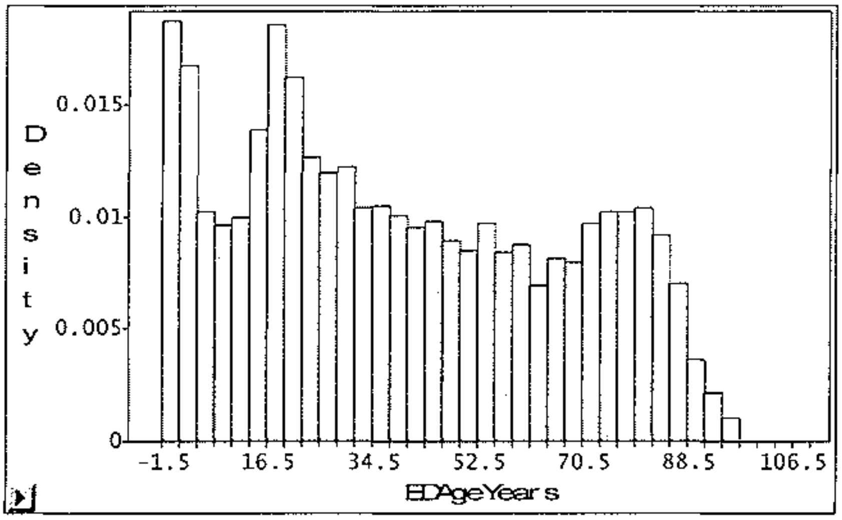
Quantiles			
100% Max	109.0000	99.0%	91.0000
75% Q3	61.0000	97.5%	88.0000
50% Med	35.0000	95.0%	84.0000
25% Q1	16.0000	90.0%	79.0000
0% Min	0	10.0%	3.0000
Range	109.0000	5.0%	1.0000
Q3-Q1	45.0000	2.5%	0
Mode	0	1.0%	0

S9.1.8 Box Plot & Dist: TGA VAL DS – Fin Yr 2006 Age dist of ED Present's

TGA AGE by T, V & T
EDDataFinYr2006
TEST:

EDAgeYears





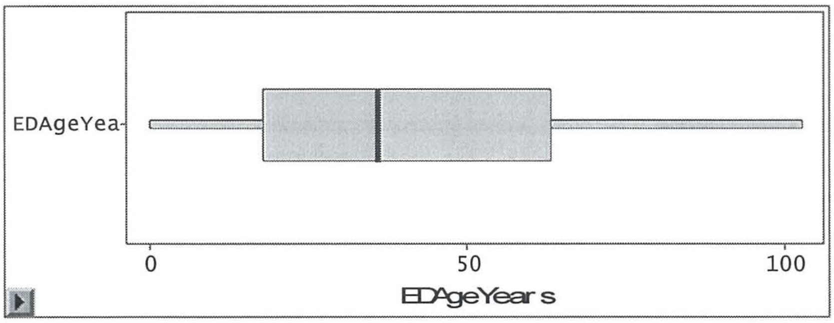
Moments			
N	10573.0000	Sum Wgts	10573.0000
Mean	39.7620	Sum	420404.000
Std Dev	27.1475	Variance	736.9891
Skewness	0.2633	Kurtosis	-1.1556
USS	24507568.0	CSS	7791449.28
CV	68.2750	Std Mean	0.2640

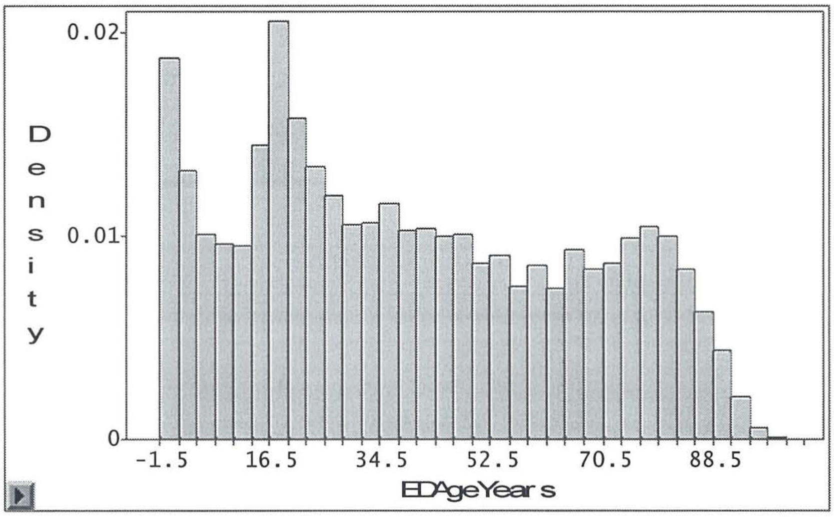
Quantiles			
100% Max	109.0000	99.0%	92.0000
75% Q3	63.0000	97.5%	88.0000
50% Med	36.0000	95.0%	85.0000
25% Q1	17.0000	90.0%	80.0000
0% Min	0	10.0%	4.0000
Range	109.0000	5.0%	1.0000
Q3-Q1	46.0000	2.5%	0
Mode	0	1.0%	0

S9.1.9 Box Plot & Dist: TGA TST DS – Fin Yr 2006 Age dist of ED Present's

TGA: AGE by T, V & T
EDDataFinYr2007
TRAINING:

EDAgeYears





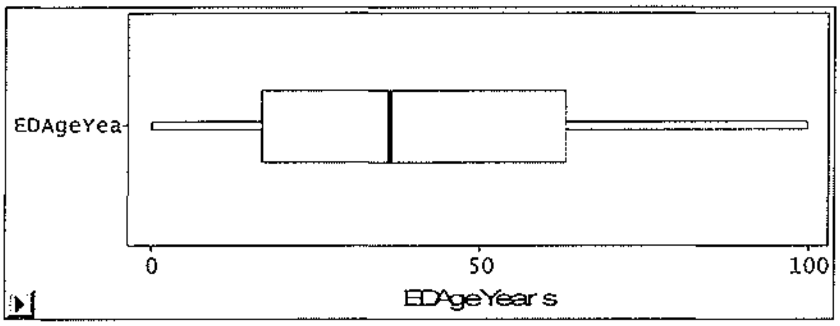
Moments			
N	14478.0000	Sum Wgts	14478.0000
Mean	39.8335	Sum	576709.000
Std Dev	26.7631	Variance	716.2633
Skewness	0.2664	Kurtosis	-1.1285
USS	33341665.0	CSS	10369343.5
CV	67.1875	Std Mean	0.2224

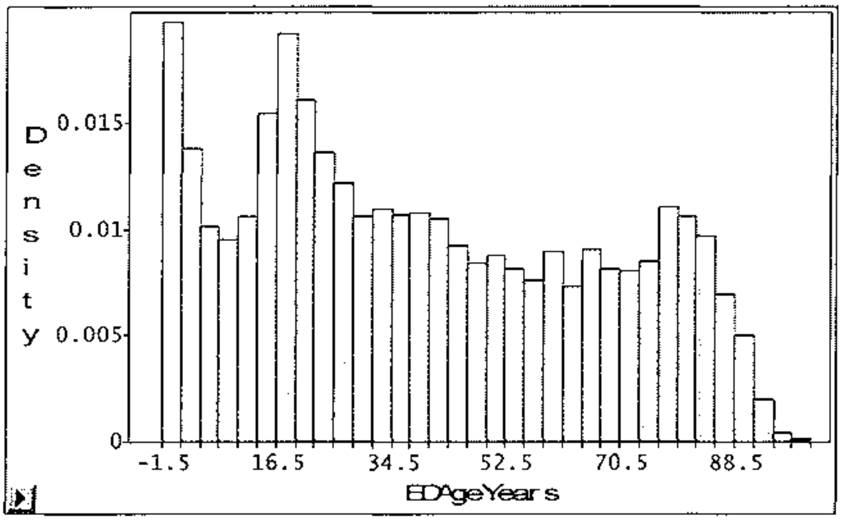
Quantiles			
100% Max	103.0000	99.0%	91.0000
75% Q3	63.0000	97.5%	88.0000
50% Med	36.0000	95.0%	84.0000
25% Q1	18.0000	90.0%	79.0000
0% Min	0	10.0%	5.0000
Range	103.0000	5.0%	1.0000
Q3-Q1	45.0000	2.5%	0
Mode	0	1.0%	0

S9.1.10 Box Plot & Dist: TGA TRN DS – Fin Yr 2007 Age dist of ED Present's

TGA: AGE by T, V & T
EDDataFinYr2007
VALIDATION:

EDAgeYears





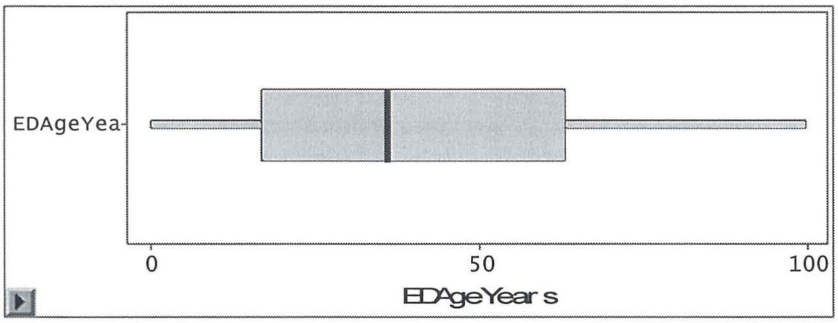
Moments			
N	10859.0000	Sum Wgts	10859.0000
Mean	39.6861	Sum	430951.000
Std Dev	27.1312	Variance	736.1047
Skewness	0.2859	Kurtosis	-1.1432
USS	25095375.0	CSS	7992624.80
CV	68.3647	Std Mean	0.2604

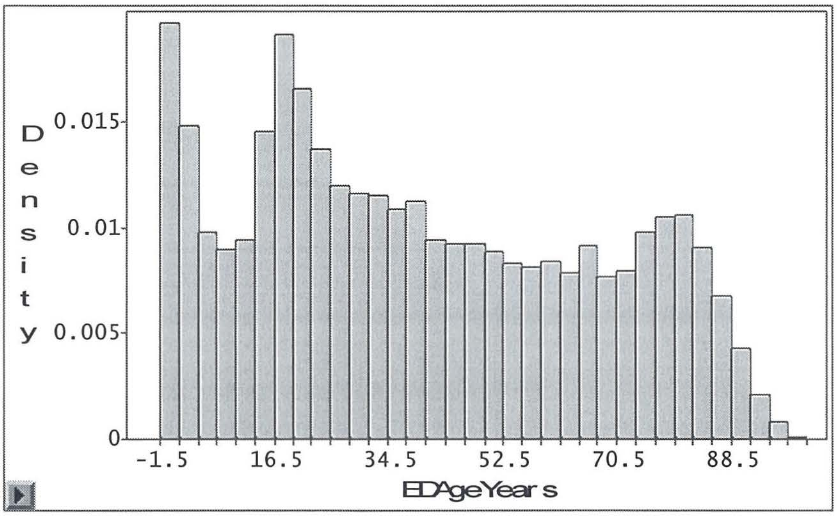
Quantiles			
100% Max	100.0000	99.0%	91.0000
75% Q3	63.0000	97.5%	88.0000
50% Med	36.0000	95.0%	85.0000
25% Q1	17.0000	90.0%	80.0000
0% Min	0	10.0%	4.0000
Range	100.0000	5.0%	1.0000
Q3-Q1	46.0000	2.5%	0
Mode	0	1.0%	0

S9.1.11 Box Plot & Dist: TGA VAL DS – Fin Yr 2007 Age dist of ED Present's

TGA: AGE by T, V & T
EDDataFinYr2007
TEST:

EDAgeYears





Moments

N	10858.0000	Sum Wgts	10858.0000
Mean	39.7019	Sum	431083.000
Std Dev	26.9825	Variance	728.0556
Skewness	0.2762	Kurtosis	-1.1310
USS	25019305.0	CSS	7904499.98
CV	67.9628	Std Mean	0.2589

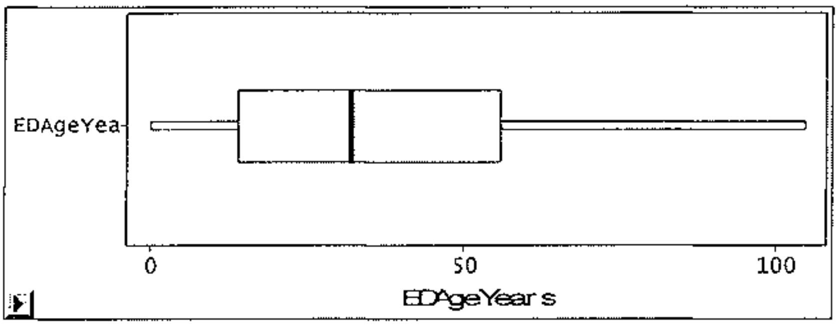
Quantiles

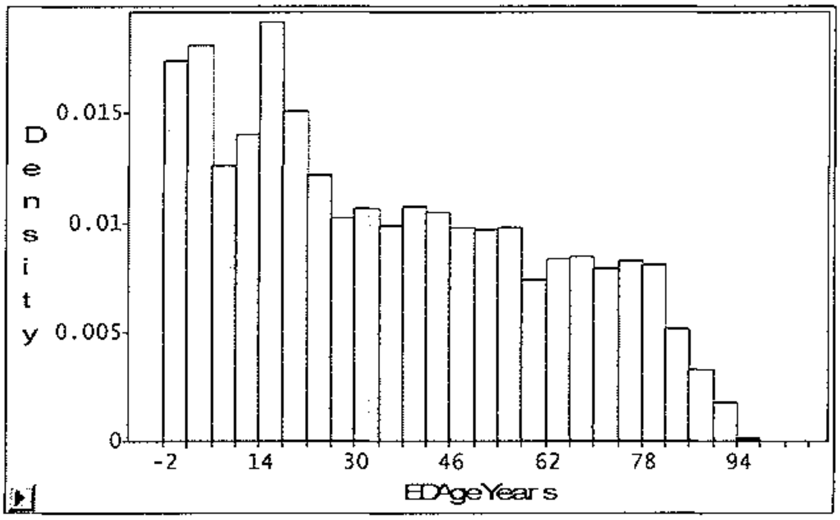
100% Max	100.0000	99.0%	91.0000
75% Q3	63.0000	97.5%	88.0000
50% Med	36.0000	95.0%	85.0000
25% Q1	17.0000	90.0%	80.0000
0% Min	0	10.0%	4.0000
Range	100.0000	5.0%	1.0000
Q3-Q1	46.0000	2.5%	0
Mode	0	1.0%	0

S9.1.12 Box Plot & Dist: TGA TST DS – Fin Yr 2007 Age dist of ED Present's

WHK AGE by T, V & T
EDDataFinYr2006
TRAINING:

EDAgeYears





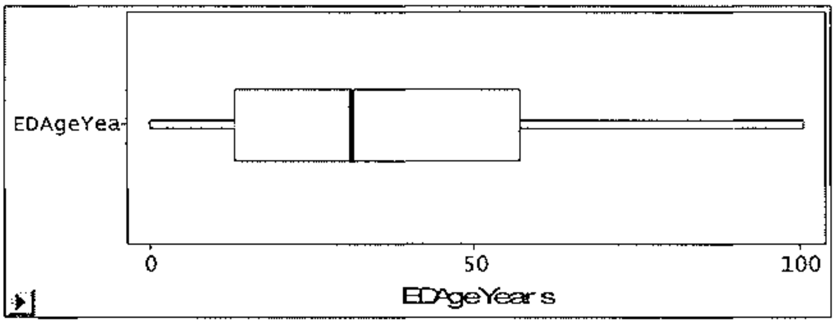
Moments			
N	7221.0000	Sum Wgts	7221.0000
Mean	35.5347	Sum	256596.000
Std Dev	25.9260	Variance	672.1577
Skewness	0.3717	Kurtosis	-1.0454
USS	13971038.0	CSS	4852978.56
CV	72.9597	Std Mean	0.3051

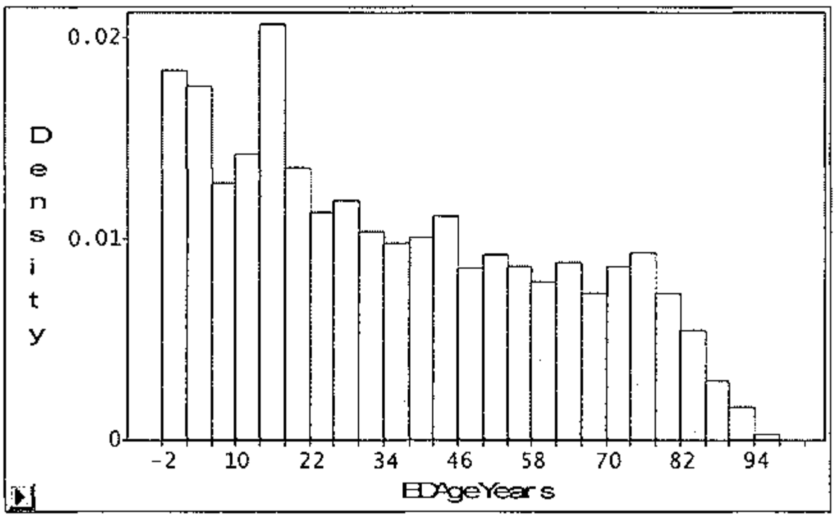
Quantiles			
100% Max	105.0000	99.0%	88.0000
75% Q3	56.0000	97.5%	85.0000
50% Med	32.0000	95.0%	80.0000
25% Q1	14.0000	90.0%	75.0000
0% Min	0	10.0%	3.0000
Range	105.0000	5.0%	1.0000
Q3-Q1	42.0000	2.5%	0
Mode	0	1.0%	0

S9.1.13 Box Plot & Dist: WHK TRN DS – Fin Yr 2006 Age dist of ED Present's

WHK: AGE by T, V & T
EDDataFinYr2006
VALIDATION:

EDAgeYears





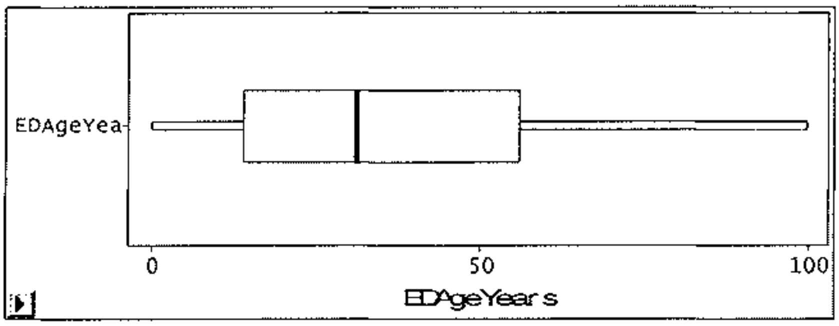
Moments			
N	5416.0000	Sum Wgts	5416.0000
Mean	35.3213	Sum	191300.000
Std Dev	26.0246	Variance	677.2774
Skewness	0.3854	Kurtosis	-1.0517
USS	10424416.0	CSS	3667456.99
CV	73.6796	Std Mean	0.3536

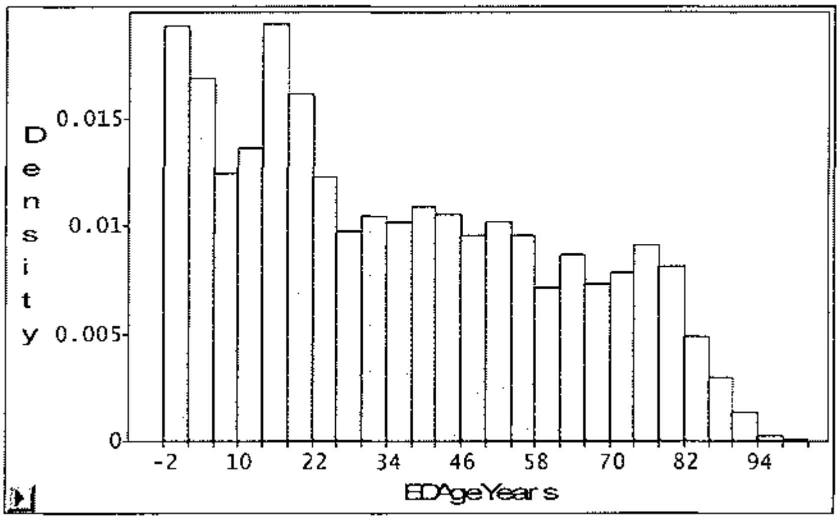
Quantiles			
100% Max	101.0000	99.0%	89.0000
75% Q3	57.0000	97.5%	85.0000
50% Med	31.0000	95.0%	80.0000
25% Q1	13.0000	90.0%	75.0000
0% Min	0	10.0%	3.0000
Range	101.0000	5.0%	1.0000
Q3-Q1	44.0000	2.5%	0
Mode	1.0000	1.0%	0

S9.1.14 Box Plot & Dist: WHK VAL DS – Fin Yr 2006 Age dist of ED Present's

WHK AGE by T, V & T
EDDataFinYr2006
TEST:

EDAgeYears



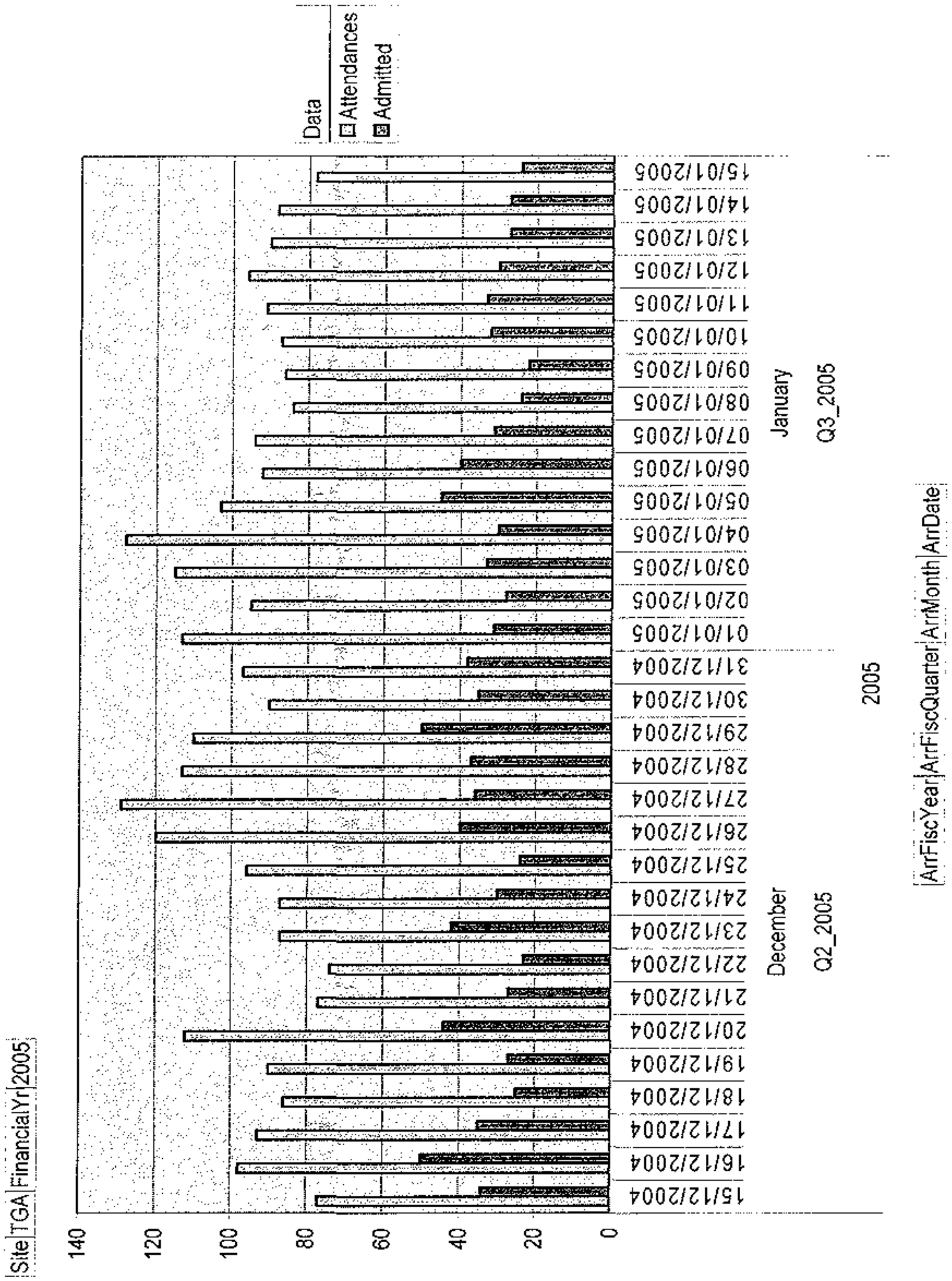


Moments			
N	5416.0000	Sum Wgts	5416.0000
Mean	35.2029	Sum	190659.000
Std Dev	25.8051	Variance	665.9036
Skewness	0.3767	Kurtosis	-1.0388
USS	10317621.0	CSS	3605867.99
CV	73.3039	Std Mean	0.3506

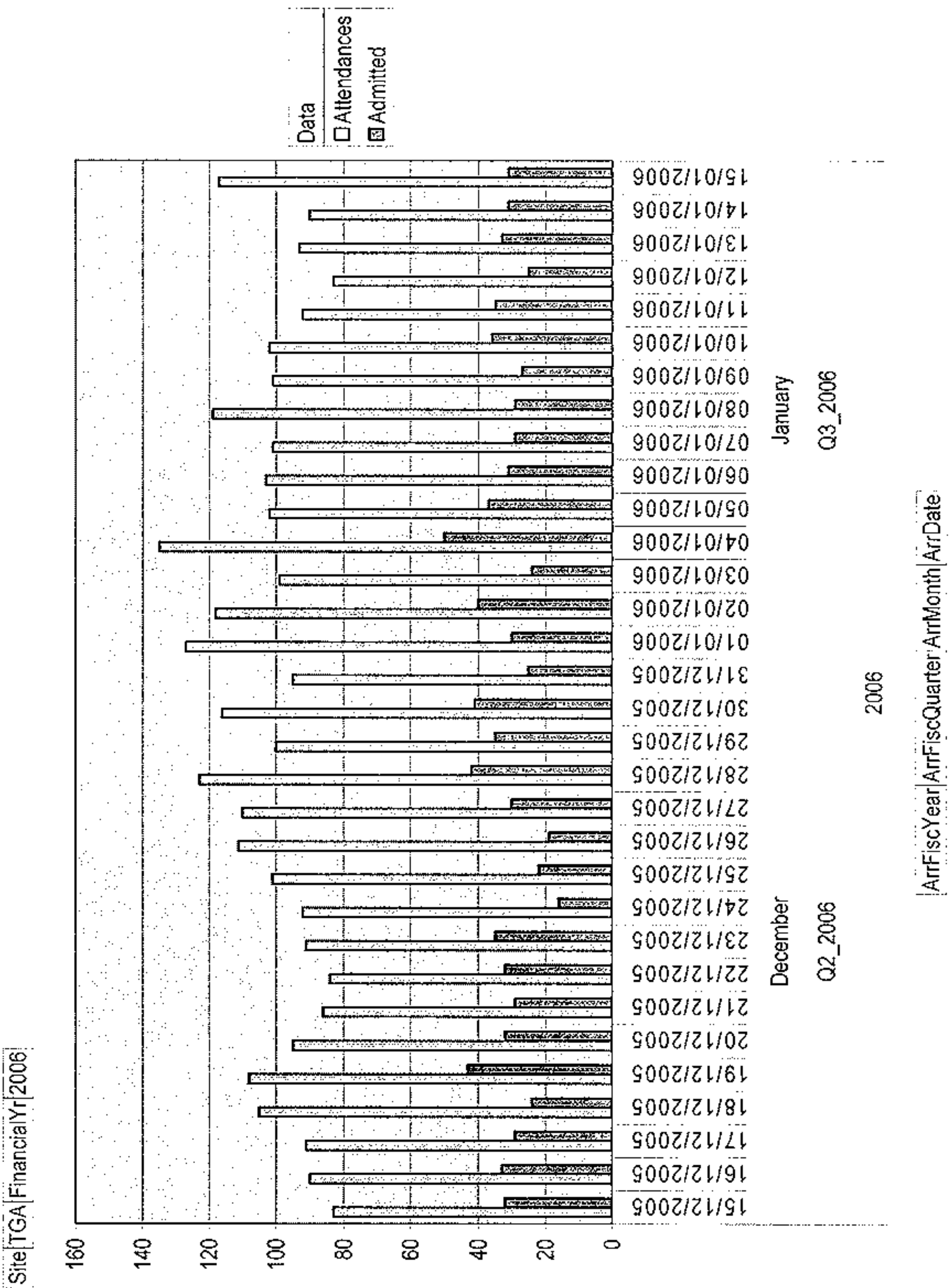
Quantiles			
100% Max	100.0000	99.0%	88.0000
75% Q3	56.0000	97.5%	84.0000
50% Med	31.0000	95.0%	80.0000
25% Q1	14.0000	90.0%	74.0000
0% Min	0	10.0%	2.0000
Range	100.0000	5.0%	1.0000
Q3-Q1	42.0000	2.5%	0
Mode	0	1.0%	0

S9.1.15 Box Plot & Dist: WHK TST DS – Fin Yr 2006 Age dist of ED Present's

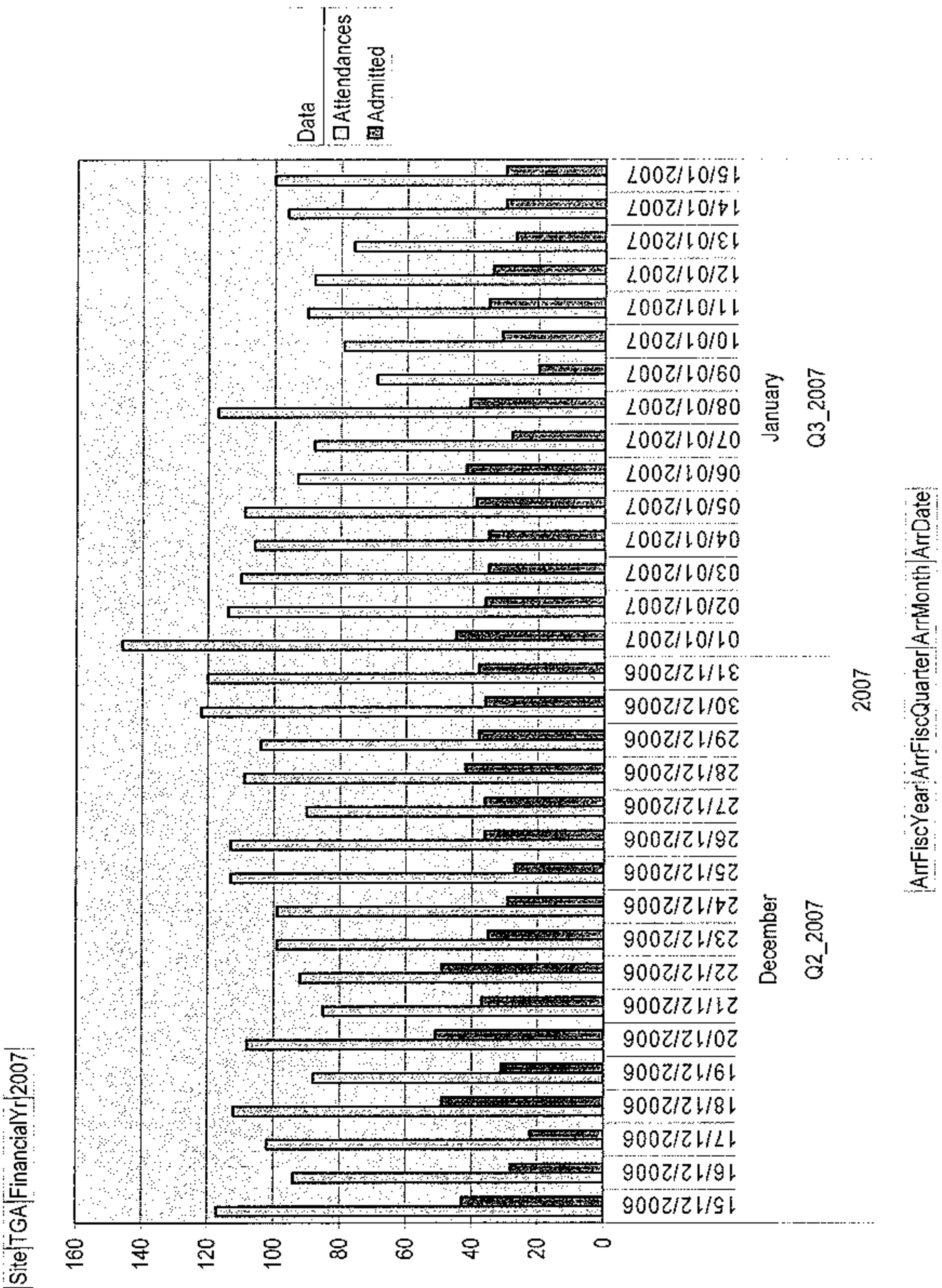
9.1.3 Using PART DS: CUBE RESULTS



C9.1.1 Bar Chart: TGA – Fin Yr 2005 Seasonal demand over Christmas / New Year (Dec 15th 2004 – Jan 15th 2005)



C9.1.2 Bar Chart: TGA – Fin Yr 2006 Seasonal demand over Christmas / New Year (Dec 15th 2005 – Jan 15th 2006) (Replication of **C7.1.27** for ease of use)



C9.1.3 Bar Chart: TGA – Fin Yr 2007 Seasonal demand over Christmas / New Year (Dec 15th 2006 – Jan 15th 2007)

13.2 APPENDIX B2: RESULTS: CHAPTER 9.2

RESULTS HELD IN THIS APPENDIX

S9.2.1	**S9.2.2**	**S9.2.3**	**S9.2.4**	**S9.2.5**	**S9.2.6**
S9.2.7	**S9.2.8**	**S9.2.9**	**S9.2.10**	**S9.2.11**	**S9.2.12**
S9.2.13	**S9.2.14**	**S9.2.15**	**S9.2.16**	**S9.2.17**	**S9.2.18**
S9.2.19	**S9.2.20**	**S9.2.21**	**S9.2.22**	**S9.2.23**	**S9.2.24**
S9.2.25	**S9.2.26**	**S9.2.27**	**S9.2.28**	**S9.2.29**	**S9.2.30**
S9.2.31	**S9.2.32**	**S9.2.33**	**S9.2.34**	**S9.2.35**	**S9.2.36**
S9.2.37	**S9.2.38**	**S9.2.39**	**S9.2.40**	**S9.2.41**	**S9.2.42**
S9.2.43	**S9.2.44**	**S9.2.45**	**S9.2.46**	**S9.2.47**	**S9.2.48**
S9.2.49	**S9.2.50**	**S9.2.51**	**S9.2.52**	**S9.2.53**	**S9.2.54**
S9.2.55	**S9.2.56**	**S9.2.57**	**S9.2.58**	**S9.2.59**	**S9.2.60**
S9.2.61	**S9.2.62**	**S9.2.63**	**S9.2.64**		

9.2. RESULTS: Using PART DS: PER SEASON – DEMAND PER DAY OF WEEK

- **(Postulate2)** Per Season: To determine proportions of demand for ED services **per day of week**

9.2.1 Using PART DS: FINDINGS

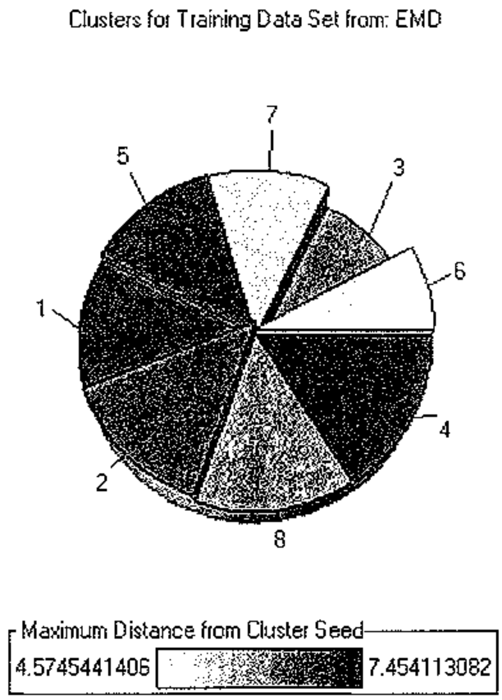
FINDINGS AND COMMENTS

Cf. Earlier Pages **133 - 148**

9.2.2 Using PART DS: SAS RESULTS

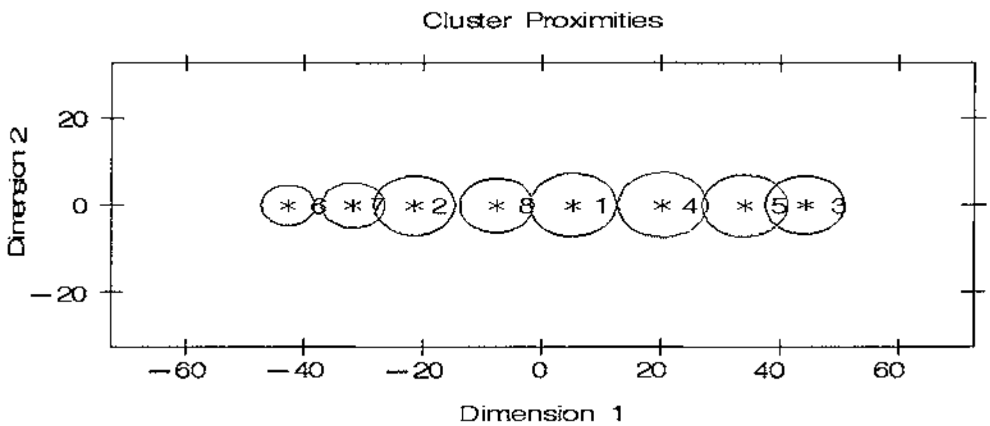
CLUSTERING RESULTS – EMPHASIS ON AGE, GENDER & DAY OF WEEK
TGA: MONTH – JULY 2005 (OF FIN YEAR 2006)
TGA
EDData200507
TRAINING:

CLUSTER PIE CHART



S9.2.1 Pie Chart: TGA TRN Data – JULY 2005

CLUSTER DISTANCES



S9.2.2 Distances: TGA TRN Data – JULY 2005

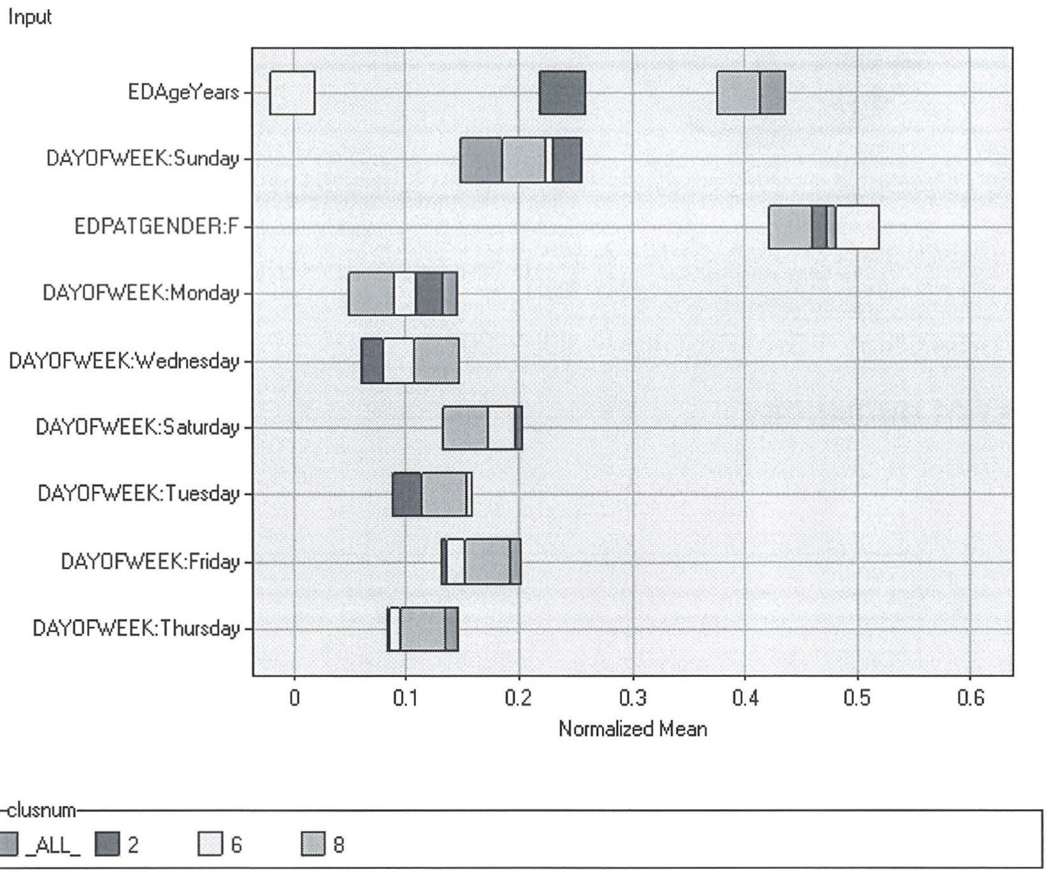
CLUSTER STATISTICS

CLUSTER	Frequency of Cluster	Root-Mean-Square Standard Deviation	Maximum Distance from Cluster Seed	Nearest Cluster	Distance to Nearest Cluster	EDAgeYears	EDPATGENDER:F
1	124	1.3228673951	7.2553181943	8	12.877263702	50	0.4838709677
2	207	1.3463883334	6.7909217949	7	10.341291177	23.304347826	0.4637681159
3	53	0.9670010932	6.6496158765	5	10.094882687	88.981132075	0.679245283
4	148	1.5255111691	7.454113082	5	13.856451712	65.033783784	0.5337837838
5	145	1.2245015319	7.1482169926	3	10.094882687	78.889655172	0.4413793103
6	176	0.7540582843	4.5745441406	7	10.947370796	2.0170454545	0.5113636364
7	138	1.1053422298	5.2739388786	2	10.341291177	12.963768116	0.4782608696
8	153	1.3609785955	6.2225105662	1	12.877263702	37.124183007	0.4509803922

CLUSTER	DAYOFWEEK:Friday	DAYOFWEEK:Monday	DAYOFWEEK:Saturday	DAYOFWEEK:Sunday	DAYOFWEEK:Thursday	DAYOFWEEK:Tuesday	DAYOFWEEK:Wednesday
1	0.2096774194	0.2016129032	0.1209677419	0.1129032258	0.1774193548	0.0887096774	0.0887096774
2	0.154589372	0.115942029	0.1884057971	0.2415458937	0.1062801932	0.1111111111	0.0821256039
3	0.1698113208	0.1886792453	0.1509433962	0.0943396226	0.1132075472	0.1509433962	0.1320754717
4	0.2162162162	0.1689189189	0.1351351351	0.1081081081	0.1418918919	0.0810810811	0.1486486486
5	0.2137931034	0.1034482759	0.1517241379	0.1379310345	0.1310344828	0.124137931	0.1379310345
6	0.1590909091	0.0909090909	0.1818181818	0.2159090909	0.1079545455	0.1420454545	0.1022727273
7	0.2028985507	0.152173913	0.1376811594	0.1594202899	0.1449275362	0.115942029	0.0869565217
8	0.1764705882	0.0718954248	0.1568627451	0.2091503268	0.1176470588	0.137254902	0.1307189542

S9.2.3 Stats: TGA TRN Data – JULY 2005

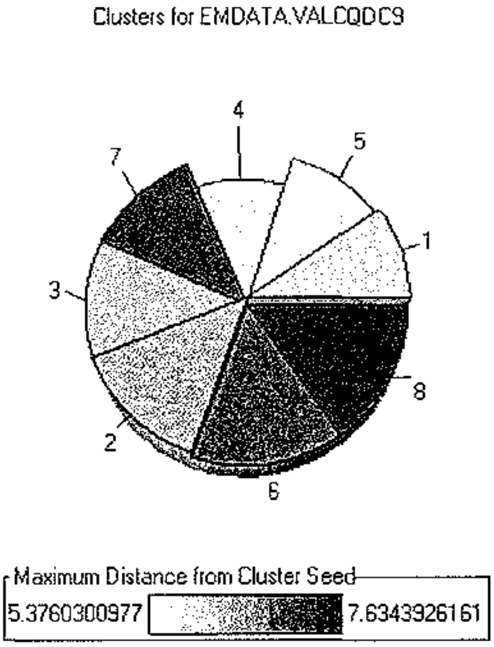
CLUSTER INPUT MEANS PLOT



S9.2.4 Input Means Plot: TGA TRN Data – JULY 2005

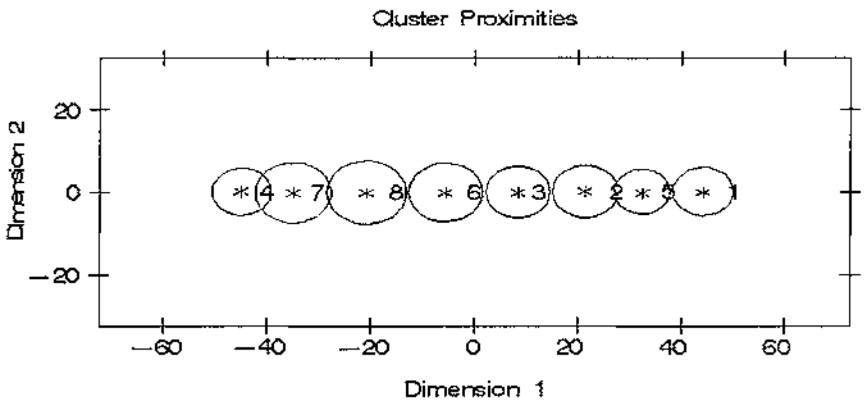
TGA
EDData200507
VALIDATION:

CLUSTER PIE CHART



S9.2.5 Pie Chart: TGA VAL Data – JULY 2005

CLUSTER DISTANCES



S9.2.6 Distances: TGA VAL Data – JULY 2005

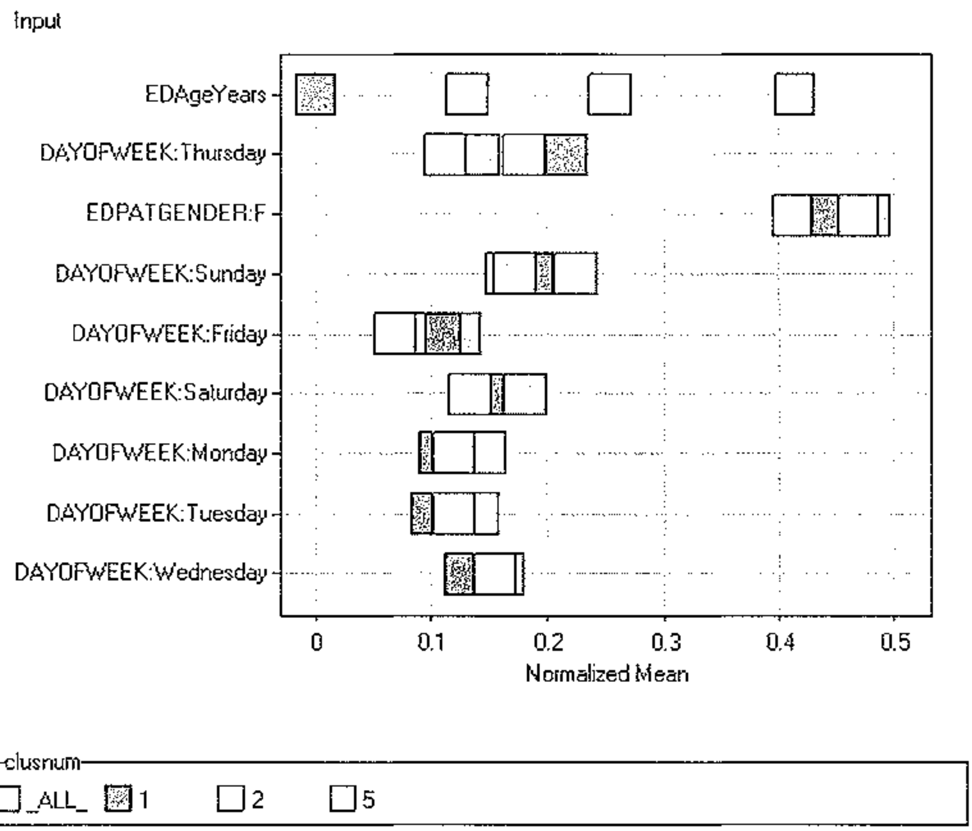
CLUSTER STATISTICS

CLUSTER	Frequency of Cluster	Root-Mean-Square Standard Deviation	Maximum Distance from Cluster Seed	Nearest Cluster	Distance to Nearest Cluster	EDAgeYears	EDPATGENDER:F
1	138	0.9622412872	5.8251359076	5	11.775383479	3.0869565217	0.4420289855
2	142	1.3647490959	6.3114230331	5	10.920277726	25.781690141	0.4718309859
3	112	1.2856040517	6.1902483901	2	13.005162532	38.785714286	0.5
4	23	1.0763558618	5.7125419984	7	10.055952582	92.217391304	0.7391304348
5	116	1.0678232735	5.3760300977	2	10.920277726	14.862068966	0.4137931034
6	108	1.4812455545	7.1321004292	3	14.03002753	52.814814815	0.4444444444
7	109	1.1995785502	7.282321514	4	10.055952582	82.165137615	0.5412844037
8	110	1.5236254555	7.6343926161	7	14.093518988	68.081818182	0.5181818182

CLUSTER	DAYOFWEEK:Friday	DAYOFWEEK:Monday	DAYOFWEEK:Saturday	DAYOFWEEK:Sunday	DAYOFWEEK:Thursday	DAYOFWEEK:Tuesday	DAYOFWEEK:Wednesday
1	0.1086956522	0.1086956522	0.1449275362	0.1884057971	0.2173913043	0.1014492754	0.1304347826
2	0.0774647887	0.1478873239	0.1338028169	0.2253521127	0.1126760563	0.1408450704	0.161971831
3	0.1607142857	0.1428571429	0.2410714286	0.1428571429	0.0803571429	0.1071428571	0.125
4	0.1739130435	0.1739130435	0.1304347826	0.0434782609	0.0869565217	0.2608695652	0.1304347826
5	0.0689655172	0.1206896552	0.1810344828	0.1724137931	0.1810344828	0.1206896552	0.1551724138
6	0.1111111111	0.1388888889	0.1666666667	0.1018518519	0.1851851852	0.1296296296	0.1666666667
7	0.1651376147	0.1834862385	0.1467889908	0.1743119266	0.0825688073	0.128440367	0.119266055
8	0.1909090909	0.1636363636	0.1363636364	0.1636363636	0.1363636364	0.1	0.1090909091

S9.2.7 Stats: TGA VAL Data – JULY 2005

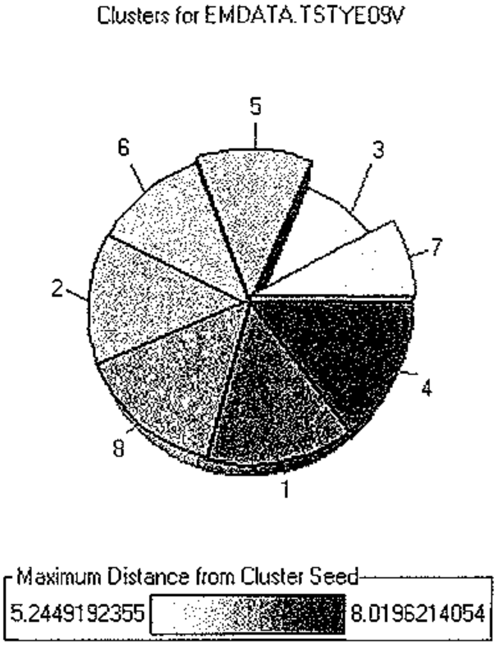
CLUSTER INPUT MEANS PLOT



S9.2.8 Input Means Plot: TGA VAL Data – JULY 2005

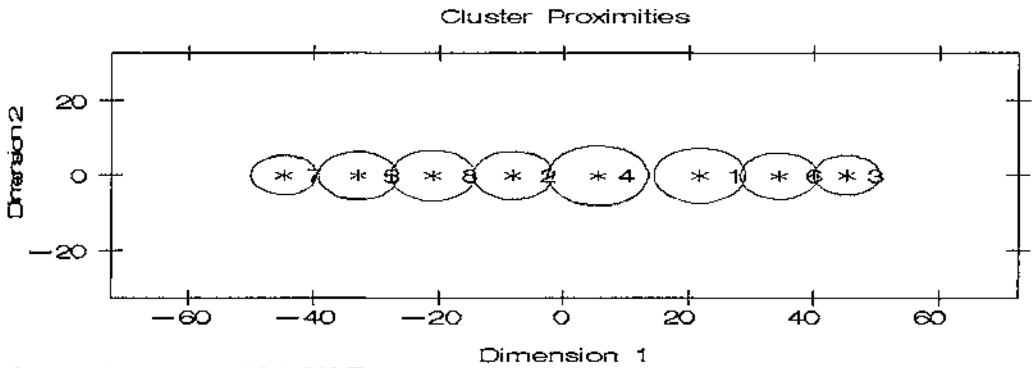
TGA
EDData200507
TEST:

CLUSTER PIE CHART



S9.2.9 Pie Chart: TGA TST Data – JULY 2005

CLUSTER DISTANCES



S9.2.10 Distances: TGA TST Data – JULY 2005

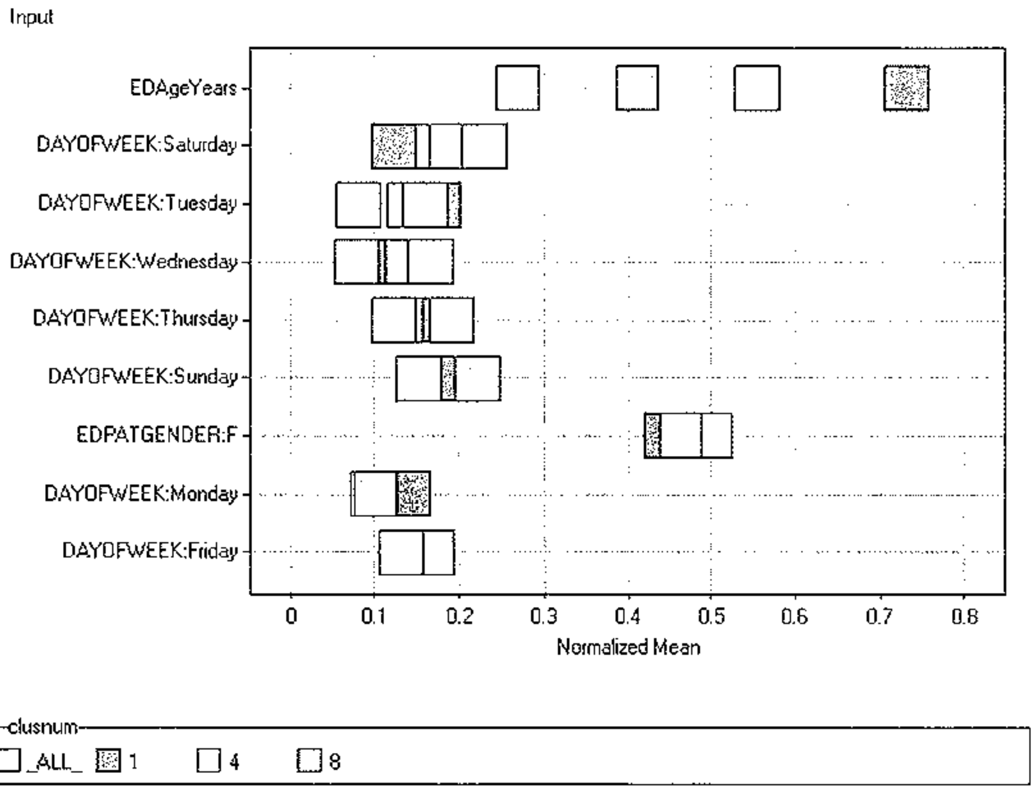
CLUSTER STATISTICS

CLUSTER	Frequency of Cluster	Root-Mean-Square Standard Deviation	Maximum Distance from Cluster Seed	Nearest Cluster	Distance to Nearest Cluster	EDAgeYears	EDPATGENDER:F
1	112	1.4304756364	7.2783654484	6	12.658202667	68.928571429	0.4464285714
2	106	1.412871703	6.415307497	8	12.83242692	39.056603774	0.5094339623
3	20	1.0659537091	5.2634724291	6	10.816010897	92.4	0.5
4	124	1.466806433	8.0196214054	2	13.645562089	52.701612903	0.5
5	119	1.172017558	6.3514861253	7	11.867744144	14.25210084	0.4285714286
6	99	1.1986348618	6.1796053474	3	10.816010897	81.585858586	0.5353535354
7	148	0.800441774	5.2449192356	5	11.867744144	2.3851351351	0.3783783784
8	129	1.4235138147	6.7214693076	5	11.973958595	26.224806202	0.4651162791

CLUSTER	DAYOFWEEK:Friday	DAYOFWEEK:Monday	DAYOFWEEK:Saturday	DAYOFWEEK:Sunday	DAYOFWEEK:Thursday	DAYOFWEEK:Tuesday	DAYOFWEEK:Wednesday
1	0.1428571429	0.1339285714	0.1160714286	0.1785714286	0.1785714286	0.1696428571	0.0803571429
2	0.179245283	0.1132075472	0.179245283	0.1320754717	0.1320754717	0.1603773585	0.1037735849
3	0.25	0.2	0.15	0.15	0.15	0.05	0.05
4	0.1612903226	0.0887096774	0.185483871	0.1451612903	0.185483871	0.0725806452	0.1612903226
5	0.1176470588	0.1176470588	0.1344537815	0.1680672269	0.1092436975	0.1512605042	0.2016806723
6	0.1616161616	0.101010101	0.1515151515	0.1414141414	0.1414141414	0.1313131313	0.1717171717
7	0.1824324324	0.1351351351	0.1418918919	0.1959459459	0.1148648649	0.1283783784	0.1013513514
8	0.1240310078	0.0930232558	0.2248062016	0.2170542636	0.1162790698	0.1550387597	0.0697674419

S9.2.11 Stats: TGA TST Data – JULY 2005

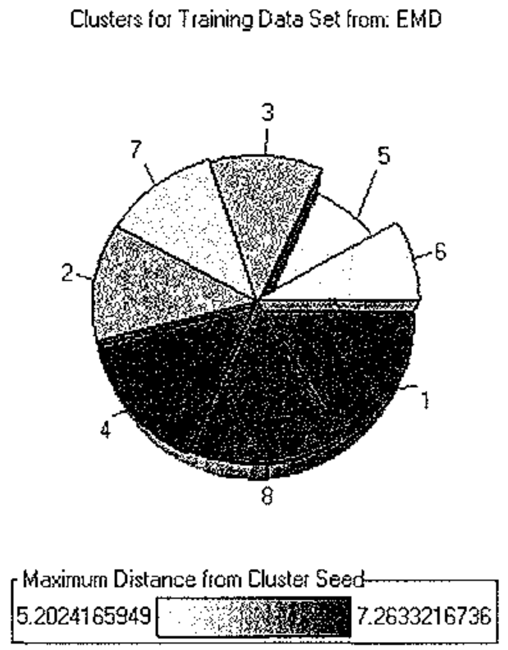
CLUSTER INPUT MEANS PLOT



S9.2.12 Input Means Plot: TGA TST Data – JULY 2005

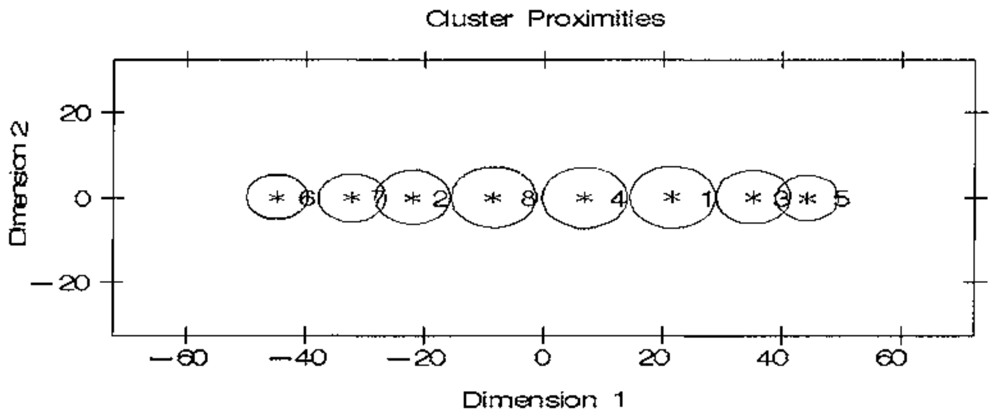
CLUSTERING RESULTS – EMPHASIS ON AGE, GENDER & DAY OF WEEK
TGA: MONTH – JULY 2006 (OF FIN YEAR 2007)
TGA
EDData200607
TRAINING:

CLUSTER PIE CHART



S9.2.13 Pie Chart: TGA TRN Data – JULY 2006

CLUSTER DISTANCES



S9.2.14 Distances: TGA TRN Data – JULY 2006

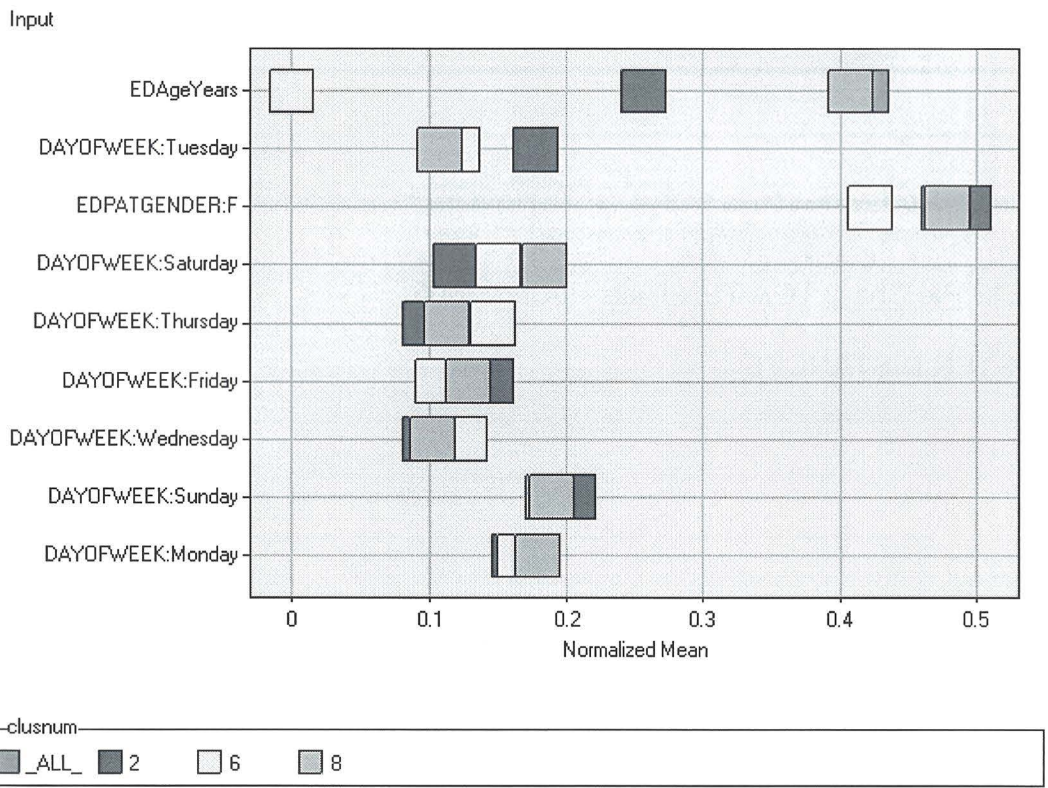
CLUSTER STATISTICS

CLUSTER	Frequency of Cluster	Root-Mean-Square Standard Deviation	Maximum Distance from Cluster Seed	Nearest Cluster	Distance to Nearest Cluster	EDAgeYears	EDPATGENDER:F
1	131	1.5749059754	7.2633216736	3	13.592778039	68.816793893	0.465648855
2	186	1.1823095705	6.289205012	7	10.175144258	25.215053763	0.4946236559
3	159	1.1177520934	6.2836946804	5	9.2003860116	82.408805031	0.4339622642
4	162	1.4029007186	7.1772871402	1	14.724515999	54.092592593	0.4938271605
5	33	0.9632340657	5.3141129004	3	9.2003860116	91.606060606	0.5757575758
6	199	0.7963017066	5.2024165949	7	12.714619696	2.3266331658	0.4221105528
7	172	1.1466405683	5.6712783176	2	10.175144258	15.040697674	0.5290697674
8	196	1.4506595215	7.1482633295	2	13.560845728	38.775510204	0.4795918367

CLUSTER	DAYOFWEEK:Friday	DAYOFWEEK:Monday	DAYOFWEEK:Saturday	DAYOFWEEK:Sunday	DAYOFWEEK:Thursday	DAYOFWEEK:Tuesday	DAYOFWEEK:Wednesday
1	0.1221374046	0.1984732824	0.1450381679	0.2290076336	0.0687022901	0.0916030534	0.1450381679
2	0.1451612903	0.1612903226	0.1182795699	0.2043010753	0.0967741935	0.1774193548	0.0967741935
3	0.1320754717	0.1446540881	0.1320754717	0.1886792453	0.1886792453	0.0943396226	0.1194968553
4	0.1234567901	0.1604938272	0.1913580247	0.1790123457	0.0987654321	0.1234567901	0.1234567901
5	0.0606060606	0.2424242424	0.2424242424	0.1212121212	0.1212121212	0.1212121212	0.0909090909
6	0.1055276382	0.1658291457	0.1507537688	0.1859296482	0.1457286432	0.1206030151	0.1256281407
7	0.1220930233	0.1918604651	0.1569767442	0.1860465116	0.1337209302	0.0813953488	0.1279069767
8	0.1275510204	0.1785714286	0.1836734694	0.1887755102	0.112244898	0.1071428571	0.1020408163

S9.2.15 Stats: TGA TRN Data – JULY 2006

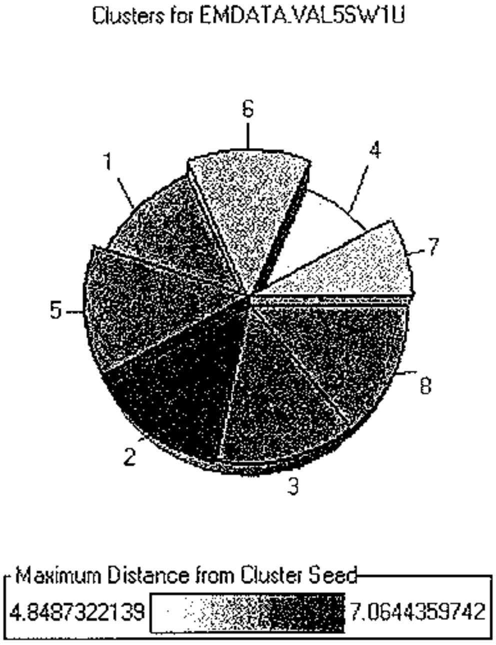
CLUSTER INPUT MEANS PLOT



S9.2.16 Input Means Plot: TGA TRN Data – JULY 2006

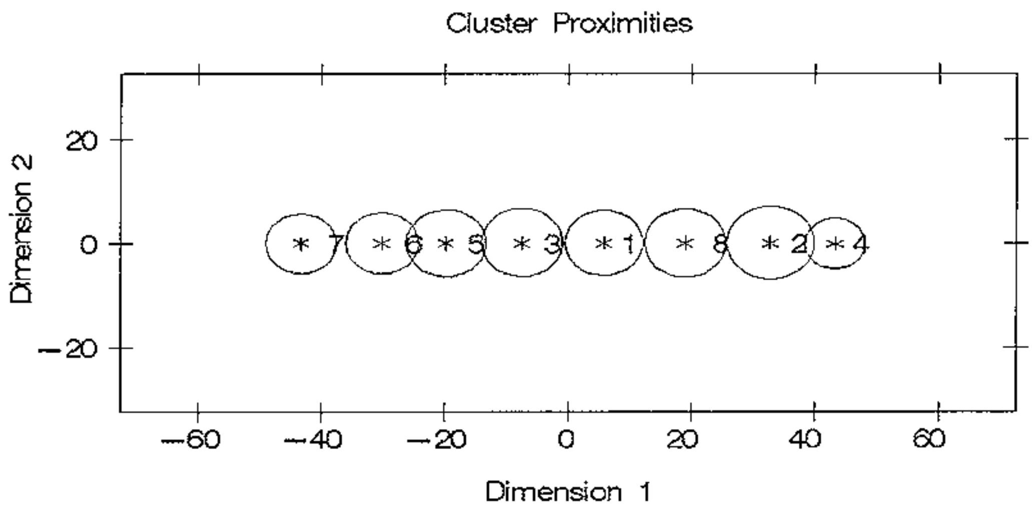
TGA
EDData200607
VALIDATION:

CLUSTER PIE CHART



S9.2.17 Pie Chart: TGA VAL Data – JULY 2006

CLUSTER DISTANCES



S9.2.18 Distances: TGA VAL Data – JULY 2006

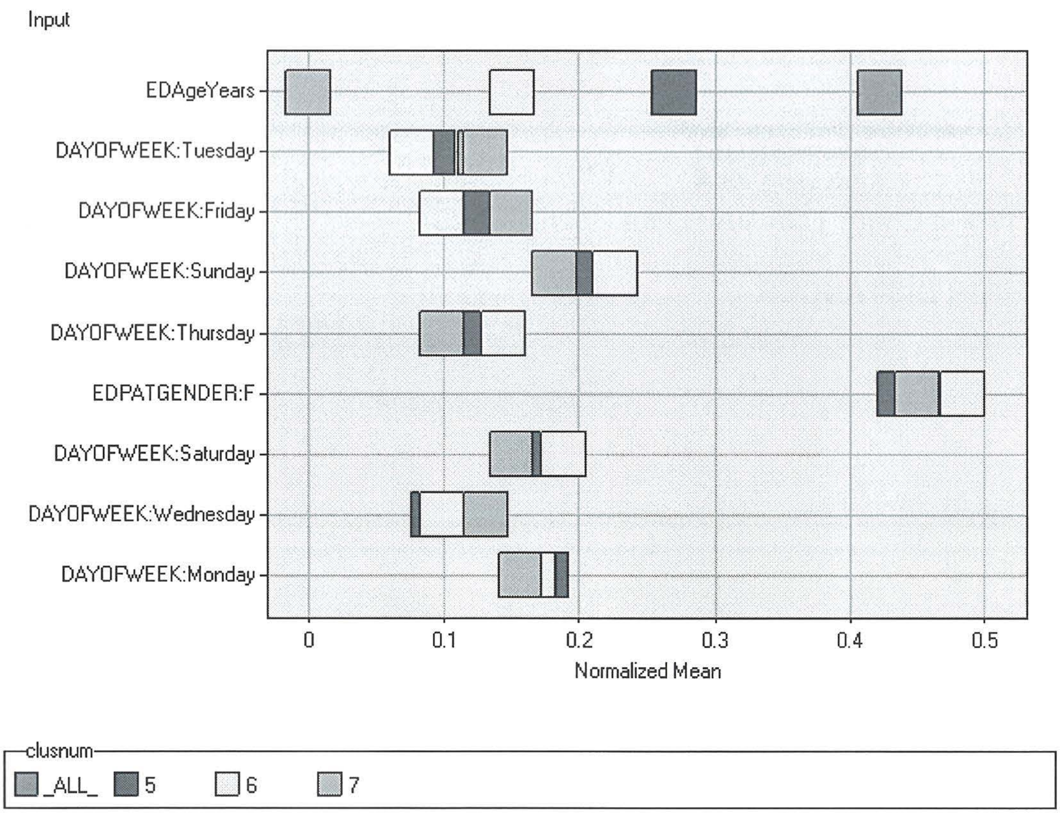
CLUSTER STATISTICS

CLUSTER	Frequency of Cluster	Root-Mean-Square Standard Deviation	Maximum Distance from Cluster Seed	Nearest Cluster	Distance to Nearest Cluster	EDAgeYears	EDPATGENDER:F
1	92	1.2121204882	6.3210887665	8	13.187279838	50.652173913	0.5
2	117	1.2255267067	7.0644359742	4	10.43985351	77.717948718	0.452991453
3	126	1.258618262	6.6002772418	5	12.281989369	37.373015873	0.5079365079
4	45	0.951341424	4.8487322139	2	10.43985351	88.155555556	0.5555555556
5	153	1.2228553259	6.4504240648	6	10.318973699	25.091503268	0.4379084967
6	132	1.1630729047	5.8541291754	5	10.318973699	14.772727273	0.4848484848
7	153	0.7390992016	5.7274477632	6	13.054293289	1.7189542484	0.4509803922
8	111	1.2949006436	6.6229752871	1	13.187279838	63.837837838	0.4414414414

CLUSTER	DAYOFWEEK:Friday	DAYOFWEEK:Monday	DAYOFWEEK:Saturday	DAYOFWEEK:Sunday	DAYOFWEEK:Thursday	DAYOFWEEK:Tuesday	DAYOFWEEK:Wednesday
1	0.1086956522	0.1086956522	0.1449275362	0.1884057971	0.2173913043	0.1014492754	0.1304347826
2	0.0774647887	0.1478873239	0.1338028169	0.2253521127	0.1126760563	0.1408450704	0.161971831
3	0.1607142857	0.1428571429	0.2410714286	0.1428571429	0.0803571429	0.1071428571	0.125
4	0.1739130435	0.1739130435	0.1304347826	0.0434782609	0.0869565217	0.2608695652	0.1304347826
5	0.0689655172	0.1206896552	0.1810344828	0.1724137931	0.1810344828	0.1206896552	0.1551724138
6	0.1111111111	0.1388888889	0.1666666667	0.1018518519	0.1851851852	0.1296296296	0.1666666667
7	0.1651376147	0.1834862385	0.1467889908	0.1743119266	0.0825688073	0.128440367	0.119266055
8	0.1909090909	0.1636363636	0.1363636364	0.1636363636	0.1363636364	0.1	0.1090909091

S9.2.19 Stats: TGA VAL Data – JULY 2006

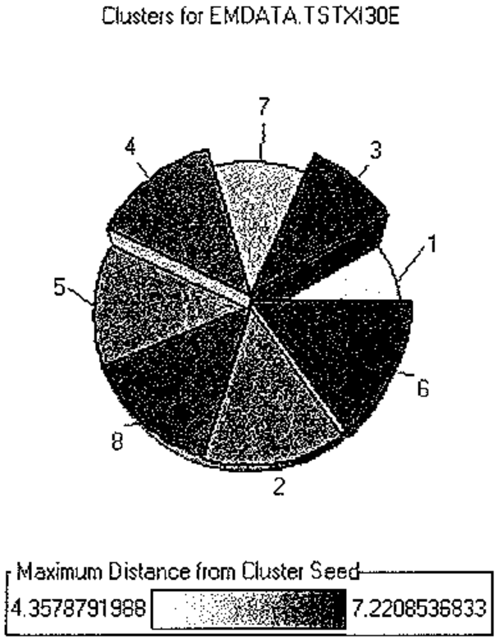
CLUSTER INPUT MEANS PLOT



S9.2.20 Input Means Plot: TGA VAL Data – JULY 2006

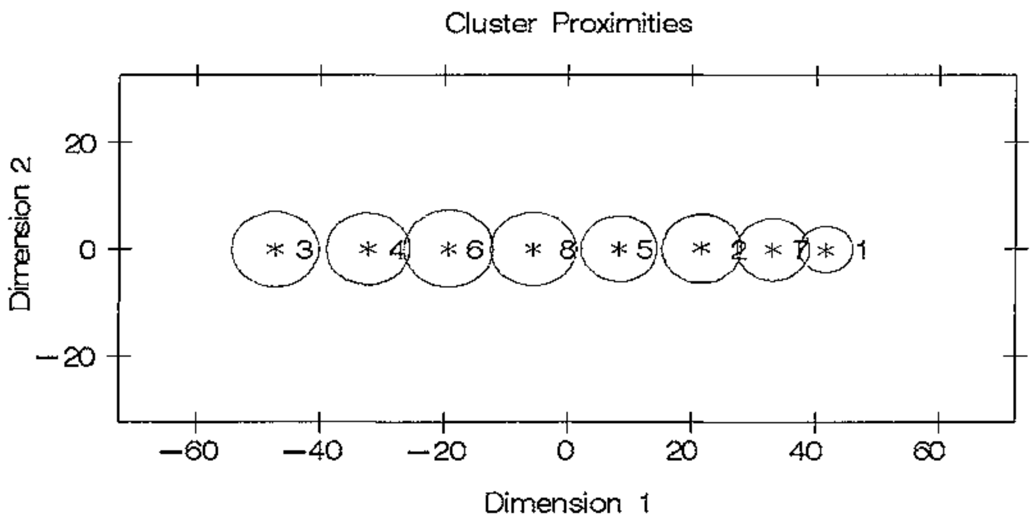
TGA
EDData200607
TEST:

CLUSTER PIE CHART



S9.2.21 Pie Chart: TGA TST Data – JULY 2006

CLUSTER DISTANCES



S9.2.22 Distances: TGA TST Data – JULY 2006

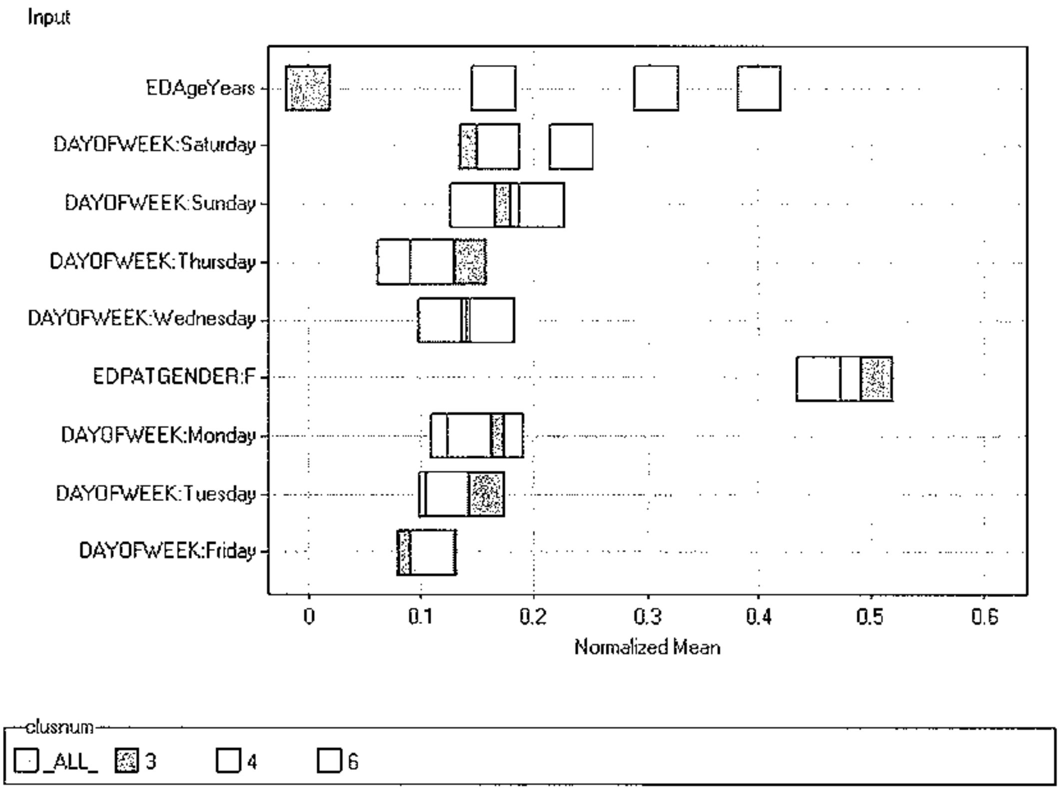
CLUSTER STATISTICS

CLUSTER	Frequency of Cluster	Root-Mean-Square Standard Deviation	Maximum Distance from Cluster Seed	Nearest Cluster	Distance to Nearest Cluster	EDAgeYears	EDPATGENDER:F
1	30	0.822894687	4.3578791988	7	8.5548389616	91.366666667	0.5666666667
2	99	1.3620810052	6.4139868955	7	11.493222137	71.323232323	0.4242424242
3	178	0.9263412739	7.0433539121	4	14.940309104	2.4887640449	0.5112359551
4	168	1.2789823566	6.6891759667	6	12.982488444	17.428571429	0.4821428571
5	91	1.2695013492	6.1538167189	2	13.258170239	58.065934066	0.4945054945
6	151	1.4565979899	7.2209536833	4	12.982488444	30.410596026	0.4635761589
7	97	1.0437522078	5.8227362138	1	8.5548389616	82.81443299	0.5567010309
8	114	1.3424171753	6.9368056096	6	13.738899503	44.149122807	0.5526315789

CLUSTER	DAYOFWEEK:Friday	DAYOFWEEK:Monday	DAYOFWEEK:Saturday	DAYOFWEEK:Sunday	DAYOFWEEK:Thursday	DAYOFWEEK:Tuesday	DAYOFWEEK:Wednesday
1	0.1	0.2333333333	0.0333333333	0.1666666667	0.1333333333	0.0666666667	0.2666666667
2	0.1313131313	0.2727272727	0.1717171717	0.1212121212	0.101010101	0.1111111111	0.0909090909
3	0.1011235955	0.1573033708	0.1573033708	0.1629213483	0.1404494382	0.1573033708	0.1235955056
4	0.1130952381	0.130952381	0.2380952381	0.1488095238	0.0833333333	0.119047619	0.1666666667
5	0.0879120879	0.2197802198	0.1428571429	0.1648351648	0.1208791209	0.0769230769	0.1868131868
6	0.1125827815	0.1456953642	0.1721854305	0.2119205298	0.1125827815	0.1258278146	0.119205298
7	0.1443298969	0.206185567	0.1030927835	0.2474226804	0.0515463918	0.1237113402	0.1237113402
8	0.0789473684	0.149122807	0.1578947368	0.2368421053	0.1228070175	0.1403508772	0.1140350877

S9.2.23 Stats: TGA TST Data – JULY 2006

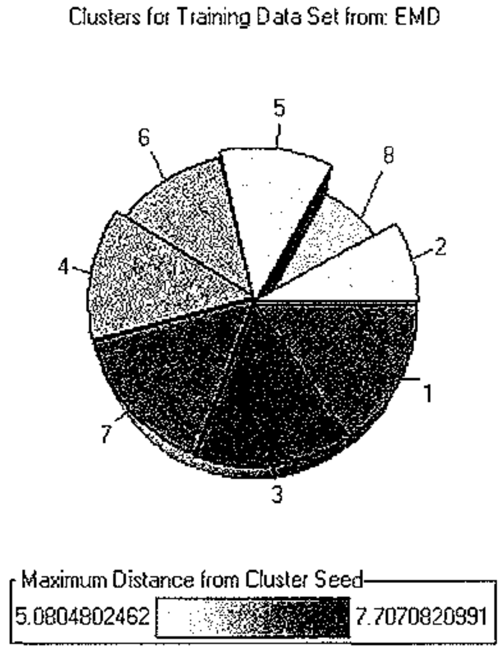
CLUSTER INPUT MEANS PLOT



S9.2.24 Input Means Plot: TGA TST Data – JULY 2006

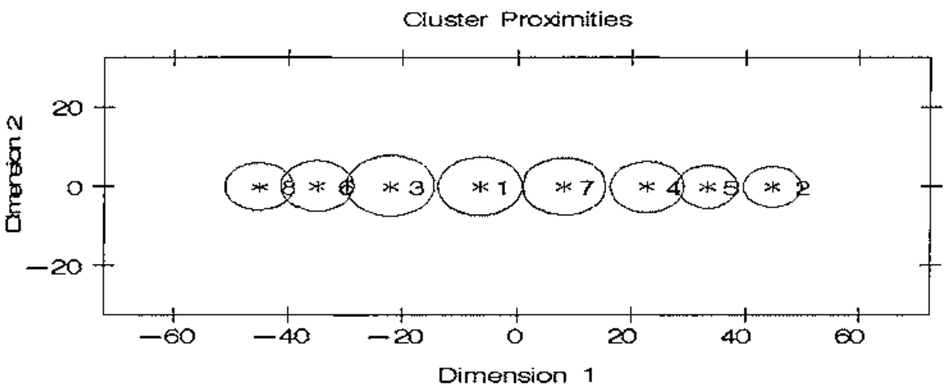
CLUSTERING RESULTS – EMPHASIS ON AGE, GENDER & DAY OF WEEK
TGA: FINANCIAL YEAR – 2006 – I.E. JULY 1ST 2005 – JUNE 30TH 2006
TGA
EDDataFinYr2006
TRAINING:

CLUSTER PIE CHART



S9.2.25 Pie Chart: TGA TRN Data – FIN YR 2006

CLUSTER DISTANCES



S9.2.26 Distances: TGA TRN Data – FIN YR 2006

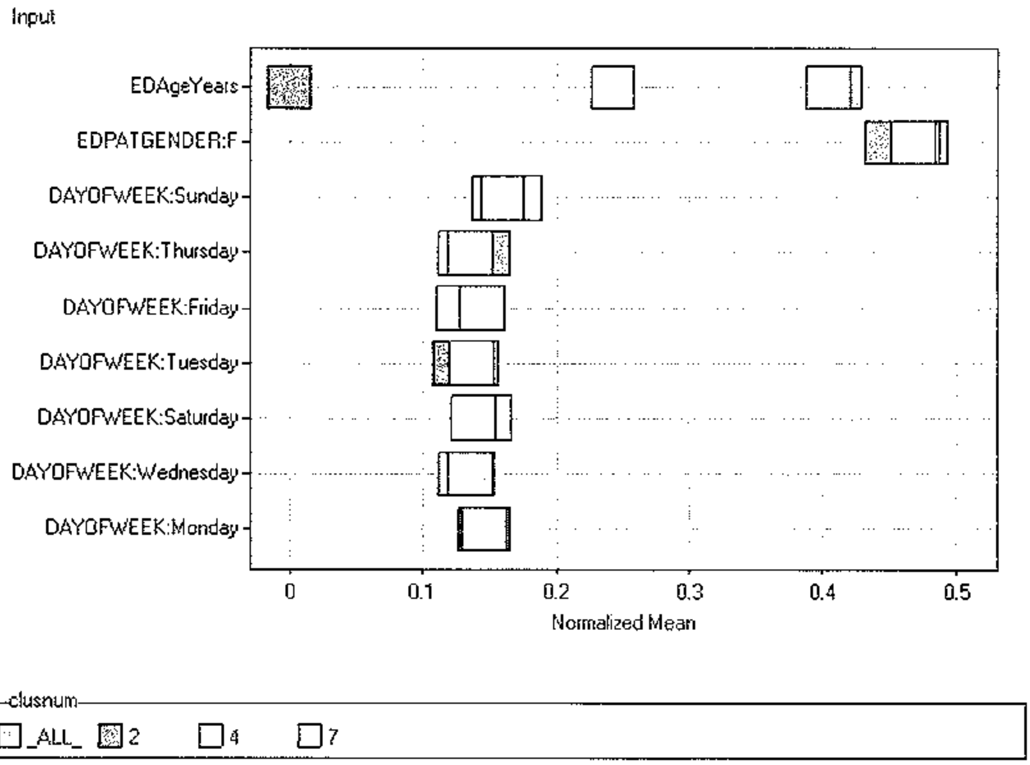
CLUSTER STATISTICS

CLUSTER	Frequency of Cluster	Root-Mean-Square Standard Deviation	Maximum Distance from Cluster Seed	Nearest Cluster	Distance to Nearest Cluster	EDAgeYears	EDPATGENDER:F
1	1803	1.5267915295	7.410974454	7	14.701747878	53.666666667	0.4836383905
2	2034	0.8102185322	5.0804802462	5	11.389453028	2.4700098328	0.4498525074
3	1916	1.4829725129	7.7070820991	6	12.883853913	69.376826722	0.4629436326
4	2334	1.3339717296	6.4543493606	5	10.557074472	24.416452442	0.4725792631
5	1942	1.1231589153	5.3269764265	4	10.557074472	13.859423275	0.4526261586
6	1606	1.2136143103	6.3799780972	8	10.106130456	82.260273973	0.5591531756
7	2225	1.4816985512	7.2702470494	4	14.548516001	38.96494382	0.4701123595
8	238	0.8732359487	5.9895358158	6	10.106130456	92.365546218	0.6806722689

CLUSTER	DAYOFWEEK:Friday	DAYOFWEEK:Monday	DAYOFWEEK:Saturday	DAYOFWEEK:Sunday	DAYOFWEEK:Thursday	DAYOFWEEK:Tuesday	DAYOFWEEK:Wednesday
1	0.1403216861	0.15640599	0.1325568497	0.1453133666	0.1342207432	0.1458679978	0.1453133666
2	0.133726647	0.1440511308	0.1425762045	0.1691248771	0.1489675516	0.1258603736	0.1356932153
3	0.1477035491	0.1534446764	0.121095595	0.1471816284	0.139874739	0.1456158664	0.1450939457
4	0.1285347044	0.147386461	0.1503856041	0.1735502999	0.1298200514	0.1409597258	0.1289631534
5	0.1457260556	0.1380020597	0.1513903193	0.1611740474	0.1326527291	0.1421215242	0.1287332647
6	0.1556662516	0.1569115816	0.1288916563	0.1158156912	0.1494396015	0.1488169365	0.1444582814
7	0.1456179775	0.1465168539	0.1384269663	0.1604494382	0.1357303371	0.1375280899	0.1357303371
8	0.1344537815	0.1764705882	0.1512605042	0.1344537815	0.1260504202	0.1302521008	0.1470588235

S9.2.27 Stats: TGA TRN Data – FIN YR 2006

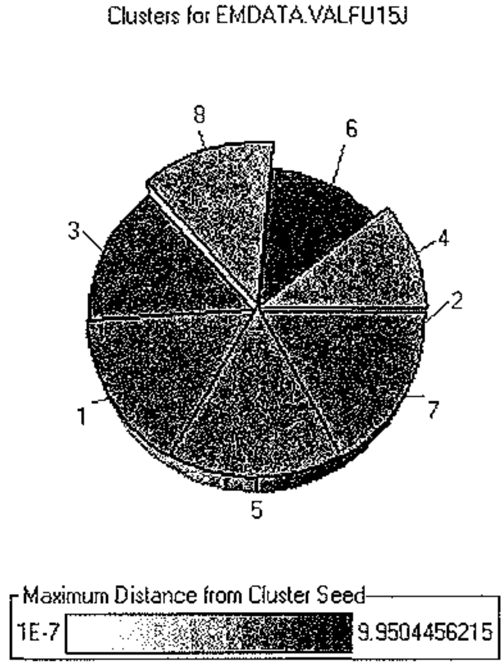
CLUSTER INPUT MEANS PLOT



S9.2.28 Input Means Plot: TGA TRN Data – FIN YR 2006

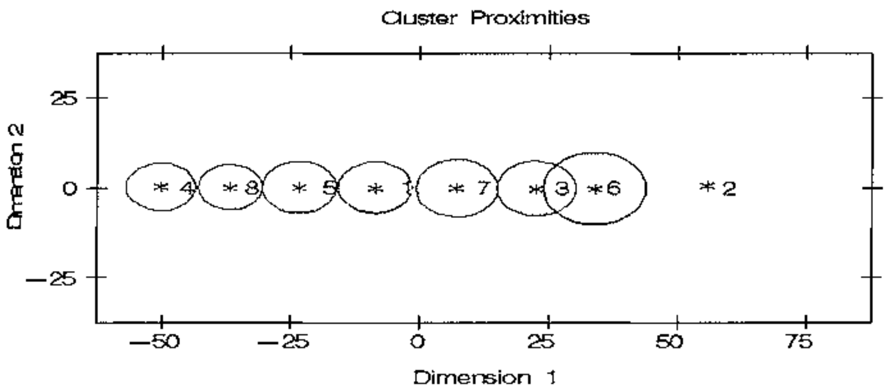
TGA
EDDataFinYr2006
VALIDATION:

CLUSTER PIE CHART



S9.2.29 Pie Chart: TGA VAL Data – FIN YR 2006

CLUSTER DISTANCES



S9.2.30 Distances: TGA VAL Data – FIN YR 2006

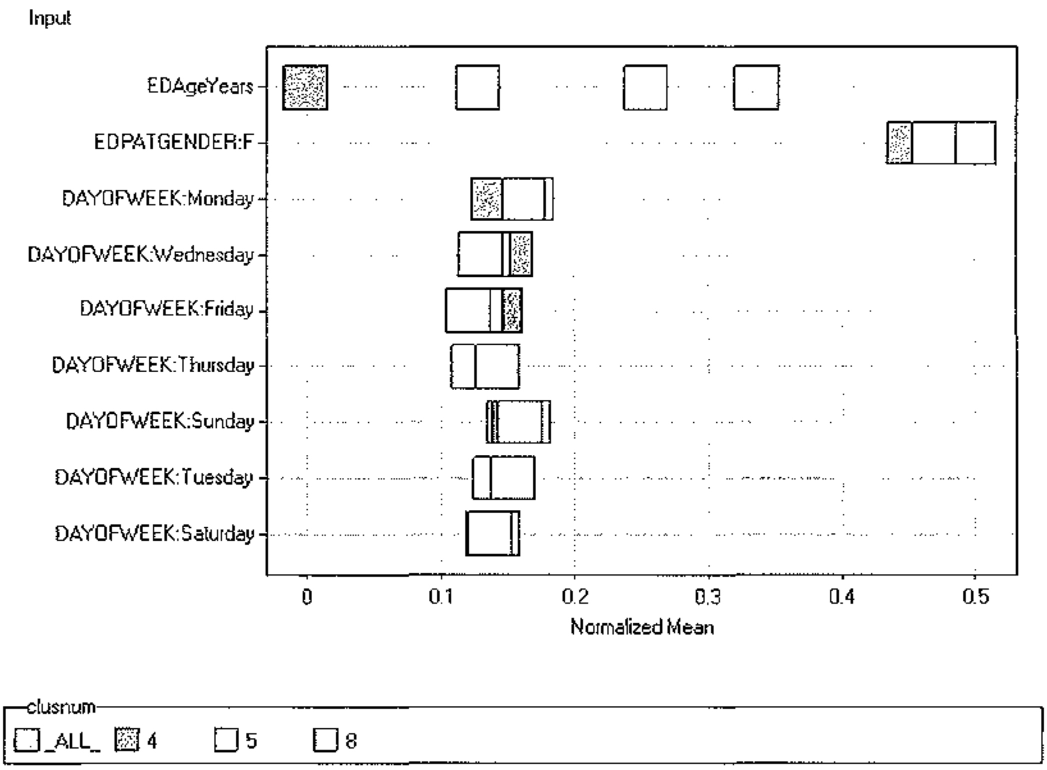
CLUSTER STATISTICS

CLUSTER	Frequency of Cluster	Root-Mean-Square Standard Deviation	Maximum Distance from Cluster Seed	Nearest Cluster	Distance to Nearest Cluster	EDAgeYears	EDPATGENDER:F
1	1612	1.4836581131	7.1380035248	5	14.703430647	44.629652605	0.479528536
2	1	.	0	6	21.961504385	109	1
3	1344	1.3500289254	7.5759487006	6	11.328429896	75.733630952	0.4791666667
4	1755	1.0075650801	6.6596548204	8	13.492156932	3.1145299145	0.4455726496
5	1790	1.5196972231	7.154444165	8	13.319710199	29.926256983	0.4994413408
6	687	1.1825331864	9.9504456215	3	11.328429896	87.061135371	0.6200873362
7	1386	1.5722772231	7.8742114687	3	15.289975674	60.443722944	0.4603174603
8	1998	1.2187474087	6.2199417046	5	13.319710199	16.606606607	0.4694694695

CLUSTER	DAYOFWEEK:Friday	DAYOFWEEK:Monday	DAYOFWEEK:Saturday	DAYOFWEEK:Sunday	DAYOFWEEK:Thursday	DAYOFWEEK:Tuesday	DAYOFWEEK:Wednesday
1	0.1364764268	0.1718362283	0.1364764268	0.1439205955	0.1228287841	0.1451612903	0.1433002481
2	0	0	0	0	0	0	1
3	0.1540178571	0.1540178571	0.1436011905	0.1324404762	0.1376488095	0.1391369048	0.1391369048
4	0.1435897436	0.1384615385	0.1344729345	0.1544159544	0.1310541311	0.1458689459	0.1521367521
5	0.1290502793	0.1675977654	0.1407821229	0.1648044693	0.1234636872	0.1396648045	0.1346368715
6	0.1310043668	0.154294032	0.1426491994	0.135371179	0.1596608443	0.1310043668	0.1470160116
7	0.1378066378	0.1659451659	0.1219336219	0.1493506494	0.1219336219	0.1515151515	0.1515151515
8	0.1206206206	0.1616616617	0.1356356356	0.1585585587	0.1411411411	0.1531531532	0.1291291291

S9.2.31 Stats: TGA VAL Data – FIN YR 2006

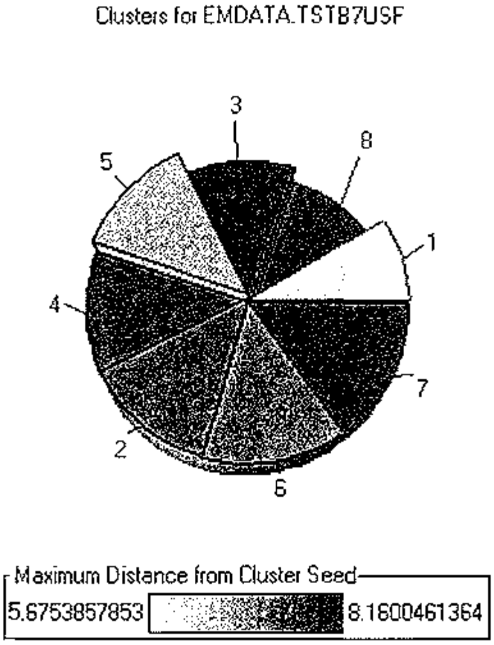
INPUT MEANS PLOT



S9.2.32 Input Means Plot: TGA VAL Data – FIN YR 2006

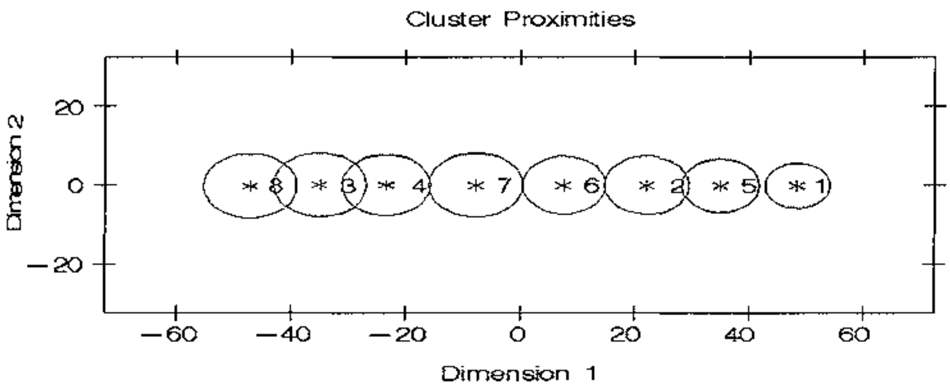
TGA
EDDataFinYr2006
TEST:

CLUSTER PIE CHART



S9.2.33 Pie Chart: TGA TST Data – FIN YR 2006

CLUSTER DISTANCES



S9.2.34 Distances: TGA TST Data – FIN YR 2006

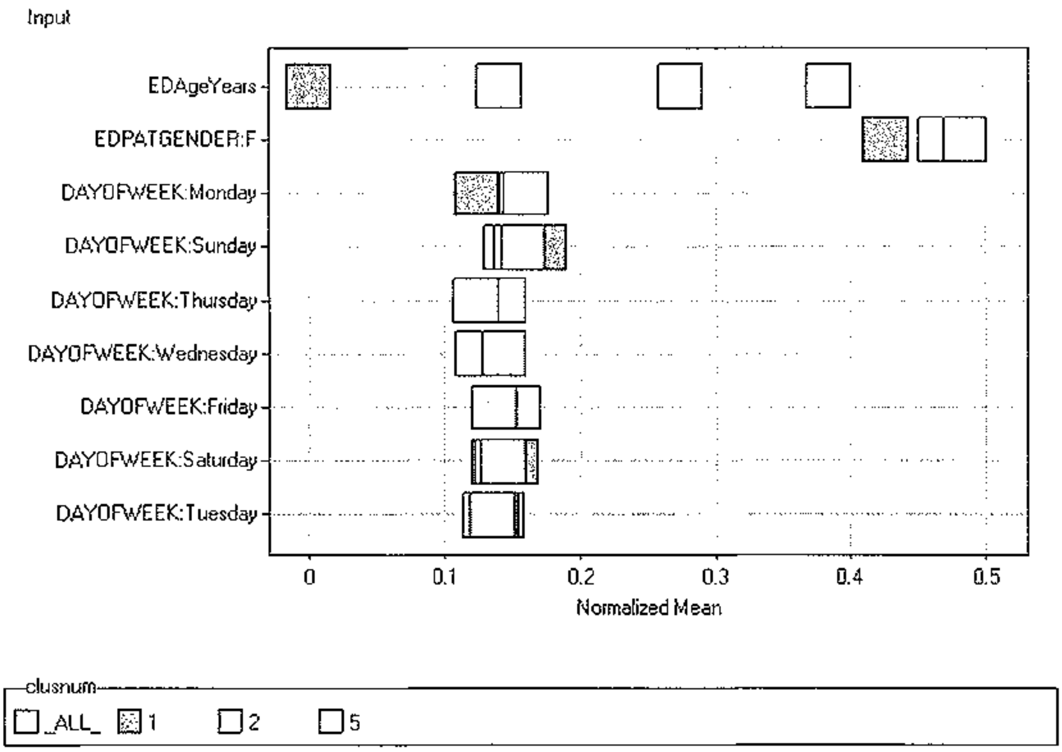
CLUSTER STATISTICS

CLUSTER	Frequency of Cluster	Root-Mean-Square Standard Deviation	Maximum Distance from Cluster Seed	Nearest Cluster	Distance to Nearest Cluster	EDAgeYears	EDPATGENDER:F
1	1559	0.9148230523	5.6753857853	5	13.404153054	2.9371391918	0.4271969211
2	1735	1.3822007453	7.4004585138	5	12.880861612	29.221902017	0.4674351585
3	851	1.2521555495	8.1114193086	4	11.537047287	86.313748531	0.598119859
4	1423	1.3530214149	7.7388393431	3	11.537047287	74.777231202	0.4947294448
5	2061	1.3076103493	6.746655447	2	12.880861612	16.341096555	0.4856865599
6	1498	1.4640096581	7.3177451344	2	14.538504572	43.76034713	0.4906542056
7	1433	1.5773535387	8.1600461364	6	15.382031255	59.142358688	0.4849965108
8	13	1.1779067822	8.1547532152	3	12.228850356	98.538461538	0.6923076923

CLUSTER	DAYOFWEEK:Friday	DAYOFWEEK:Monday	DAYOFWEEK:Saturday	DAYOFWEEK:Sunday	DAYOFWEEK:Thursday	DAYOFWEEK:Tuesday	DAYOFWEEK:Wednesday
1	0.1475304682	0.123797306	0.152020526	0.173187941	0.1282873637	0.137908916	0.1372674792
2	0.1538904893	0.157925072	0.1383285303	0.1527377522	0.1429394813	0.1291066282	0.1250720461
3	0.1621621622	0.1410105758	0.1457109283	0.1233842538	0.1398354877	0.1539365452	0.133960047
4	0.158116655	0.1482782853	0.1131412509	0.1208713985	0.1560084329	0.1598193956	0.1447645819
5	0.1363415818	0.1601164483	0.1426491994	0.1581756429	0.1237263464	0.135371179	0.1436196021
6	0.1508678238	0.1455273698	0.1408544726	0.1381842457	0.1328437917	0.1468624833	0.1448598131
7	0.163991626	0.1465457083	0.123517097	0.1367759944	0.1416608514	0.1423586881	0.1451500349
8	0.3076923077	0.3076923077	0	0.0769230769	0	0.1538461538	0.1538461538

S9.2.35 Stats: TGA TST Data – FIN YR 2006

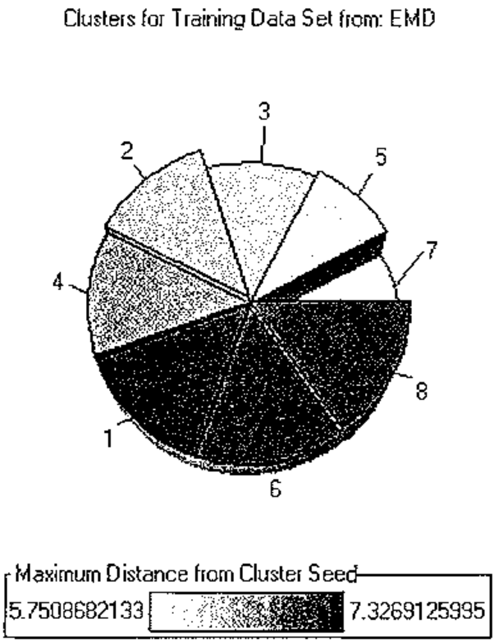
CLUSTER INPUT MEANS PLOT



S9.2.36 Input Means Plot: TGA TST Data – FIN YR 2006

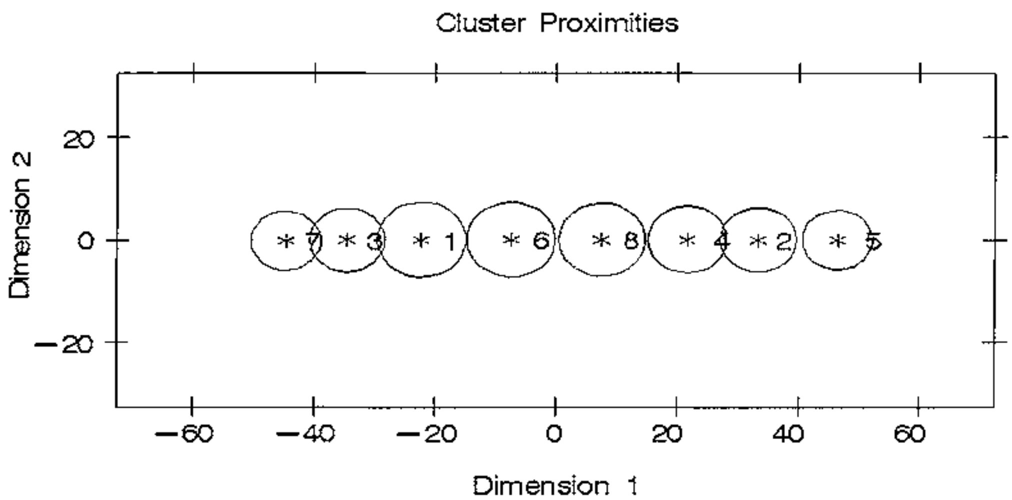
CLUSTERING RESULTS – EMPHASIS ON AGE, GENDER & DAY OF WEEK
TGA: FINANCIAL YEAR – 2007 – I.E. JULY 1ST 2006 - JUNE 30TH 2007
TGA
EDDataFinYr2007
TRAINING:

CLUSTER PIE CHART



S9.2.37 Pie Chart: TGA TRN Data – FIN YR 2007

CLUSTER DISTANCES



S9.2.38 Distances: TGA TRN Data – FIN YR 2007

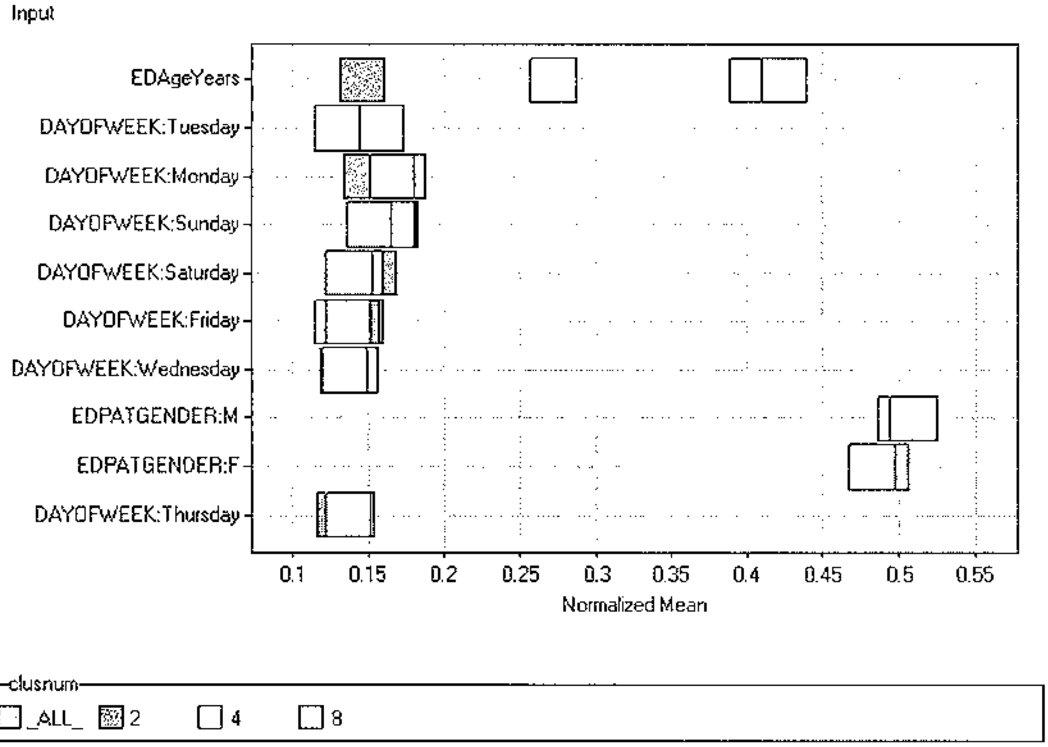
CLUSTER STATISTICS

CLUSTER	Frequency of Cluster	Root-Mean-Square Standard Deviation	Maximum Distance from Cluster Seed	Nearest Cluster	Distance to Nearest Cluster	EDAgeYears	EDPATGENDER:F
1	1889	1.3545201739	7.3180261251	3	12.2012442	71.666490206	0.475383801
2	2713	1.1790630149	6.2650908785	4	11.663478659	15.964983413	0.4872834501
3	1430	1.1781077914	6.2124901939	7	10.102486661	83.867132867	0.5587412587
4	2239	1.243090257	6.5204769441	2	11.663478659	27.628405538	0.4948637785
5	1977	0.899536141	5.7816877879	2	13.058732068	2.9064238746	0.4436014163
6	1810	1.4160611659	7.3269125996	1	14.89636217	56.770165746	0.4845303867
7	127	0.7584214525	5.7509682133	3	10.102486661	93.968503937	0.6220472441
8	2293	1.4356833214	7.1541035115	4	14.148359169	41.776711731	0.4862625382

CLUSTER	DAYOFWEEK:Friday	DAYOFWEEK:Monday	DAYOFWEEK:Saturday	DAYOFWEEK:Sunday	DAYOFWEEK:Thursday	DAYOFWEEK:Tuesday	DAYOFWEEK:Wednesday
1	0.1556379037	0.1588141874	0.1259925887	0.1376389624	0.1318157755	0.1434621493	0.146638433
2	0.1396977516	0.145595282	0.151861408	0.1654994471	0.1275340951	0.1400663472	0.129745669
3	0.1636363636	0.1552447552	0.1216783217	0.1356643357	0.1531468531	0.1293706294	0.1412587413
4	0.1263957124	0.1706118803	0.141581063	0.163465833	0.1335417597	0.1263957124	0.1380080393
5	0.1365705615	0.1583206879	0.1446636318	0.1517450683	0.1421345473	0.1330298432	0.1335356601
6	0.144198895	0.1591160221	0.1348066298	0.1569060773	0.1392265193	0.1348066298	0.1309392265
7	0.1653543307	0.1653543307	0.1417322835	0.1102362205	0.062992126	0.1417322835	0.2125984252
8	0.1334496293	0.1631051025	0.1343218491	0.1482773659	0.1334496293	0.156563454	0.1308329699

S9.2.39 Stats: TGA TRN Data – FIN YR 2007

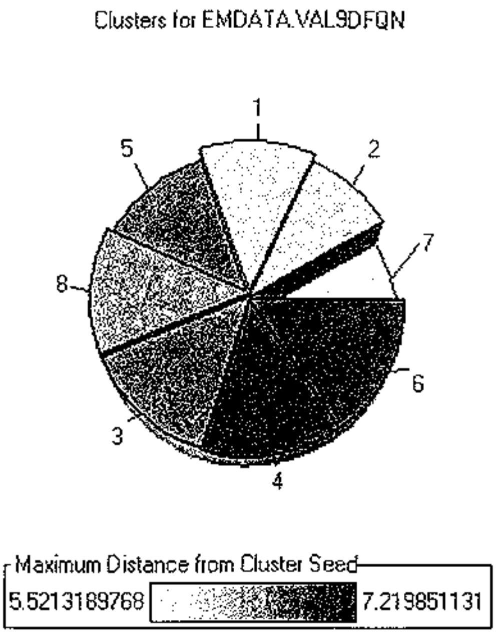
CLUSTER INPUT MEANS PLOT



S9.2.40 Input Means Plot: TGA TRN Data – FIN YR 2007

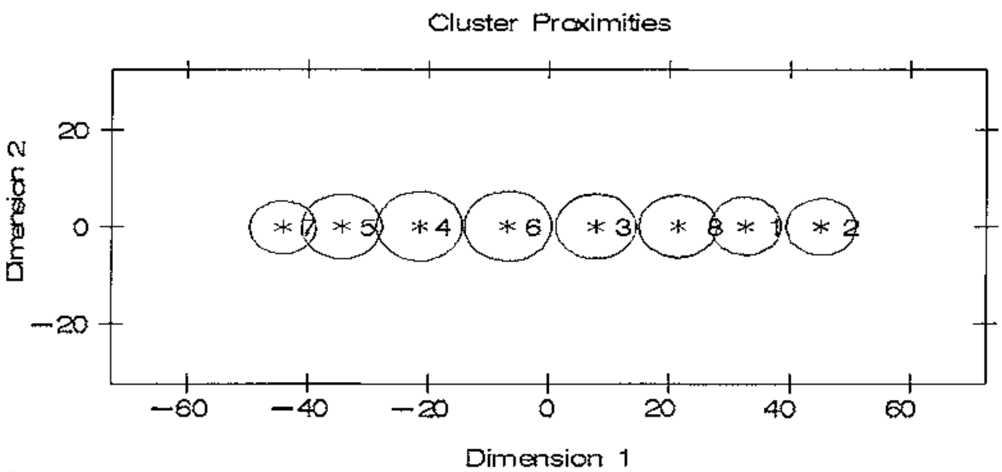
TGA
EDDataFinYr2007
VALIDATION:

CLUSTER PIE CHART



S9.2.41 Pie Chart: TGA VAL Data – FIN YR 2007

CLUSTER DISTANCES



S9.2.42 Distances: TGA VAL Data – FIN YR 2007

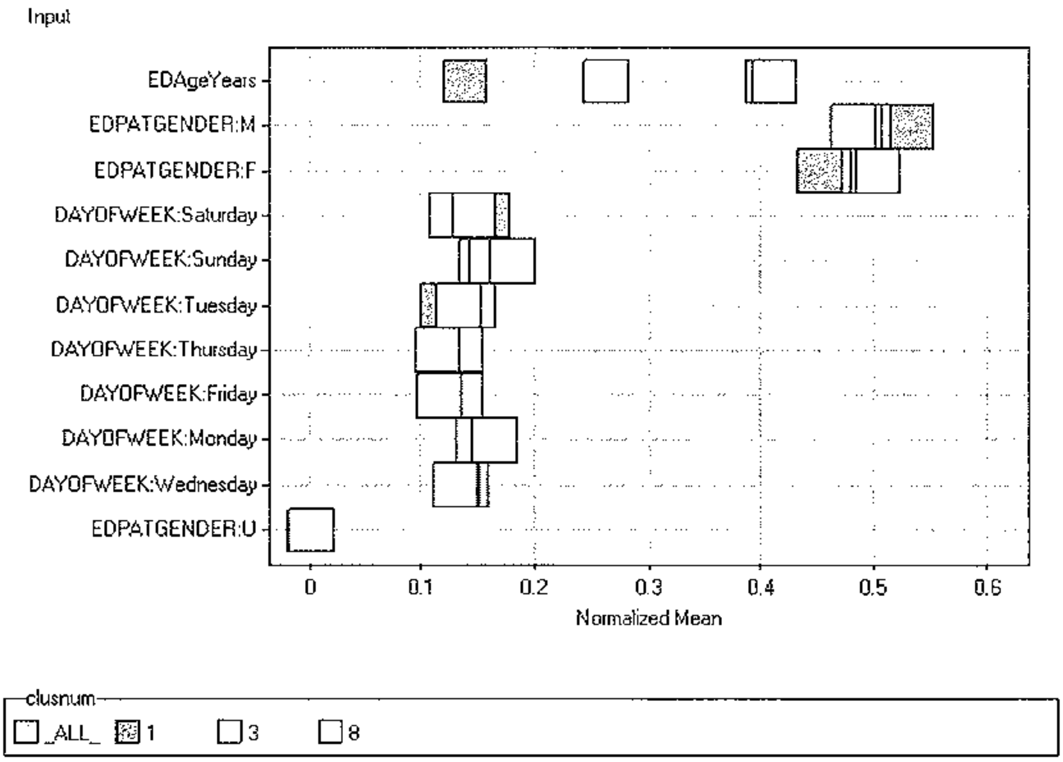
CLUSTER STATISTICS

CLUSTER	Frequency of Cluster	Root-Mean-Square Standard Deviation	Maximum Distance from Cluster Seed	Nearest Cluster	Distance to Nearest Cluster	EDAgeYears	EDPATGENDER:F
1	1897	1.0585953473	5.9365117308	8	11.225726491	15.393779552	0.45914602
2	1526	0.8575239546	5.8485817118	1	12.568652213	2.8250327654	0.4456094364
3	1542	1.2378105923	6.6681350263	8	13.568252088	40.187418936	0.5054850843
4	1270	1.2600442154	7.1578381353	5	12.904340043	69.465354331	0.4858267717
5	1323	1.1304223797	6.6575409381	7	9.7835000328	82.369614512	0.5109599395
6	1359	1.3552397346	7.219951131	3	14.599340637	54.7866078	0.4731420162
7	185	0.7504405287	5.5213169768	5	9.7835000328	92.151351351	0.6324324324
8	1757	1.18568193	6.431218985	1	11.225726491	26.619237336	0.5105293113

CLUSTER	DAYOFWEEK:Friday	DAYOFWEEK:Monday	DAYOFWEEK:Saturday	DAYOFWEEK:Sunday	DAYOFWEEK:Thursday	DAYOFWEEK:Tuesday	DAYOFWEEK:Wednesday
1	0.1307327359	0.1634159199	0.1602530311	0.1718502899	0.1217712177	0.1207169215	0.131259884
2	0.1520314548	0.1323722149	0.1480996068	0.1566185107	0.1363040629	0.1349934469	0.1395806029
3	0.1361867704	0.1517509728	0.1284046693	0.1653696498	0.1368352789	0.1478599222	0.1335927367
4	0.1551181102	0.1677165354	0.1188976378	0.125984252	0.1440944882	0.1377952756	0.1503937008
5	0.1390778534	0.1572184429	0.1235606954	0.1428571429	0.1519274376	0.1413454271	0.1436130008
6	0.1339220015	0.1692420898	0.1265636497	0.1368653422	0.1331861663	0.136129507	0.1640912436
7	0.1567567568	0.1189189189	0.1621621622	0.1081081081	0.1405405405	0.1567567568	0.1567567568
8	0.1178144565	0.1667615253	0.1485486625	0.1832669323	0.1161070006	0.1354581673	0.1320432555

S9.2.43 Stats: TGA VAL Data – FIN YR 2007

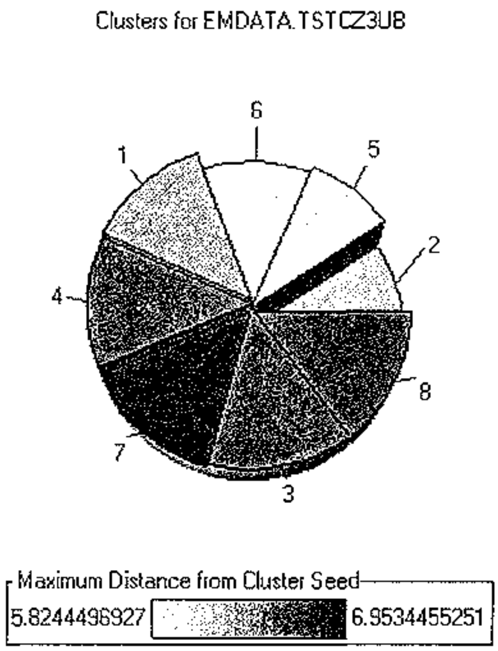
CLUSTER INPUT MEANS PLOT



S9.2.44 Input Means Plot: TGA VAL Data – FIN YR 2007

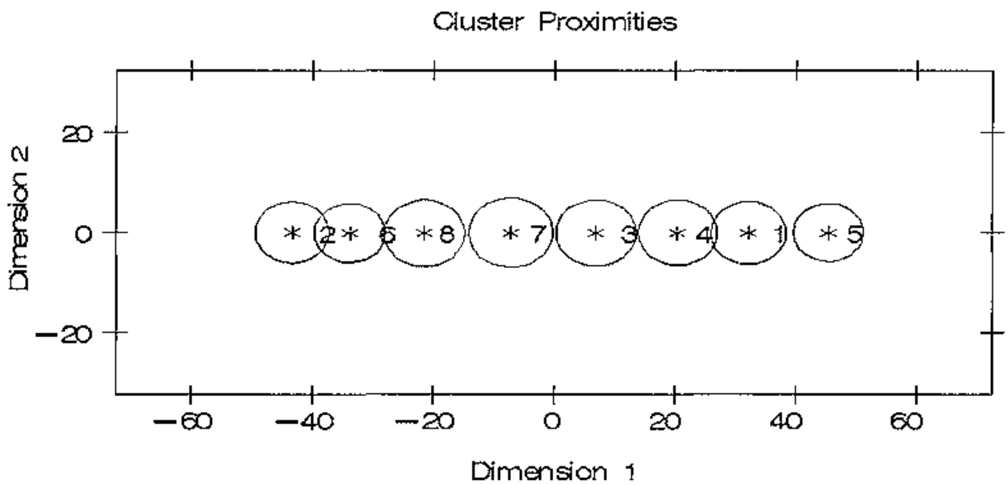
TGA
EDDataFinYr2007
TEST:

CLUSTER PIE CHART



S9.2.45 Pie Chart: TGA TST Data – FIN YR 2007

CLUSTER DISTANCES



S9.2.46 Distances: TGA TST Data – FIN YR 2007

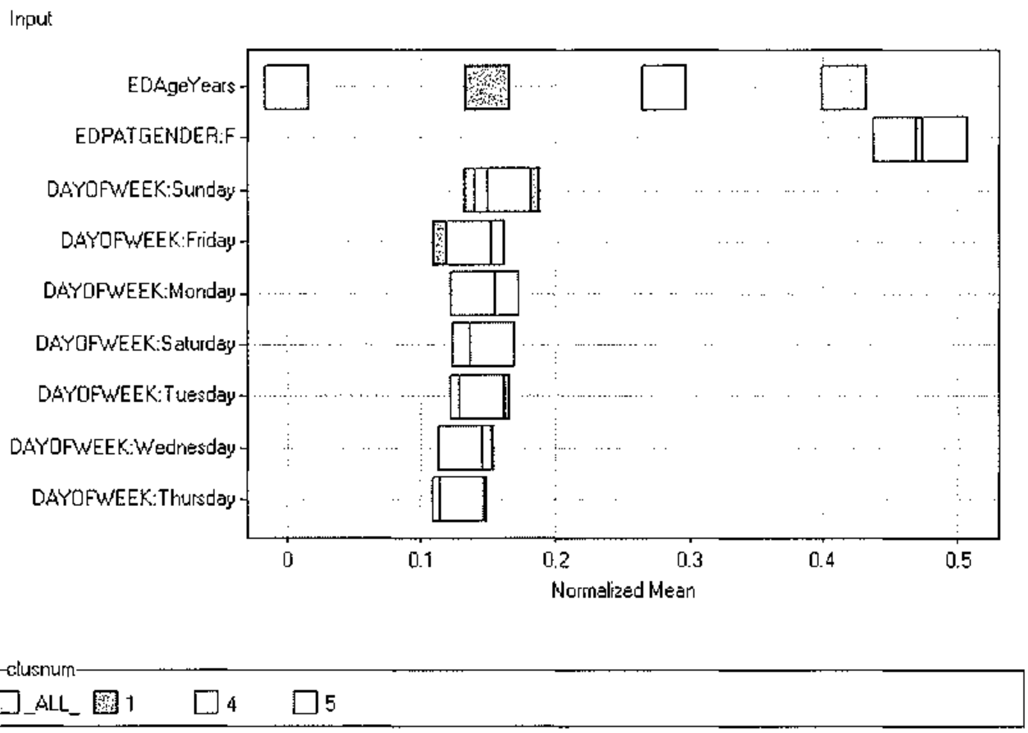
CLUSTER STATISTICS

CLUSTER	Frequency of Cluster	Root-Mean-Square Standard Deviation	Maximum Distance from Cluster Seed	Nearest Cluster	Distance to Nearest Cluster	EDAgeYears	EDPATGENDER:F
1	1992	1.23351048	6.2505537624	4	11.717054999	15.993975904	0.4578313253
2	241	0.8913355275	6.1203577143	6	9.609280523	91.580912863	0.643153527
3	1535	1.3892904864	6.6415427598	4	13.49238212	41.203257329	0.4703583062
4	1754	1.3071419254	6.5369234977	1	11.717054999	27.710946408	0.4914481186
5	1537	0.9103166	5.8244496927	1	13.232114001	2.7618737801	0.4534808068
6	1206	1.1416949557	5.8918270679	2	9.608280623	81.973466003	0.5331674959
7	1283	1.3933822308	6.9534455251	3	14.129642203	55.332813718	0.5035074045
8	1310	1.4254593849	6.6851461002	6	12.353147734	69.620610687	0.4664122137

CLUSTER	DAYOFWEEK:Friday	DAYOFWEEK:Monday	DAYOFWEEK:Saturday	DAYOFWEEK:Sunday	DAYOFWEEK:Thursday	DAYOFWEEK:Tuesday	DAYOFWEEK:Wednesday
1	0.1260040161	0.1480923695	0.1465863454	0.171686747	0.1260040161	0.1495983936	0.1320281124
2	0.1452282158	0.1078838174	0.1576763485	0.1286307054	0.153526971	0.153526971	0.153526971
3	0.1218241042	0.1602605863	0.1530944625	0.1368078176	0.1315960912	0.1524429967	0.1439739414
4	0.1459521095	0.1562143672	0.1402508552	0.157354618	0.1254275941	0.1385404789	0.1362599772
5	0.1359791802	0.1392322707	0.1528952505	0.1659076122	0.1307742355	0.1457384515	0.1294729993
6	0.1351575456	0.1616915423	0.1343283582	0.1326699834	0.1484245439	0.1351575456	0.1525704809
7	0.1410756041	0.151208106	0.1410756041	0.1543257989	0.1410756041	0.1426344505	0.1286048324
8	0.1687022901	0.1534351145	0.1366412214	0.1091603053	0.1312977099	0.1595419847	0.141221374

S9.2.47 Stats: TGA TST Data – FIN YR 2007

CLUSTER INPUT MEANS PLOT

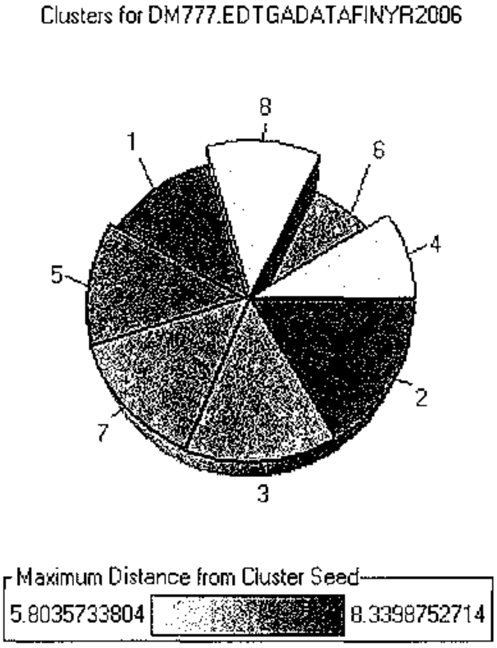


S9.2.48 Input Means Plot: TGA TST Data – FIN YR 2007

CLUSTERING RESULTS – EMPHASIS ON AGE, GENDER & DAY OF WEEK
TGA: FULL DATA SET (OF FIN YEAR 2006)

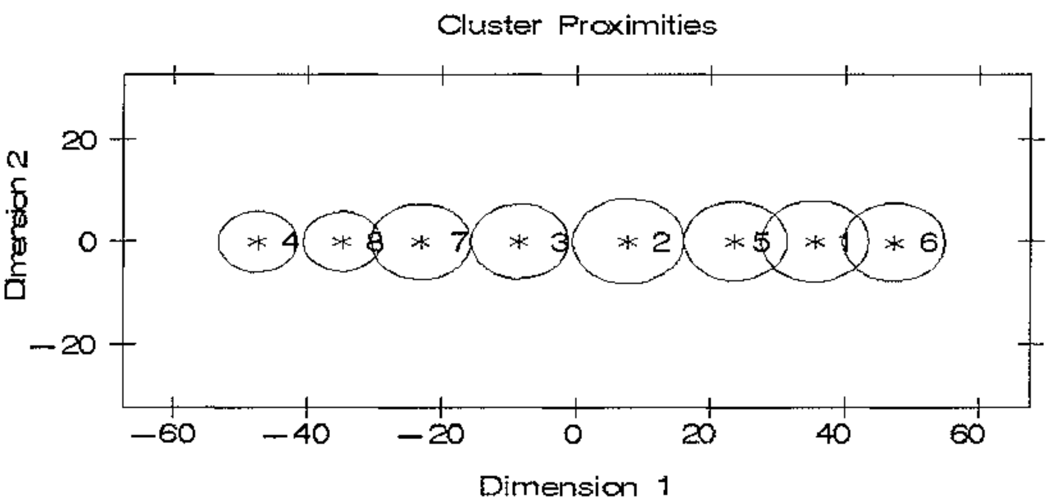
TGA
EDDataFinYr2006
FULL DATA SET:

CLUSTER PIE CHART



S9.2.49 Pie Chart: TGA FULL Data Set – FIN YR 2006

CLUSTER DISTANCES



S9.2.50 Distances: TGA FULL Data Set – FIN YR 2006

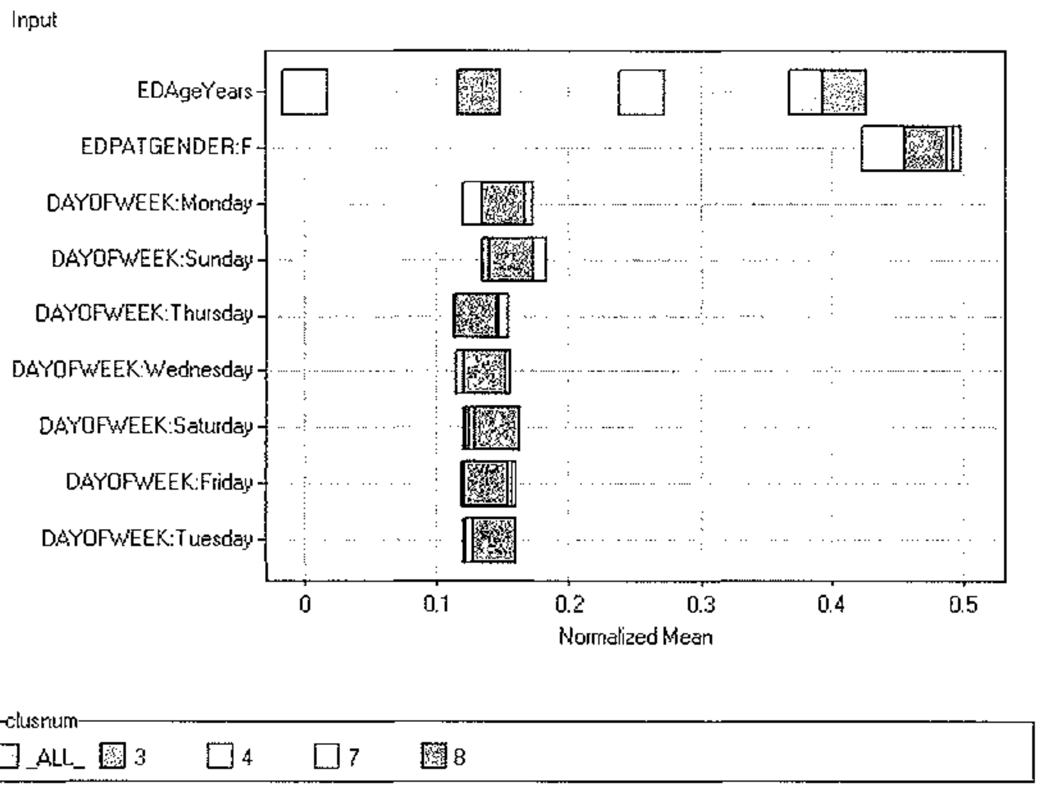
CLUSTER STATISTICS

CLUSTER	Frequency of Cluster	Root-Mean-Square Standard Deviation	Maximum Distance from Cluster Seed	Nearest Cluster	Distance to Nearest Cluster	EDAgeYears	EDPATGENDER:F
1	3041	1.2505814967	7.5541749878	5	11.813744379	85.663597501	0.5935547517
2	5003	1.6818609819	8.3393752714	5	15.936381784	57.914051569	0.4797121727
3	5479	1.484078751	7.2506331795	7	14.669339674	41.764738091	0.4776419055
4	5383	0.9092872976	5.914166806	8	12.555887437	2.832392755	0.4415753297
5	4626	1.3661458294	7.6857256937	1	11.813744379	73.850410722	0.4794639397
6	63	0.9155624158	7.6121248311	1	11.814656626	97.476190476	0.746031746
7	5816	1.4078956504	7.3803775687	8	11.706098098	27.094910591	0.4764442916
8	5833	1.1672614288	5.8035733804	7	11.706098098	15.389822218	0.4731698954

CLUSTER	DAYOFWEEK:Friday	DAYOFWEEK:Monday	DAYOFWEEK:Saturday	DAYOFWEEK:Sunday	DAYOFWEEK:Thursday	DAYOFWEEK:Tuesday	DAYOFWEEK:Wednesday
1	0.1486353173	0.1542255837	0.1341663926	0.1298914831	0.1427162118	0.1466622821	0.1437027294
2	0.1469118529	0.1597041775	0.1261243254	0.1431141315	0.1323206076	0.147111733	0.1447131721
3	0.1407191093	0.155502829	0.1387114437	0.1516700128	0.1354261727	0.139806534	0.1381638985
4	0.1409994427	0.1367267323	0.1421140628	0.1660783949	0.1380271224	0.1363551923	0.1396990526
5	0.1552096844	0.1480760317	0.1284046693	0.1273238219	0.1485084306	0.1469952443	0.1454820579
6	0.2063492063	0.2698412698	0.0952380952	0.1111111111	0.0634920635	0.126984127	0.126984127
7	0.1351444292	0.1562929849	0.1418500688	0.1669532325	0.1306740028	0.1394112792	0.1306740028
8	0.1373221327	0.1508657638	0.1458940511	0.1566946683	0.1292645294	0.1436653523	0.1362935025

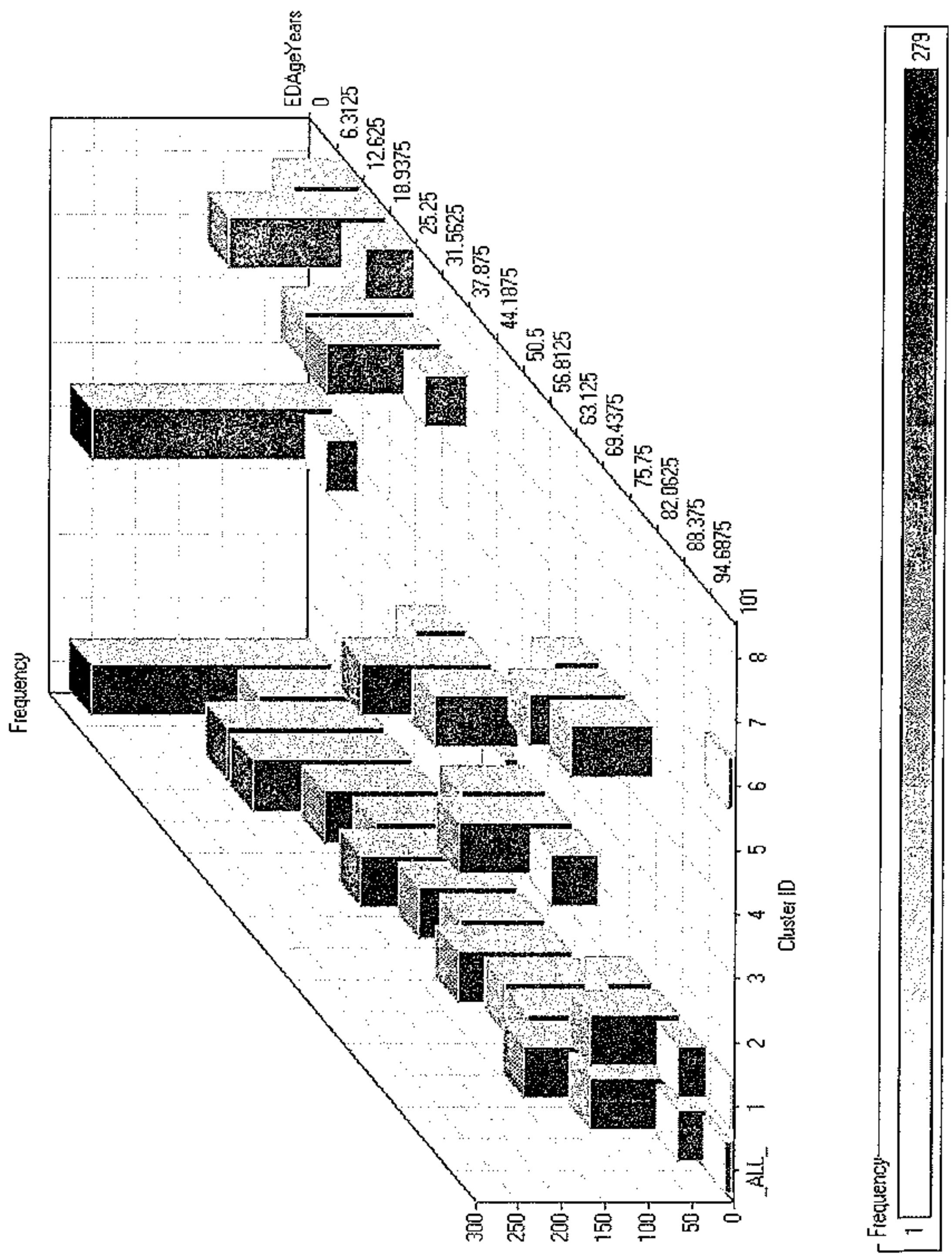
S9.2.51 Stats: TGA FULL Data Set – FIN YR 2006

CLUSTER INPUT MEANS PLOT



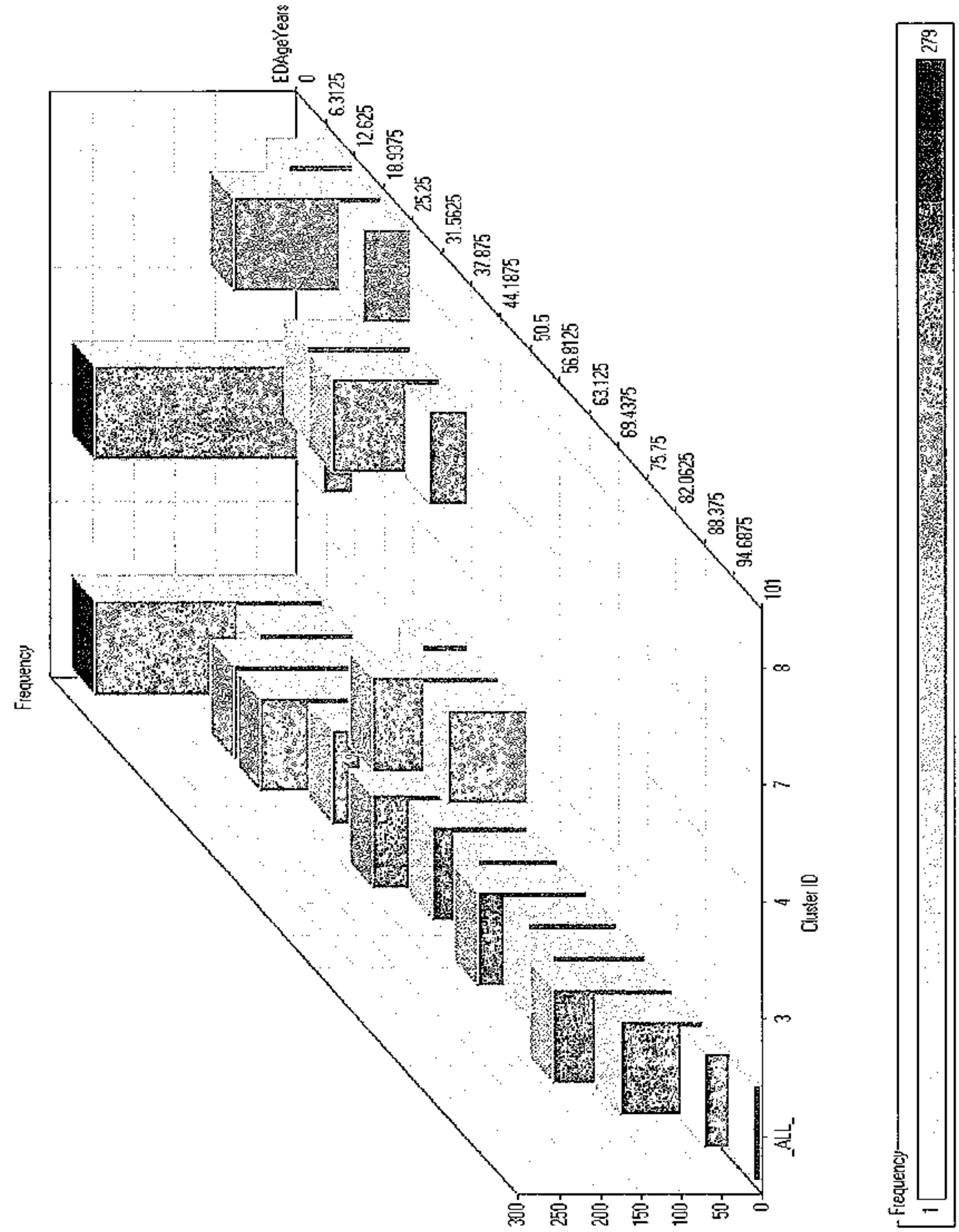
S9.2.52 Input Means Plot: TGA FULL Data Set – FIN YR 2006

CLUSTER PROFILES OF AGE – TGA FY 2006 - ALL EIGHT CLUSTERS



S9.2.53 Clusters Profile: TGA – FULL Fin Yr 2006 – Variable EDAgeYears

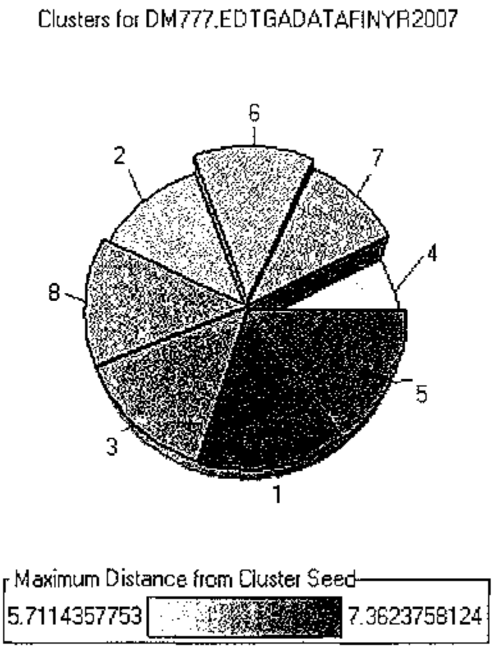
CLUSTER PROFILES OF AGE – TGA FY 2006 – FOUR HIGHEST FREQ CL'S



S9.2.54 Clusters Profile: TGA – FULL Fin Yr 2006 – Variable EDAgeYears

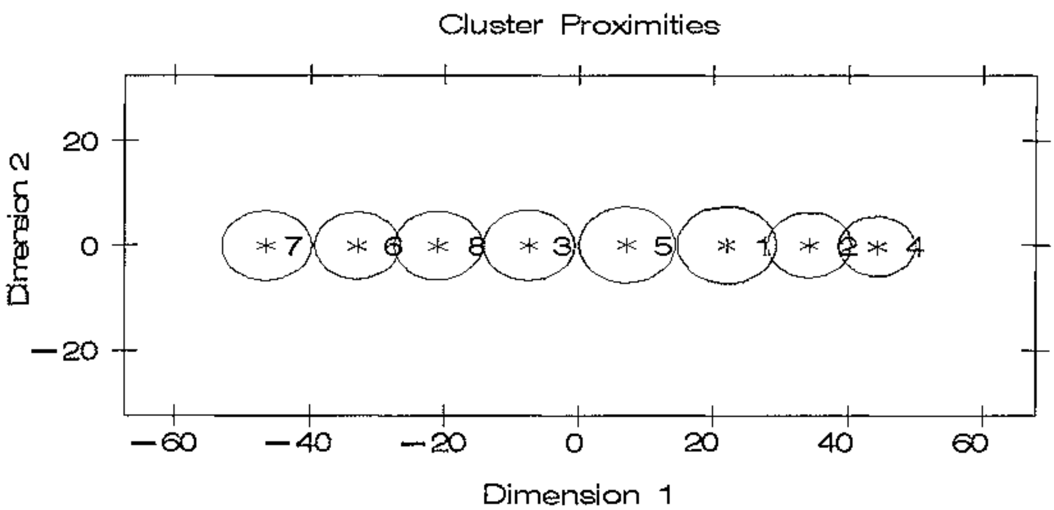
CLUSTERING RESULTS – EMPHASIS ON AGE, GENDER & DAY OF WEEK
TGA: FULL DATA SET (OF FIN YEAR 2007)
TGA
EDDataFinYr2007
FULL DATA SET:

CLUSTER PIE CHART



S9.2.55 Pie Chart: TGA FULL Data Set – FIN YR 2007

CLUSTER DISTANCES



S9.2.56 Distances: TGA FULL Data Set – FIN YR 2007

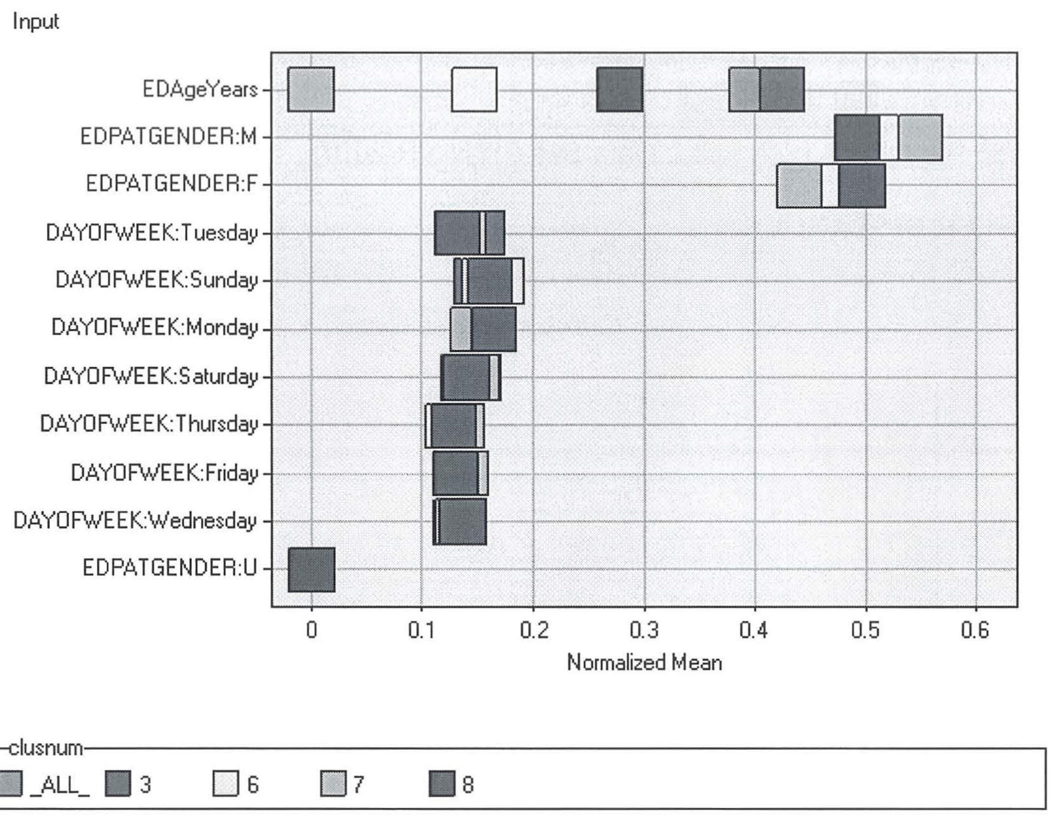
CLUSTER STATISTICS

CLUSTER	Frequency of Cluster	Root-Mean-Square Standard Deviation	Maximum Distance from Cluster Seed	Nearest Cluster	Distance to Nearest Cluster	EDAgeYears	EDPATGENDER:F
1	4580	1.3009693801	7.3623758124	2	12.216690696	71.671834061	0.4786026201
2	3736	1.10826507	6.2390602301	4	10.063990179	83.888115632	0.5473768737
3	5126	1.2685131605	6.7277396033	8	13.518939896	42.248341787	0.4816621147
4	320	0.6876086406	5.7114357753	2	10.063990179	93.95	0.675
5	4505	1.3502577135	7.2056310109	3	14.553227908	56.801553829	0.4785793563
6	6939	1.0997298711	6.3633876557	8	12.010260505	16.719267906	0.4780227699
7	5378	0.943599763	6.6321244721	6	13.494374663	3.2249907029	0.444960952
8	5611	1.1960375026	6.5445178374	6	12.010260505	28.729459989	0.5020495455

CLUSTER	DAYOFWEEK:Friday	DAYOFWEEK:Monday	DAYOFWEEK:Saturday	DAYOFWEEK:Sunday	DAYOFWEEK:Thursday	DAYOFWEEK:Tuesday	DAYOFWEEK:Wednesday
1	0.1585152838	0.1585152838	0.1272925764	0.1279475983	0.1360262009	0.1447598253	0.1469432314
2	0.1472162741	0.1571199143	0.1279443255	0.1389186296	0.1501605996	0.1375802998	0.1410599572
3	0.1322668748	0.1570425283	0.1375341397	0.15060476	0.1320717909	0.1548966055	0.1355833008
4	0.15625	0.128125	0.146875	0.090625	0.125	0.1375	0.215625
5	0.1400665927	0.1607103219	0.1354051054	0.146281909	0.1389567148	0.138290788	0.1402885683
6	0.1318633809	0.1516068598	0.1518950857	0.1717826776	0.1242253927	0.1369073354	0.1317192679
7	0.1403867609	0.1461509855	0.1494979546	0.1580513202	0.1359241354	0.1374116772	0.1325771662
8	0.1309926929	0.1659240777	0.1407948672	0.162537872	0.1297451435	0.1325966851	0.1374086616

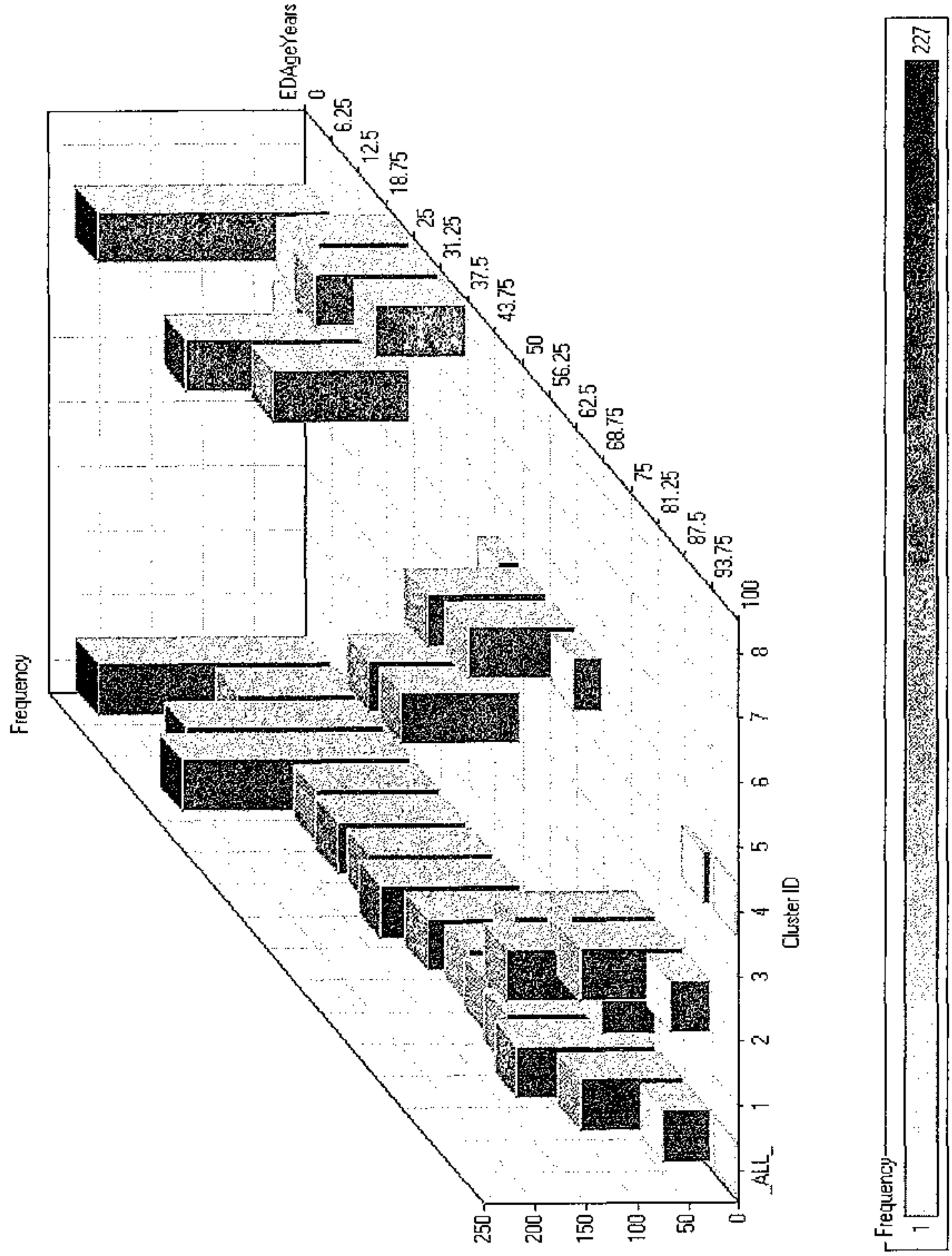
S9.2.57 Stats: TGA FULL Data Set – FIN YR 2007

CLUSTER INPUT MEANS PLOT



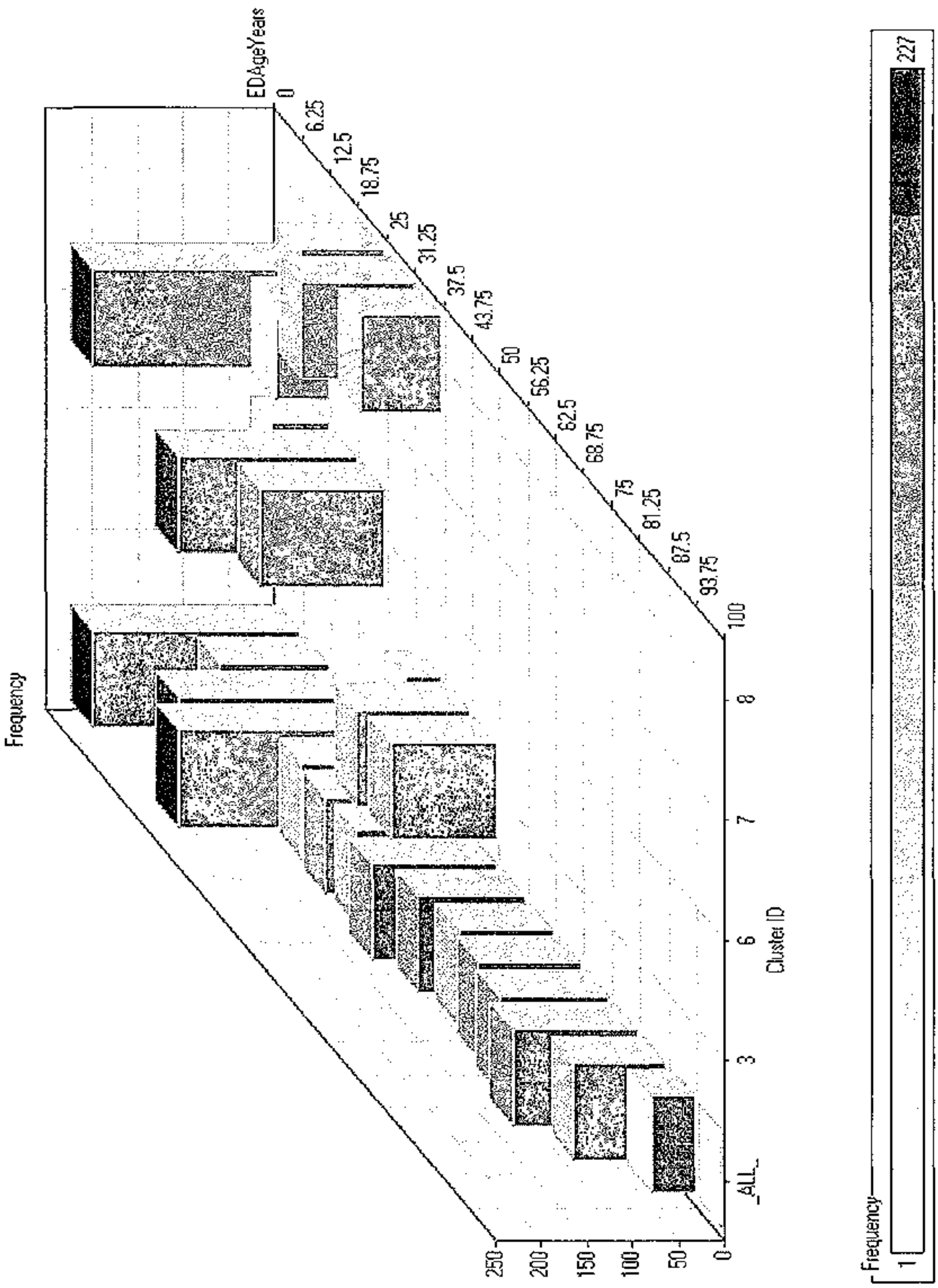
S9.2.58 Input Means Plot: TGA FULL Data Set – FIN YR 2007

CLUSTER PROFILES OF AGE – TGA FY 2007 - ALL EIGHT CLUSTERS



S9.2.59 Clusters Profile: TGA – FULL Fin Yr 2007 – Variable EDAgeYears

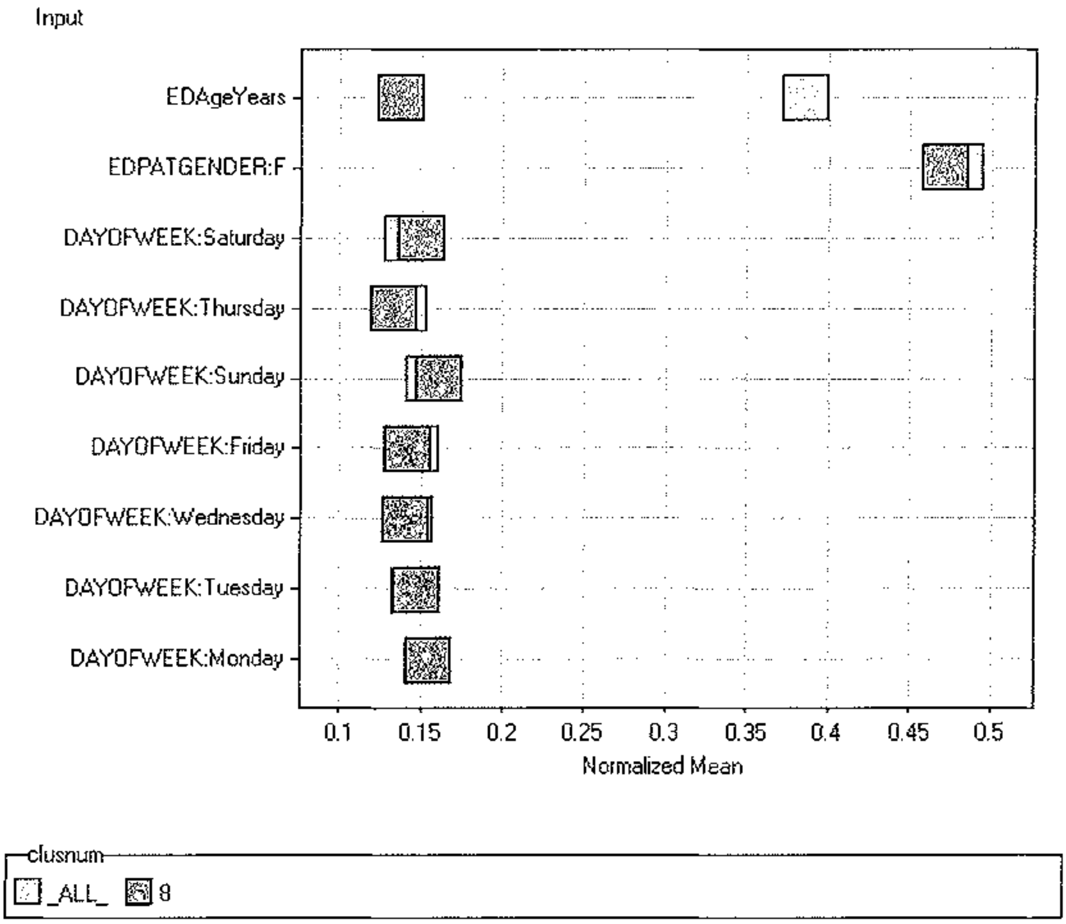
CLUSTER PROFILES OF AGE – TGA FY 2007 – FOUR HIGHEST FREQ CL'S



S9.2.60 Clusters Profile: TGA – FULL Fin Yr 2007 – Variable EDAgeYears

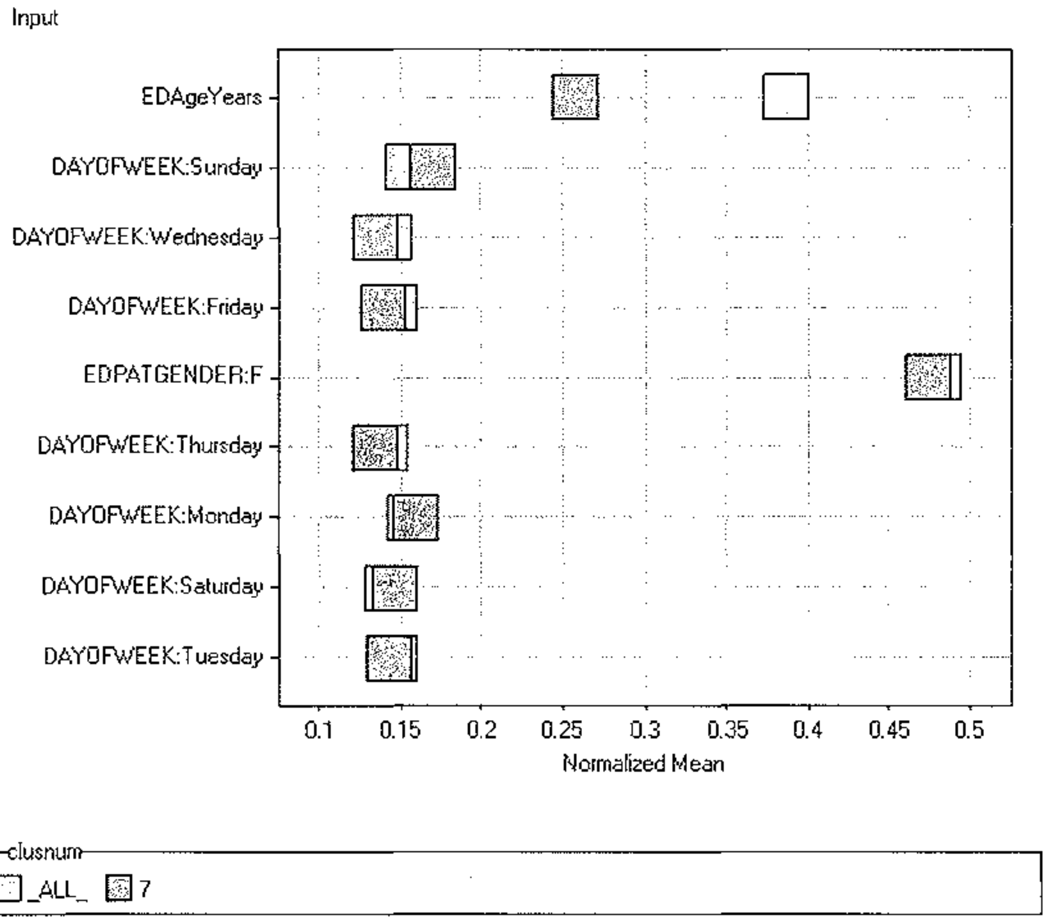
SINGLE CLUSTER INPUT MEANS PLOTS FOR TGA FULL DATA SET (OF FIN YEAR 2006)

CLUSTER INPUT MEANS PLOTS



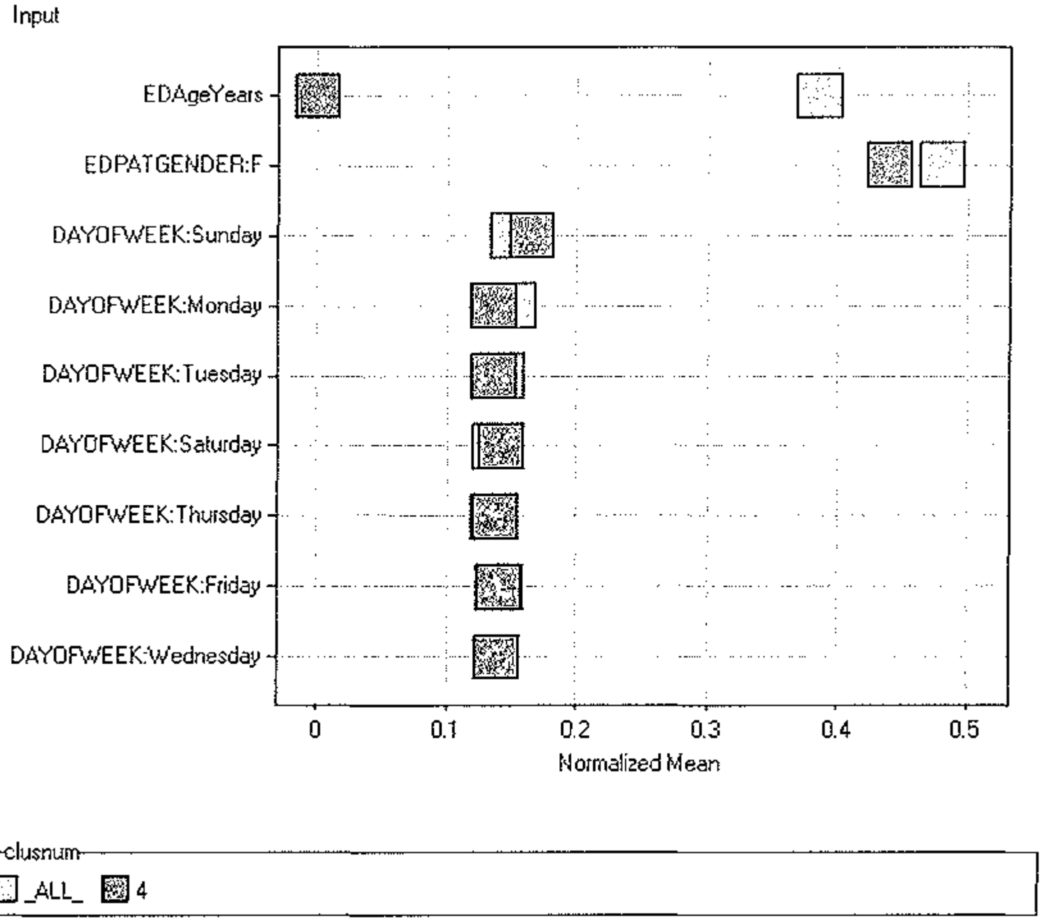
S9.2.61 Input Means Plot: TGA FULL Data Set – FIN YR 2006 – 1ST CL only / TOP Cluster only ["Teens" / "Young Adults"]

CLUSTER INPUT MEANS PLOT



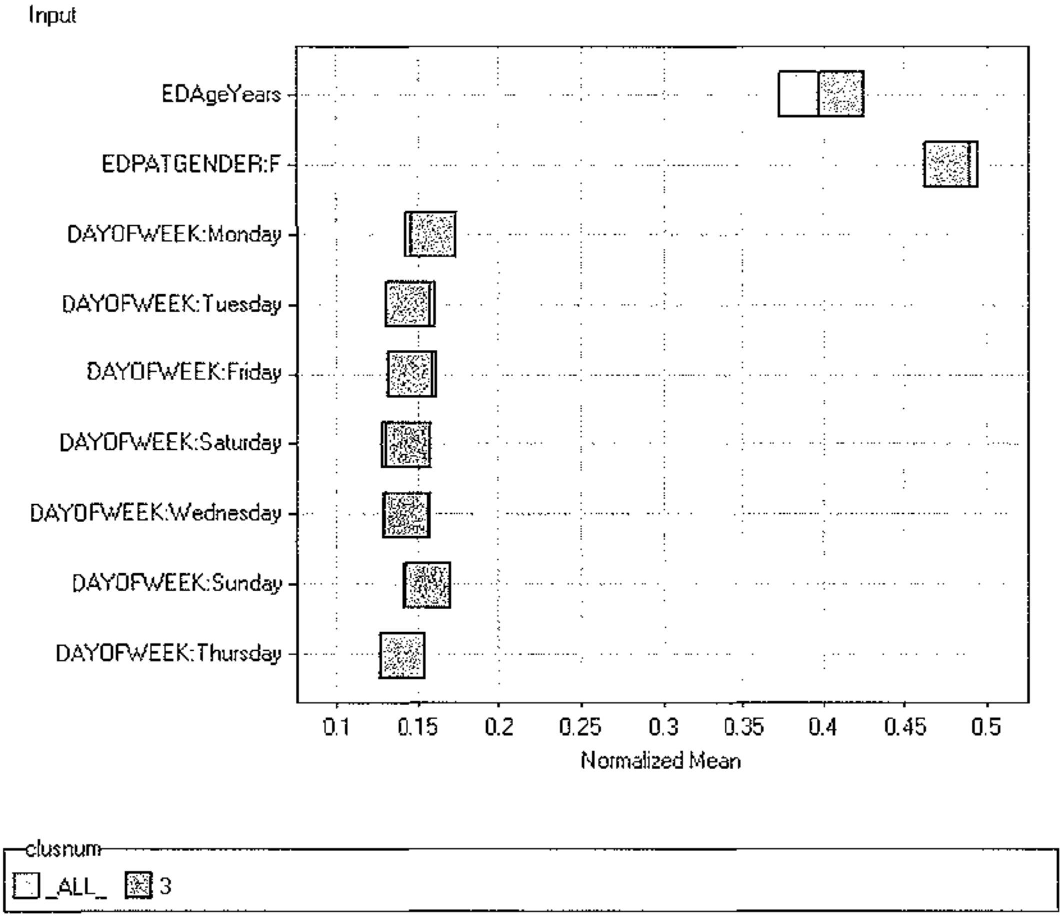
S9.2.62 Input Means Plot: TGA FULL Data Set – FIN YR 2006 – 2ND CL only ["Twenty-Something"]

CLUSTER INPUT MEANS PLOT



S9.2.63 Input Means Plot: TGA FULL Data Set – FIN YR 2006 – 3[RD] CL only ["Infants"]

CLUSTER INPUT MEANS PLOT



S9.2.64 Input Means Plot: TGA FULL Data Set – FIN YR 2006 – 4TH CL only ["Thirty- & Forty-Something"]

13.2 APPENDIX B3: RESULTS: CHAPTER 9.3

RESULTS HELD IN THIS APPENDIX

C9.3.1	C9.3.2	C9.3.3	C9.3.4	C9.3.5	C9.3.6
C9.3.7	C9.3.8	C9.3.9	C9.3.10	C9.3.11	C9.3.12
C9.3.13	C9.3.14	C9.3.15	C9.3.16	C9.3.17	C9.3.18
C9.3.19	C9.3.20	C9.3.21	C9.3.22	C9.3.23	C9.3.24
C9.3.25	C9.3.26	C9.3.27			

9.3 RESULTS: Using PART DS: PER DAY OF WEEK – DEMAND PER TIME OF DAY

- **(Postulate3)** Per Day of Week: To determine proportions of demand for ED services **per time of day**

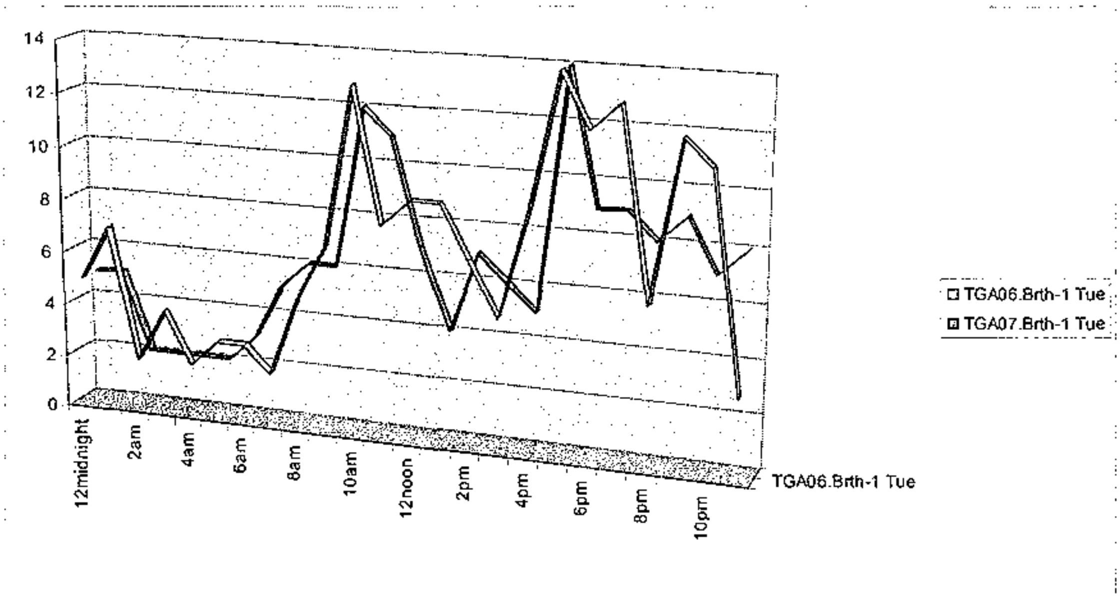
9.3.1 Using PART DS: FINDINGS

FINDINGS AND COMMENTS

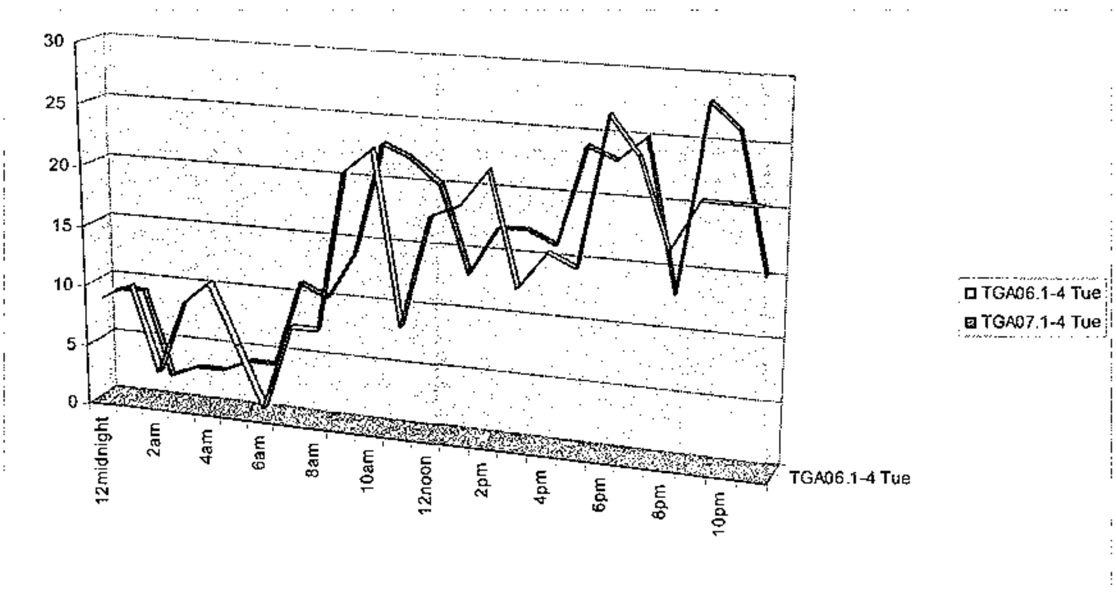
Cf. Earlier Pages **149 - 152**

9.3.2 Using PART DS: CUBE RESULTS

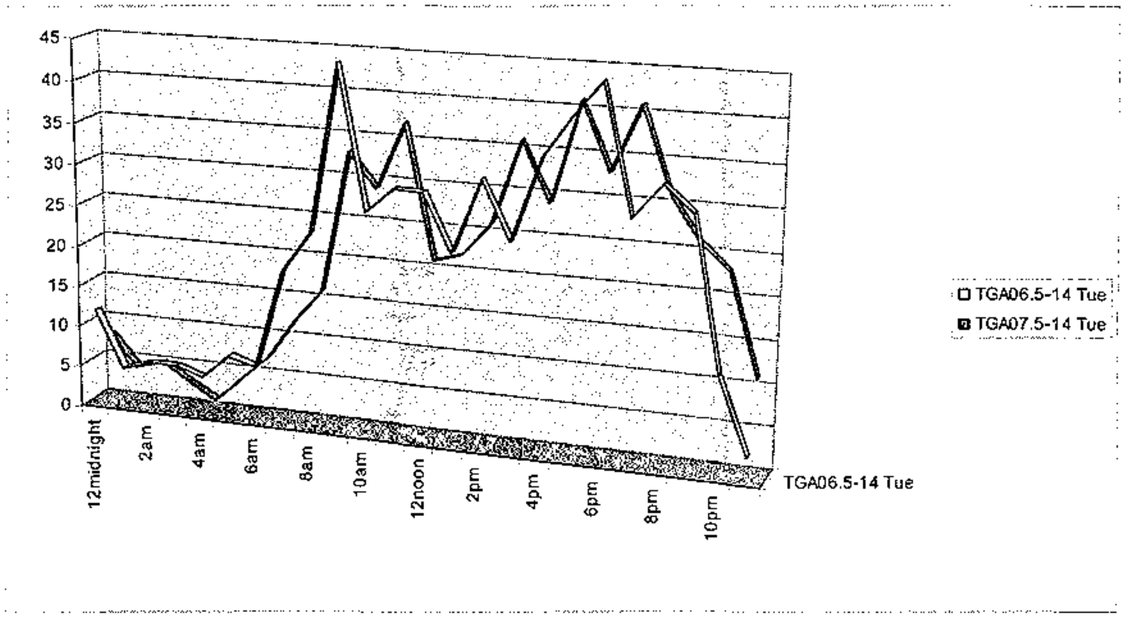
SUPERIMPOSED CHARTS OF TGA PER TIME OF DAY ON TUESDAYS FOR FIN YRS 2006 & 2007



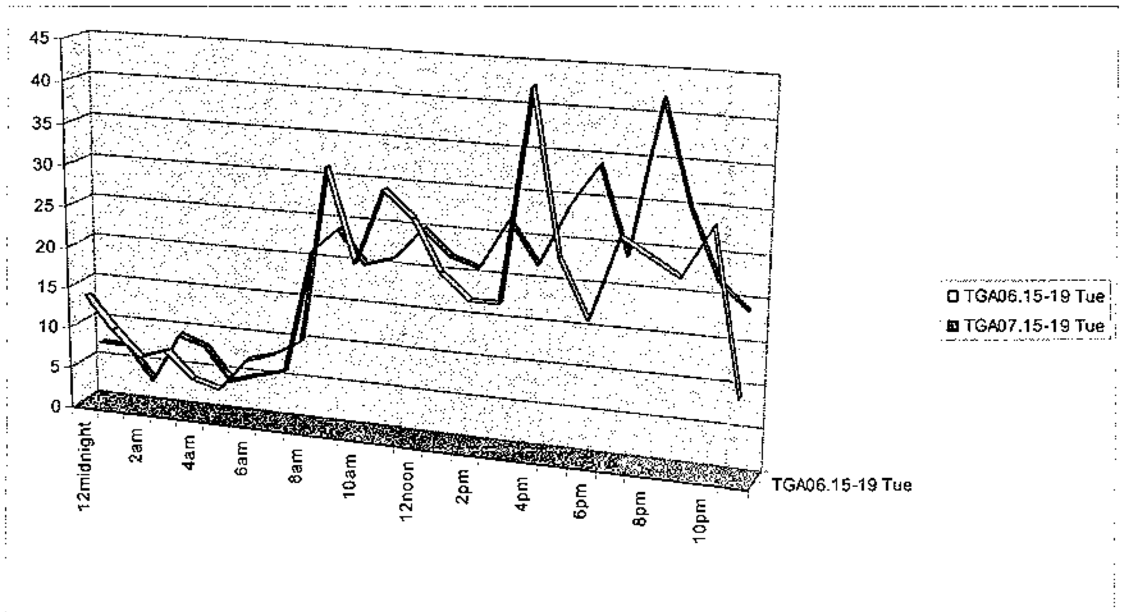
C9.3.1 Chart: TGA – FULL Fin Yrs 2006 & 2007 – Tuesdays only - Age Group: Under 1 Yr - Hr of Attendance



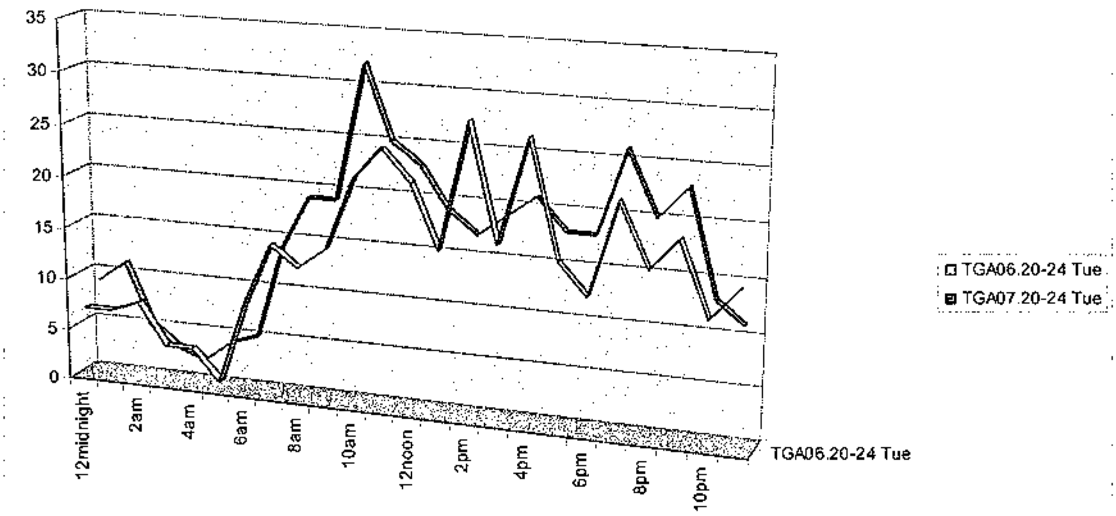
C9.3.2 Chart: TGA – FULL Fin Yrs 2006 & 2007 – Tuesdays only - Age Group: 1-4 Yrs - Hr of Attendance



C9.3.3 Chart: TGA – FULL Fin Yrs 2006 & 2007 – Tuesdays only - Age Group: 5-14 Yrs - Hr of Attendance

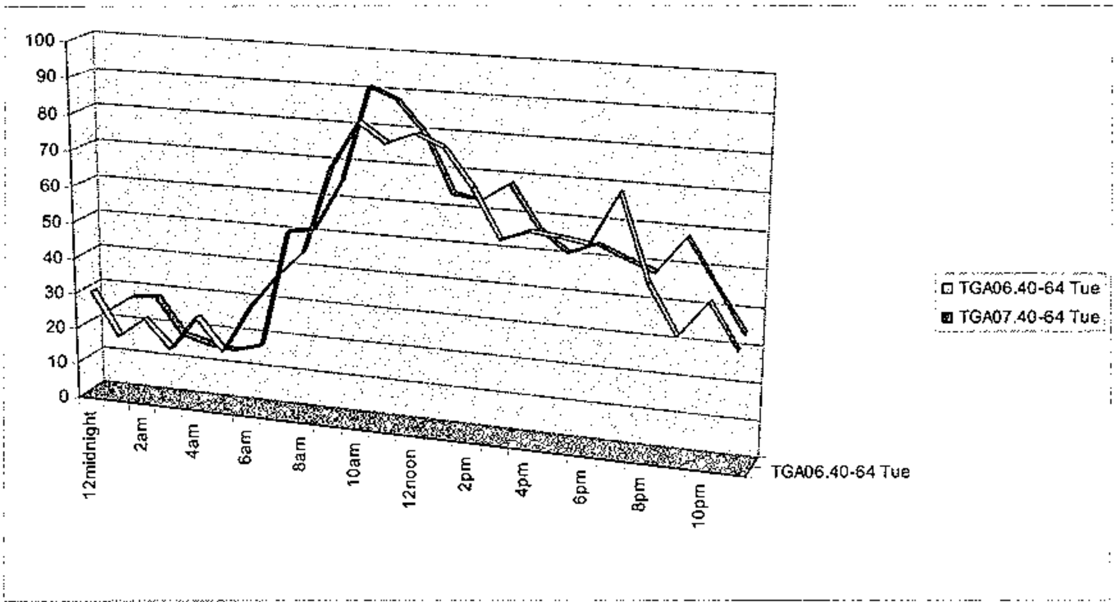


C9.3.4 Chart: TGA – FULL Fin Yrs 2006 & 2007 – Tuesdays only - Age Group: 15-19 Yrs - Hr of Attendance

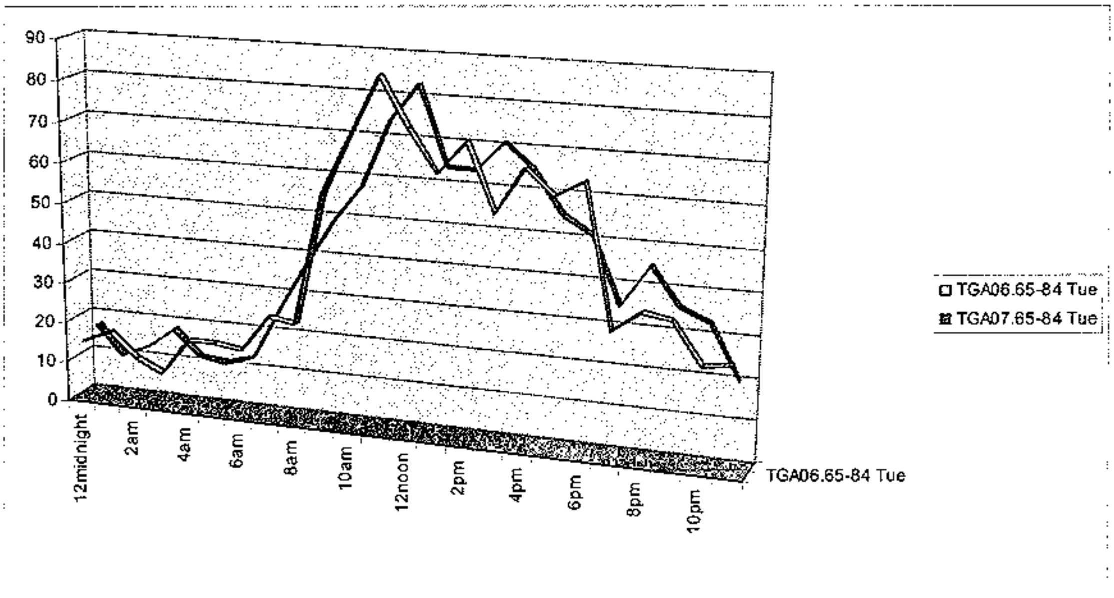


C9.3.5 Chart: TGA – FULL Fin Yrs 2006 & 2007 – Tuesdays only - Age Group: 20-24 Yrs - Hr of Attendance

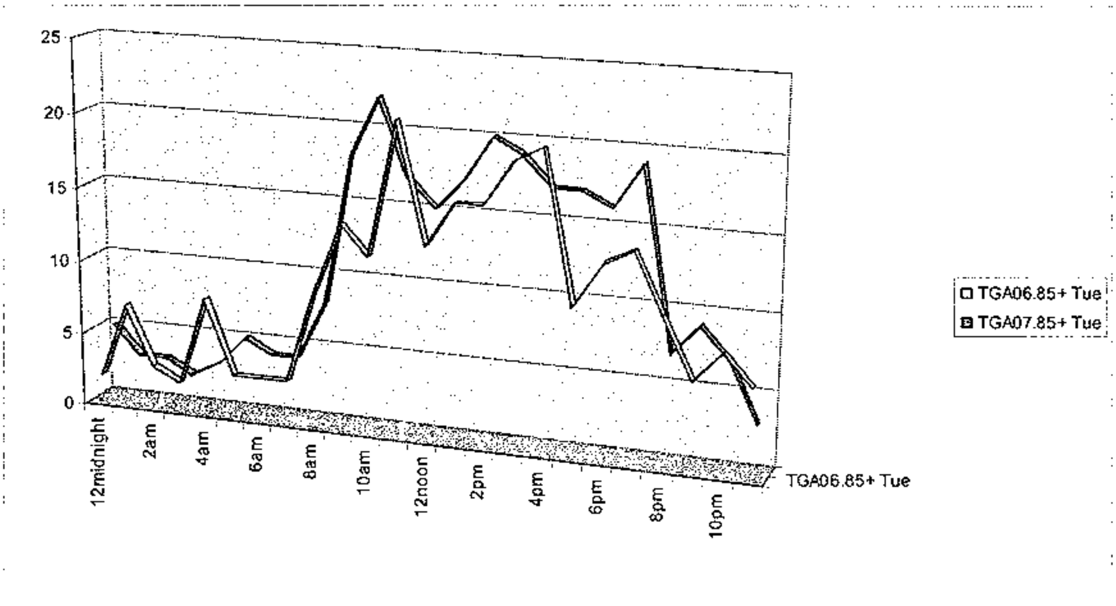
C9.3.6 Chart: TGA – FULL Fin Yrs 2006 & 2007 – Tuesdays only - Age Group: 20-39 Yrs - Hr of Attendance



C9.3.7 Chart: TGA – FULL Fin Yrs 2006 & 2007 – Tuesdays only - Age Group: 40-64 Yrs - Hr of Attendance

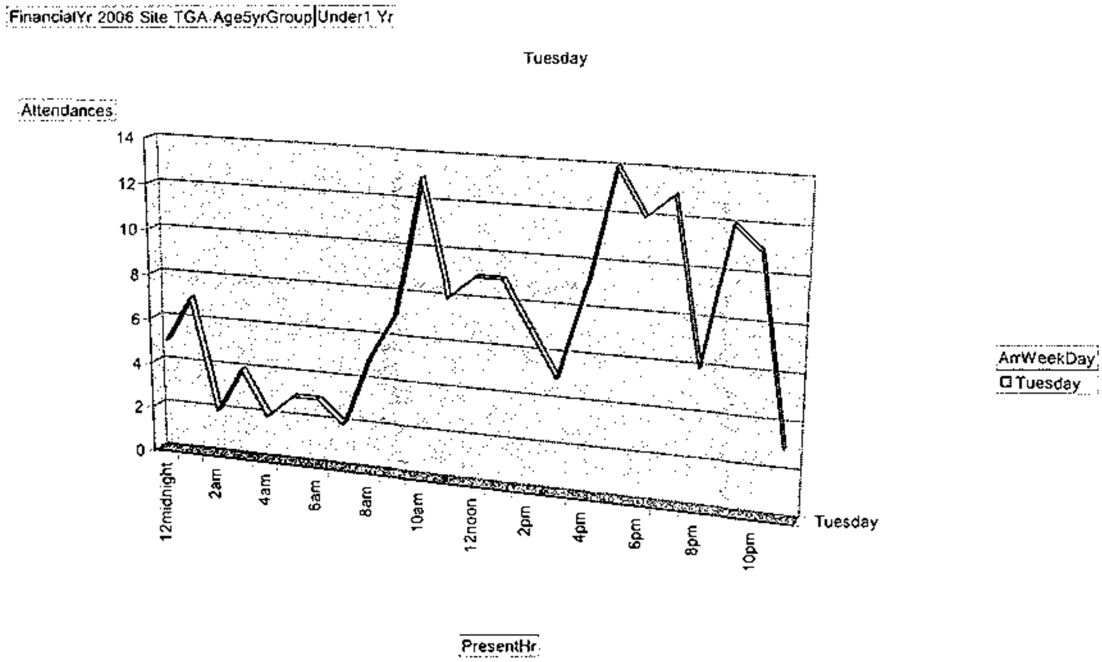


C9.3.8 Chart: TGA – FULL Fin Yrs 2006 & 2007 – Tuesdays only - Age Group: 65-84 Yrs - Hr of Attendance

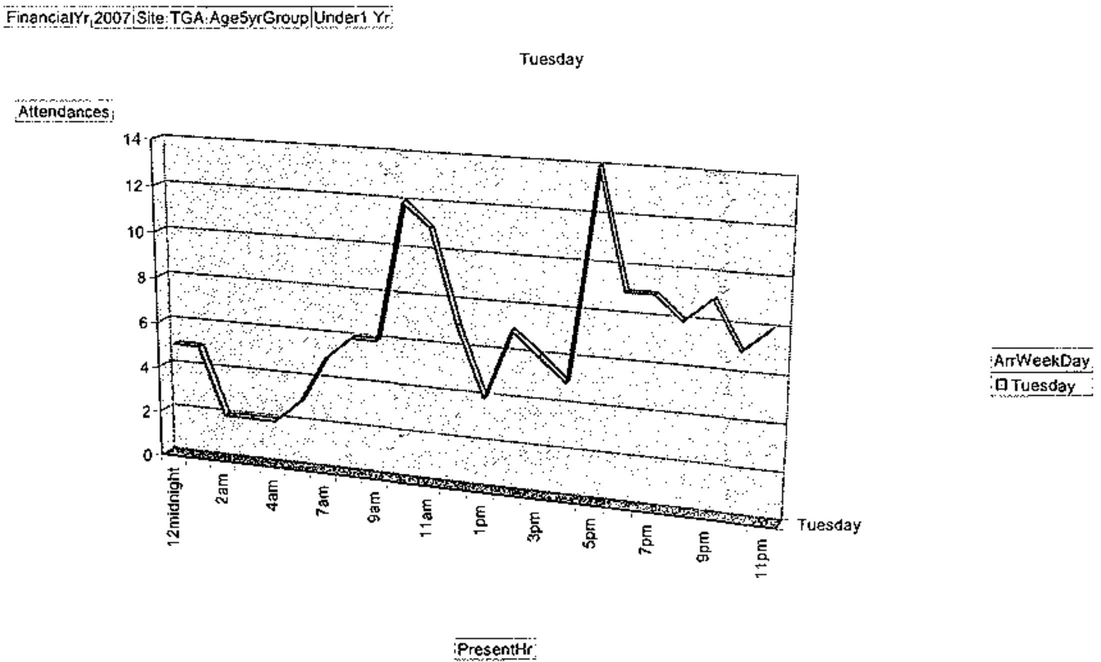


C9.3.9 Chart: TGA – FULL Fin Yrs 2006 & 2007 – Tuesdays only - Age Group: 85+ Yrs - Hr of Attendance

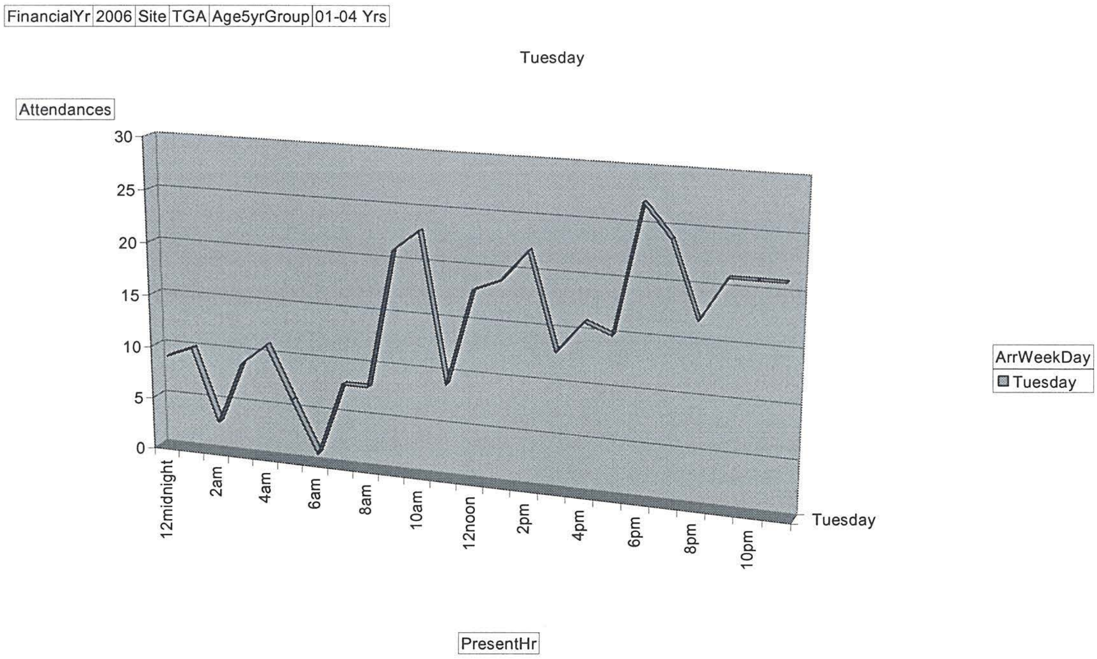
CHARTS OF TGA PER TIME OF DAY ON TUESDAYS FOR FIN YRS 2006 & 2007



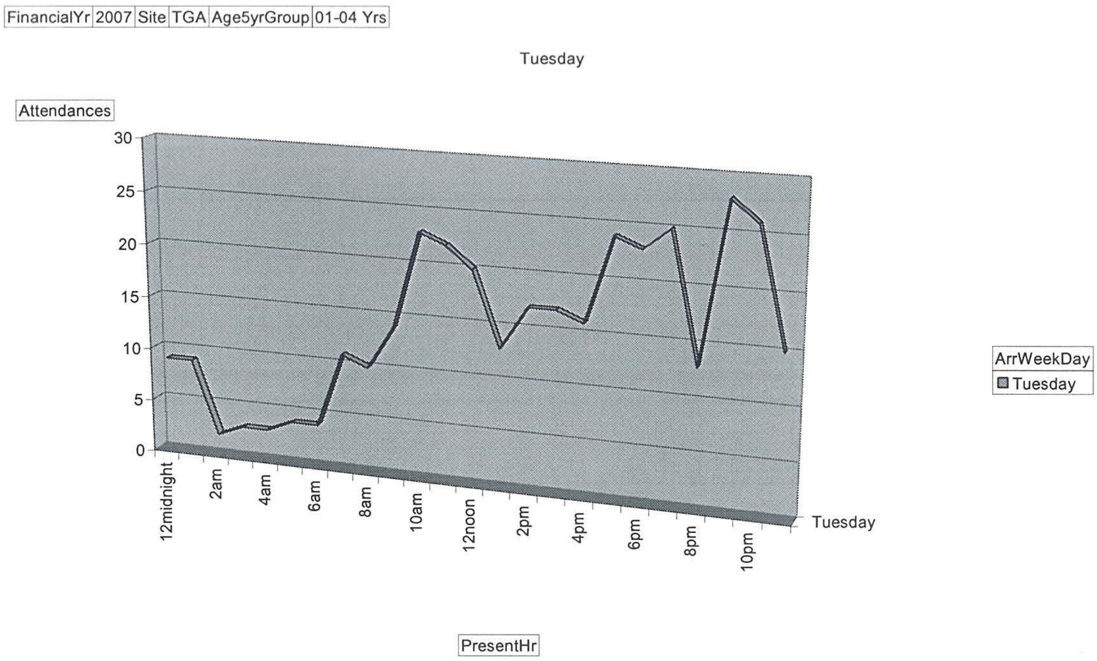
C9.3.10 Chart: TGA – FULL Fin Yr 2006 – Tuesdays only - Age Group: Under 1 Yr - Hr of Attendance



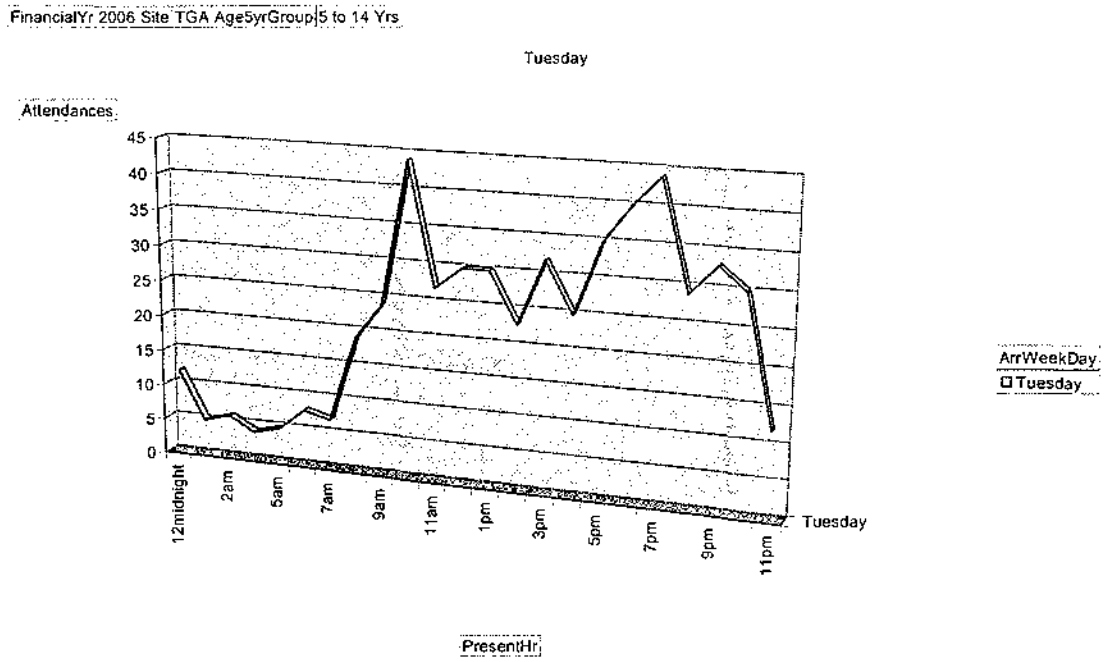
C9.3.11 Chart: TGA – FULL Fin Yr 2007 – Tuesdays only - Age Group: Under 1 Yr - Hr of Attendance



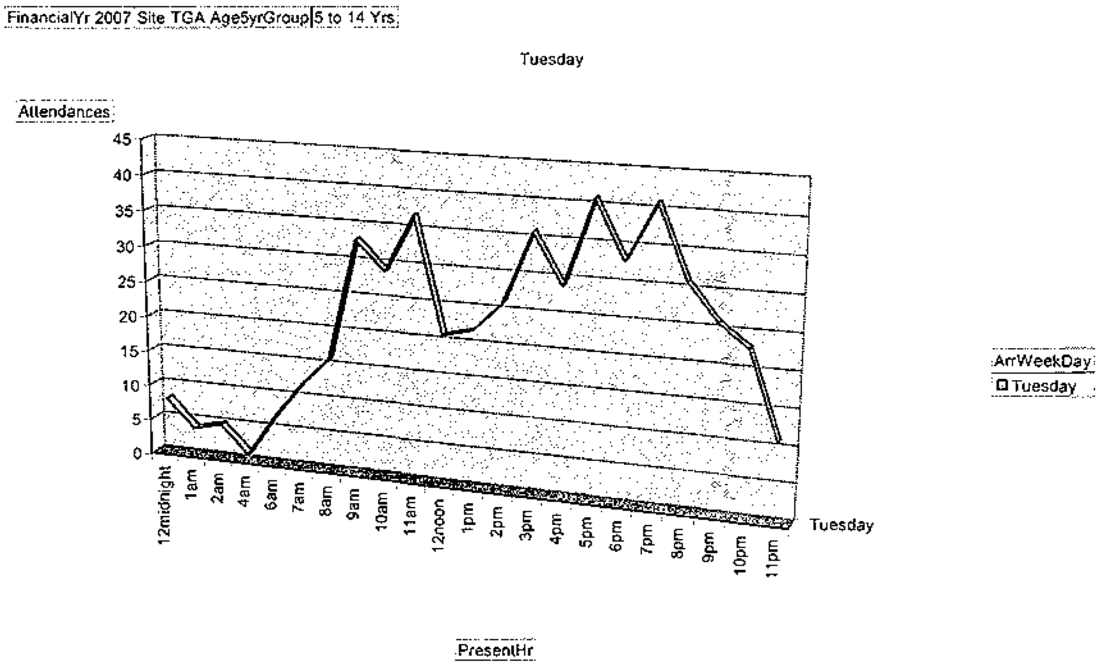
C9.3.12 Chart: TGA – FULL Fin Yr 2006 – Tuesdays only – Age Group: 1-4 Yrs - Hr of Attendance



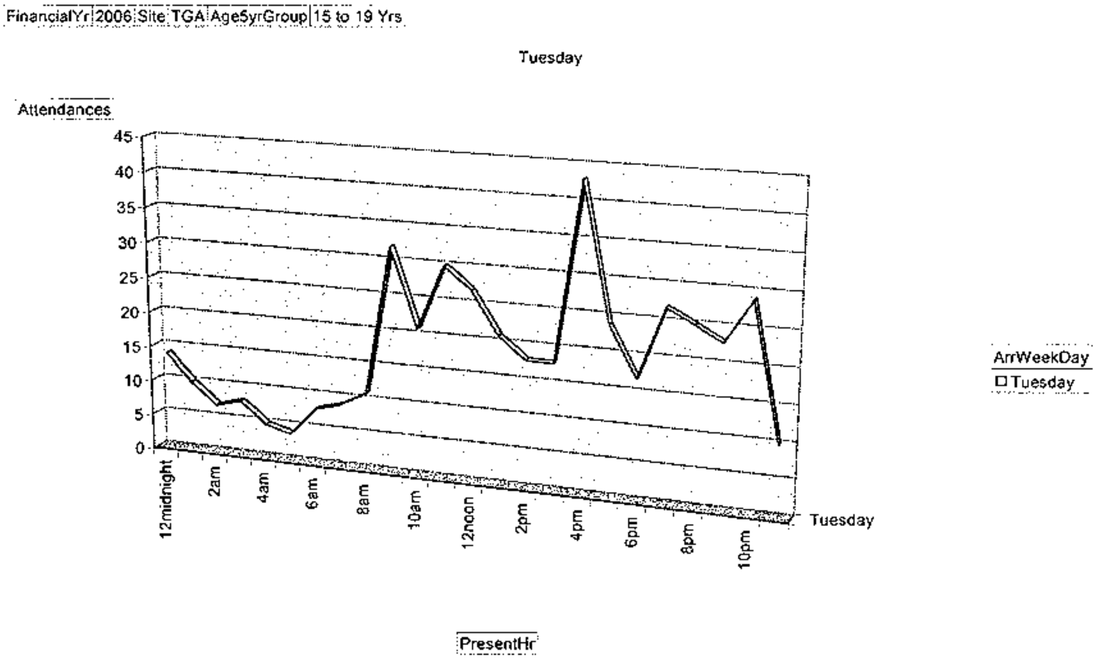
C9.3.13 Chart: TGA – FULL Fin Yr 2007 – Tuesdays only - Age Group: 1-4 Yrs - Hr of Attendance



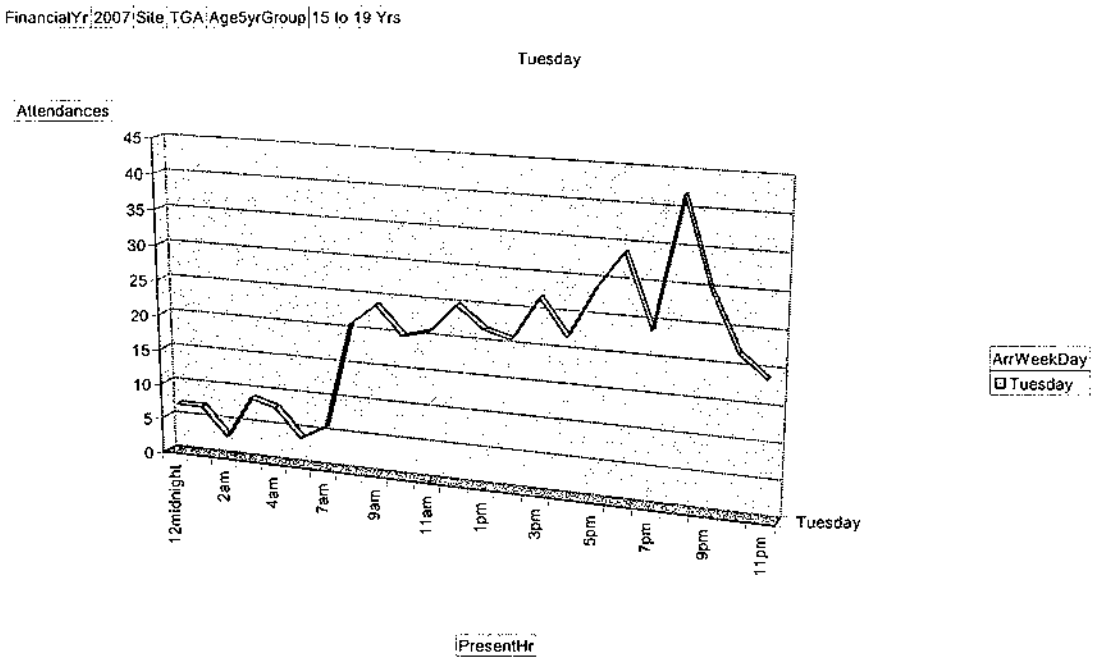
C9.3.14 Chart: TGA – FULL Fin Yr 2006 – Tuesdays only - Age Group: 5-14 Yrs - Hr of Attendance



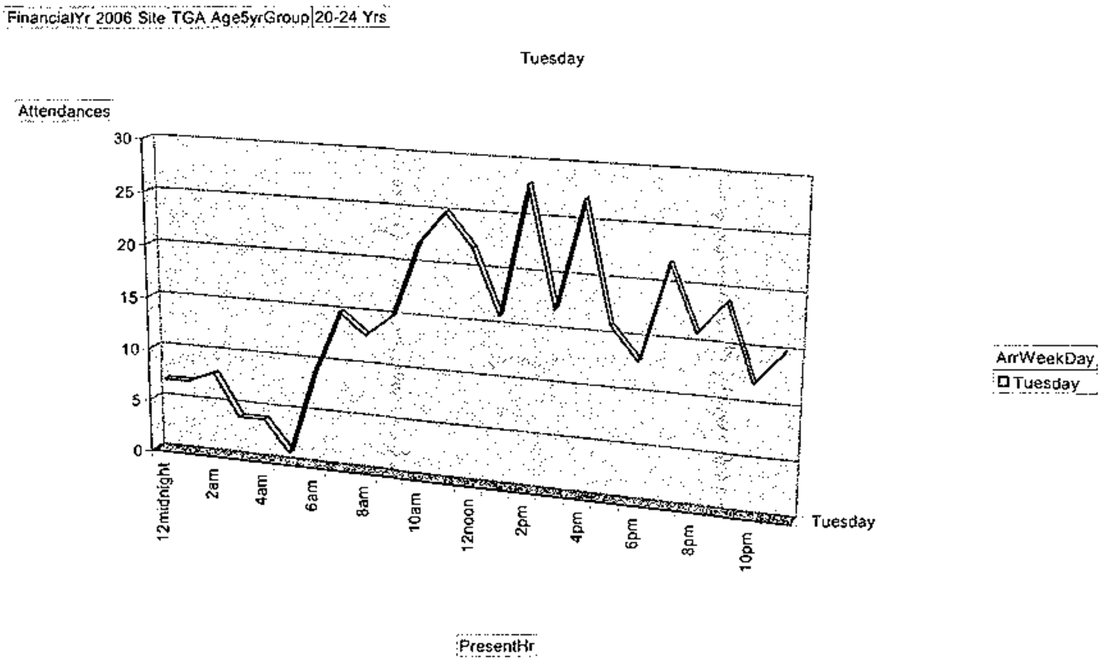
C9.3.15 Chart: TGA – FULL Fin Yr 2007 – Tuesdays only - Age Group: 5-14 Yrs - Hr of Attendance



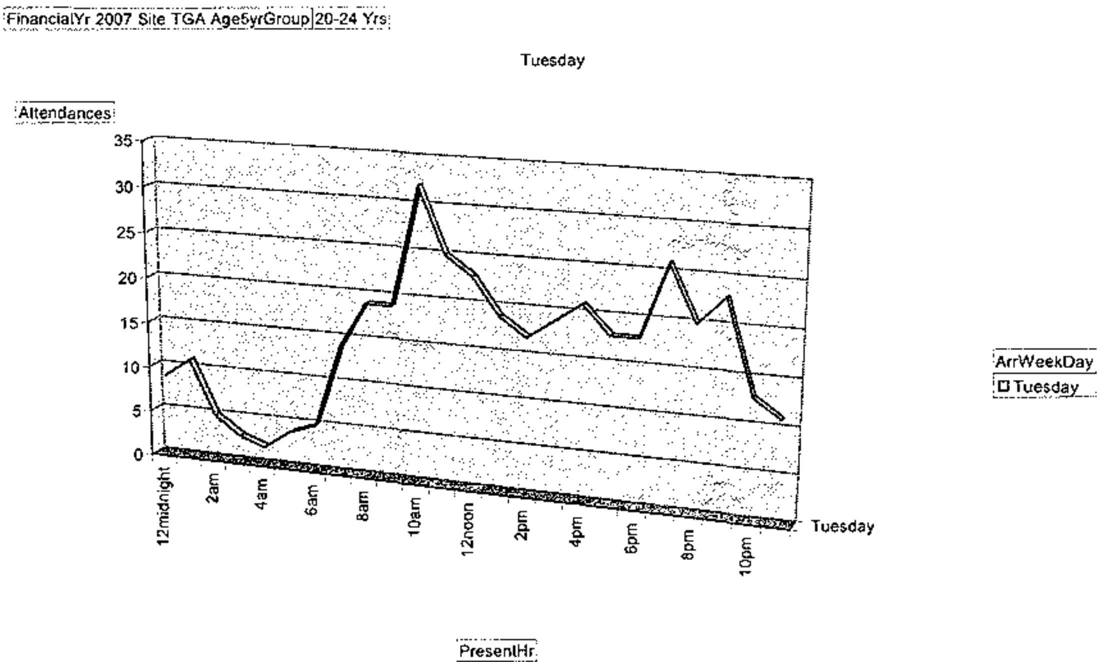
C9.3.16 Chart: TGA – FULL Fin Yr 2006 – Tuesdays only - Age Group: 15-19 Yrs - Hr of Attendance



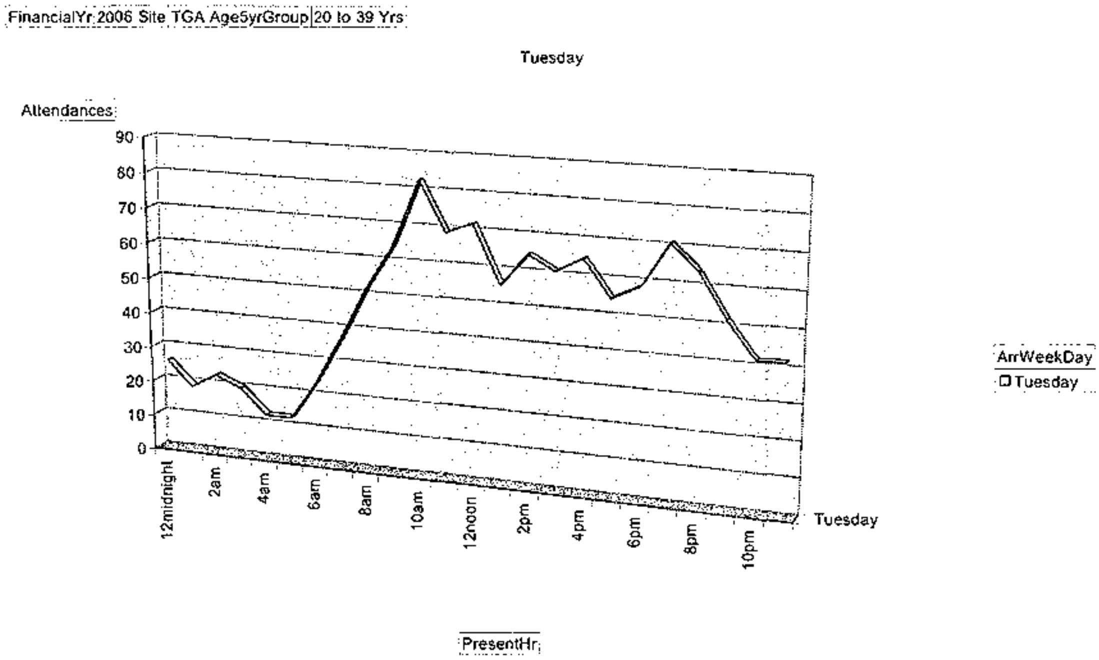
C9.3.17 Chart: TGA – FULL Fin Yr 2007 – Tuesdays only - Age Group: 15-19 Yrs - Hr of Attendance



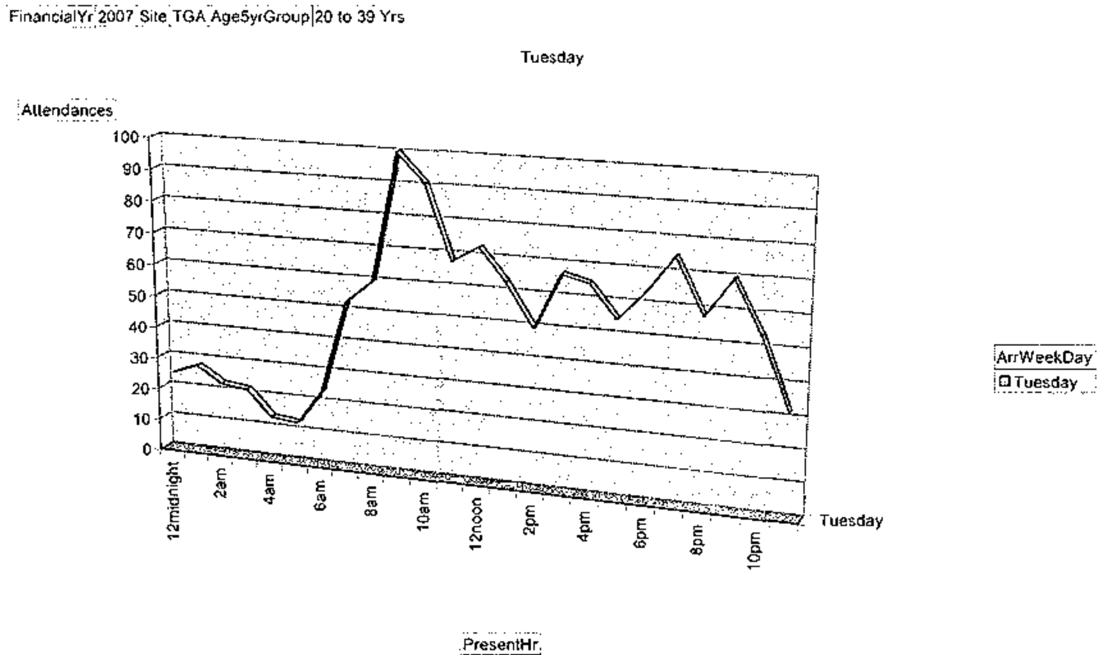
C9.3.18 Chart: TGA – FULL Fin Yr 2006 – Tuesdays only - Age Group: 20-24 Yrs - Hr of Attendance



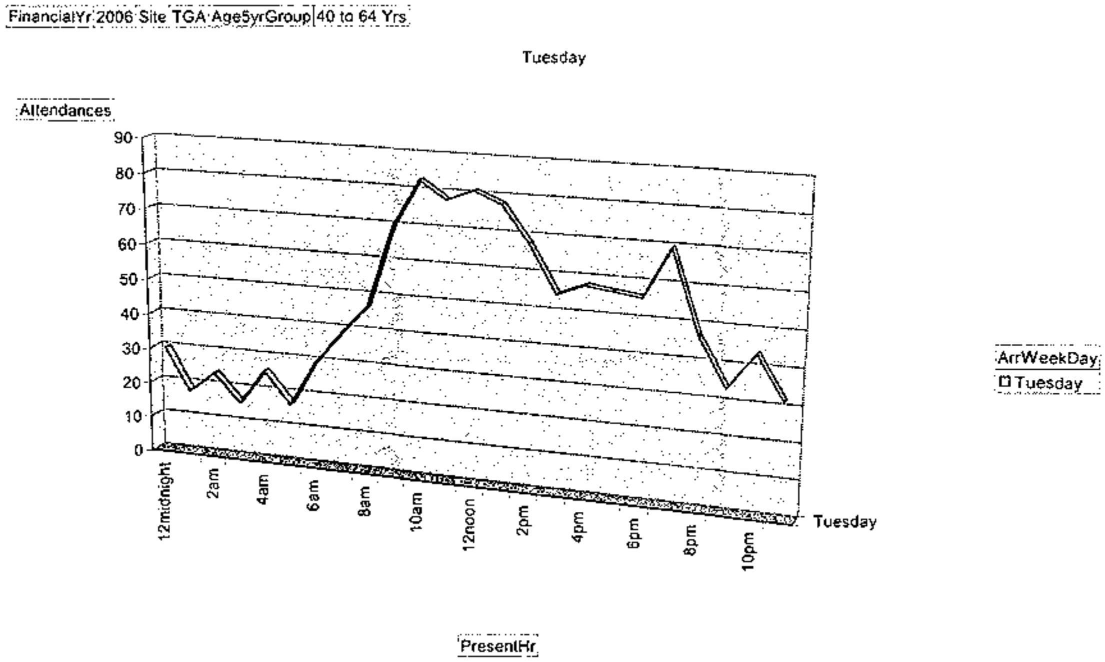
C9.3.19 Chart: TGA – FULL Fin Yr 2007 – Tuesdays only - Age Group: 20-24 Yrs - Hr of Attendance



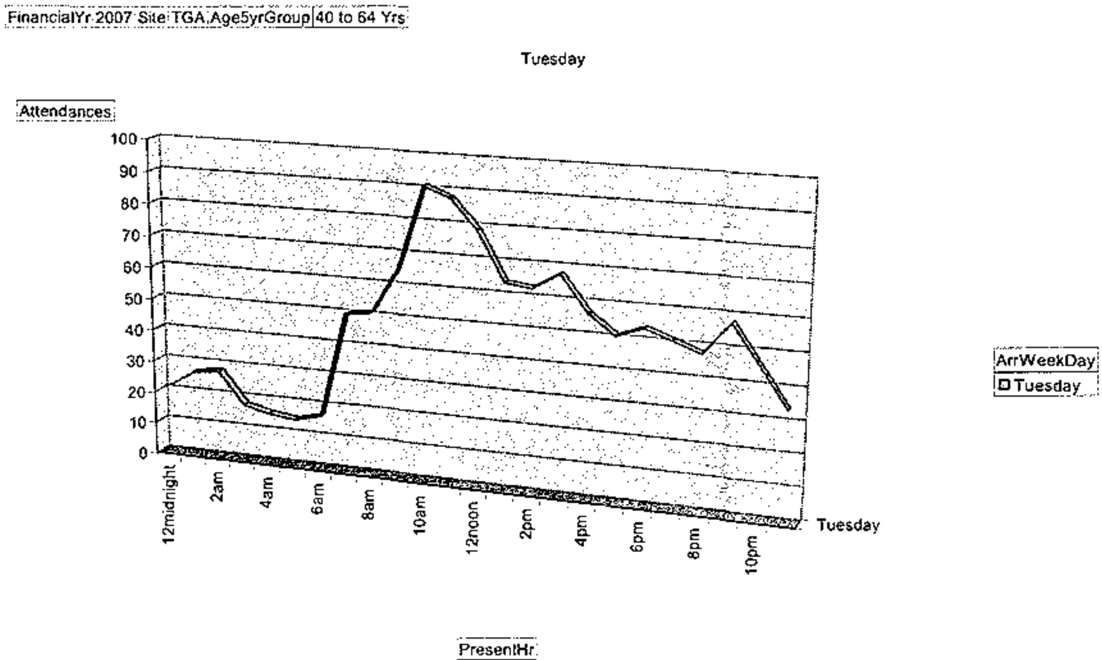
C9.3.20 Chart: TGA – FULL Fin Yr 2006 – Tuesdays only - Age Group: 20-39 Yrs - Hr of Attendance



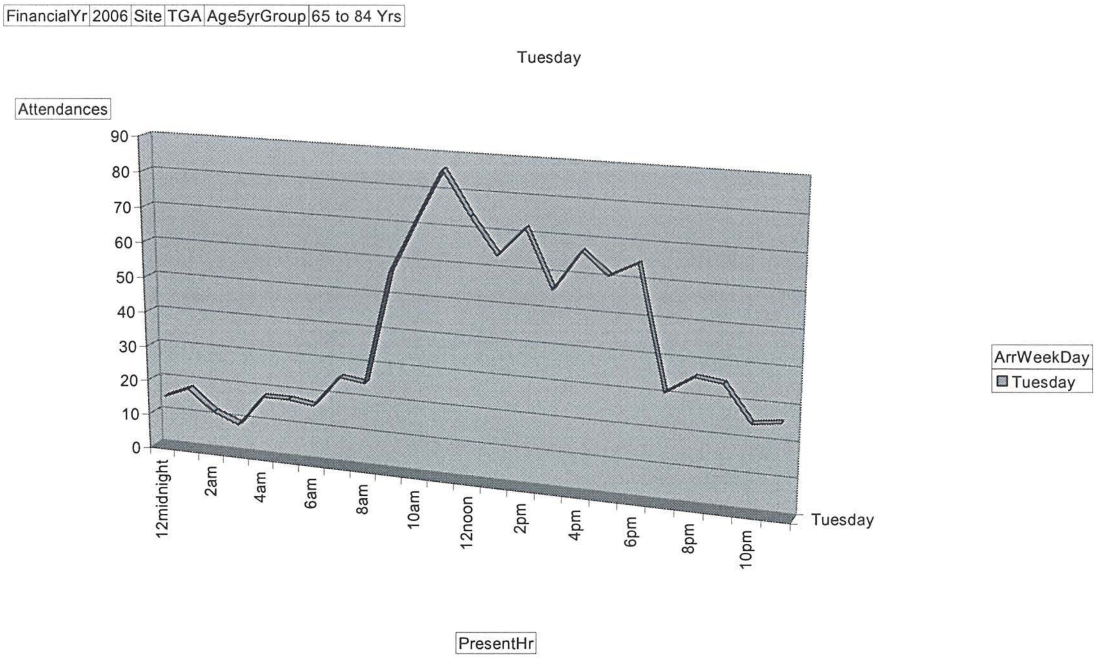
C9.3.21 Chart: TGA – FULL Fin Yr 2007 – Tuesdays only - Age Group: 20-39 Yrs - Hr of Attendance



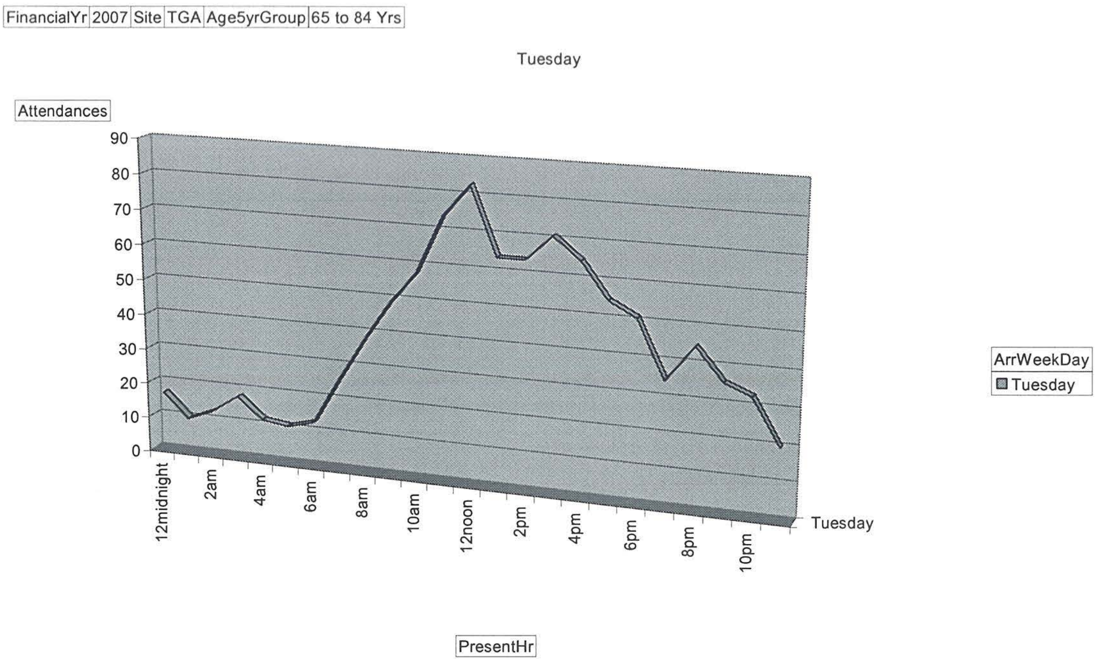
C9.3.22 Chart: TGA – FULL Fin Yr 2006 – Tuesdays only - Age Group: 40-64 Yrs - Hr of Attendance



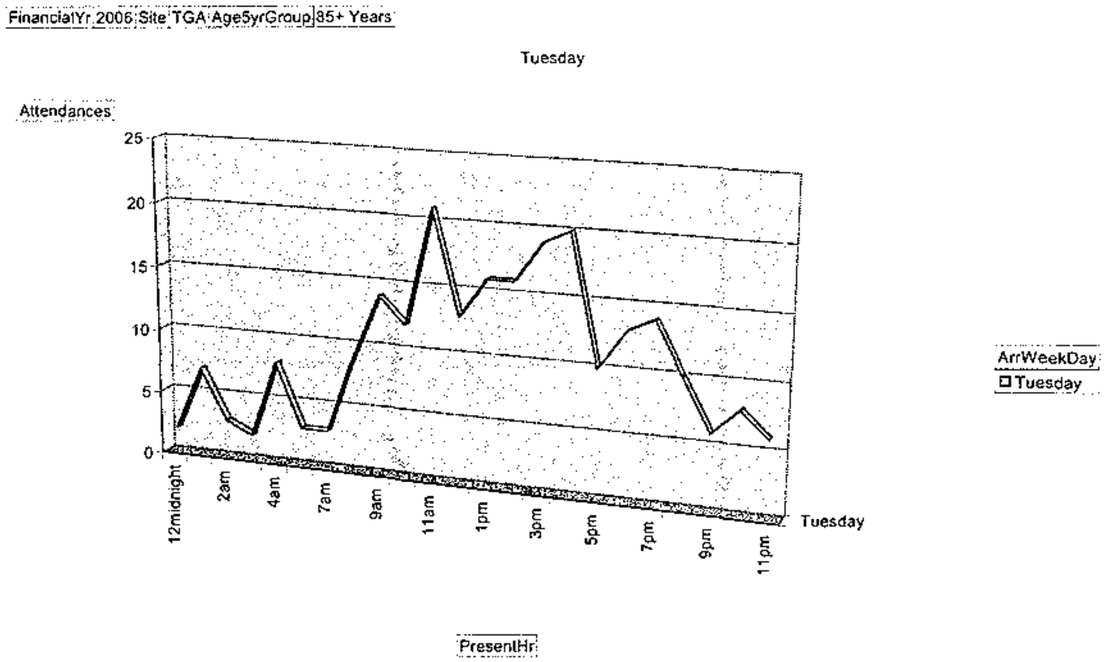
C9.3.23 Chart: TGA – FULL Fin Yr 2007 – Tuesdays only - Age Group: 40-64 Yrs - Hr of Attendance



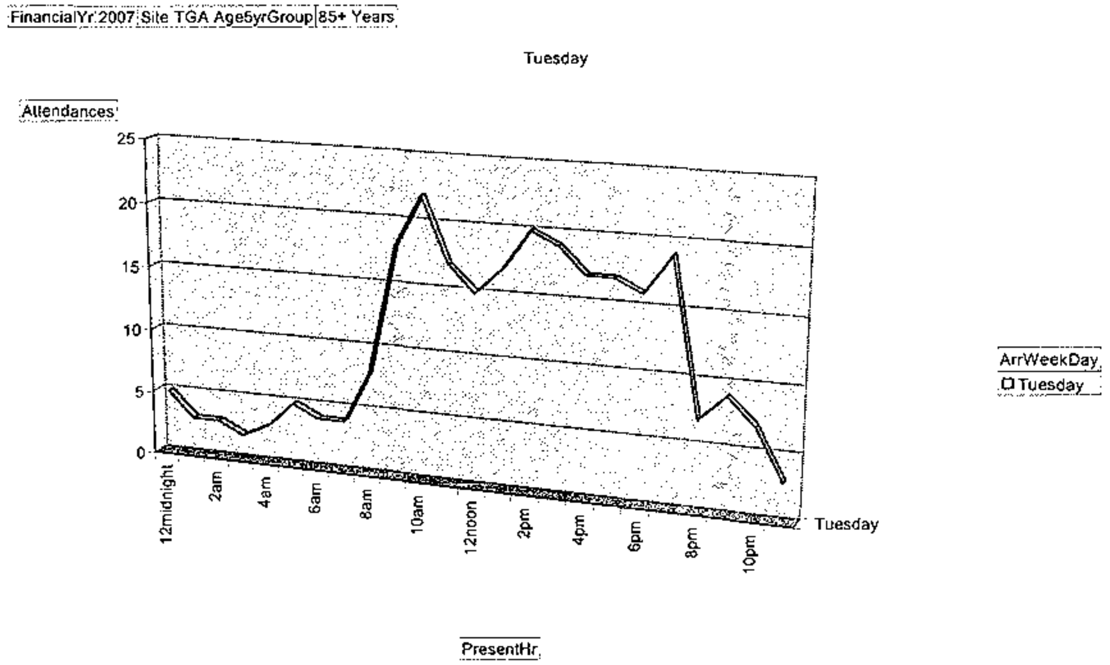
C9.3.24 Chart: TGA – FULL Fin Yr 2006 – Tuesdays only - Age Group: 65-84 Yrs - Hr of Attendance



C9.3.25 Chart: TGA – FULL Fin Yr 2007 – Tuesdays only - Age Group: 65-84 Yrs - Hr of Attendance



C9.3.26 Chart: TGA – FULL Fin Yr 2006 – Tuesdays only - Age Group: 85 Yrs plus - Hr of Attendance



C9.3.27 Chart: TGA – FULL Fin Yr 2007 – Tuesdays only - Age Group: 85 Yrs plus - Hr of Attendance

13.2 APPENDIX B4: RESULTS: CHAPTER 9.4

RESULTS HELD IN THIS APPENDIX

S9.4.1	**S9.4.2**	**S9.4.3**	**S9.4.4**	**S9.4.5**	**S9.4.6**
S9.4.7	**S9.4.8**	**S9.4.9**	**S9.4.10**	**S9.4.11**	**S9.4.12**
S9.4.13	**S9.4.14**	**S9.4.15**			

9.4 RESULTS: Using PART DS: PER SEASON - PREVALENCE OF TRIAGE RATINGS PER DAY OF WEEK

- **(Postulate4)** Per Season: To determine prevalence of various **Triage** / "urgency" ratings **per Day of Week**

9.4.1 Using PART DS: FINDINGS

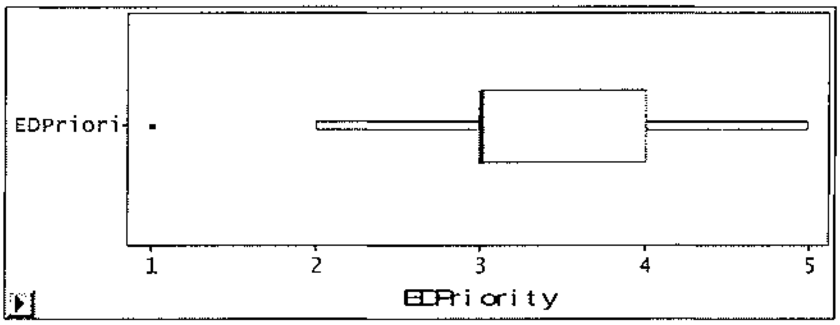
FINDINGS AND COMMENTS

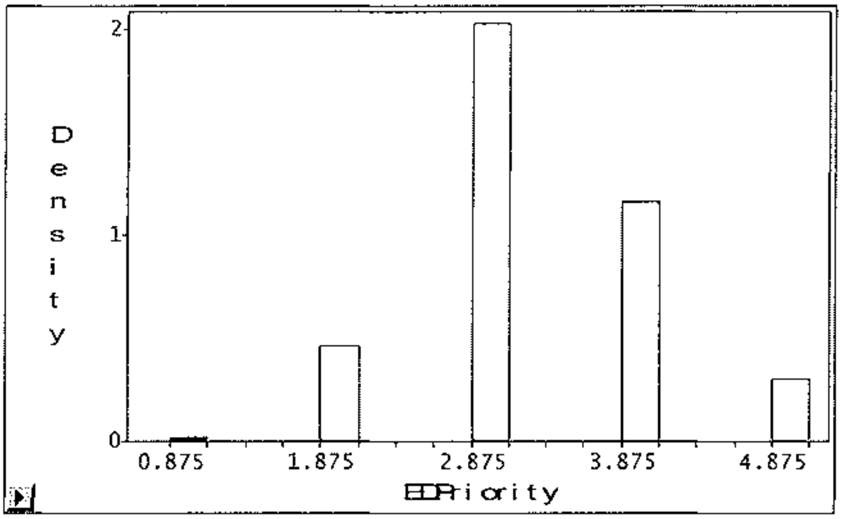
Cf. Earlier Pages **153 - 161**

9.4.2 Using PART DS: SAS RESULTS

TGA: Priority by T, V & T
EDData200507
TRAINING:

EDPriority





Moments

N	1144.0000	Sum Wgts	1144.0000
Mean	3.3138	Sum	3791.0000
Std Dev	0.8015	Variance	0.6425
Skewness	0.1809	Kurtosis	-0.0066
USS	13297.0000	CSS	734.3418
CV	24.1879	Std Mean	0.0237

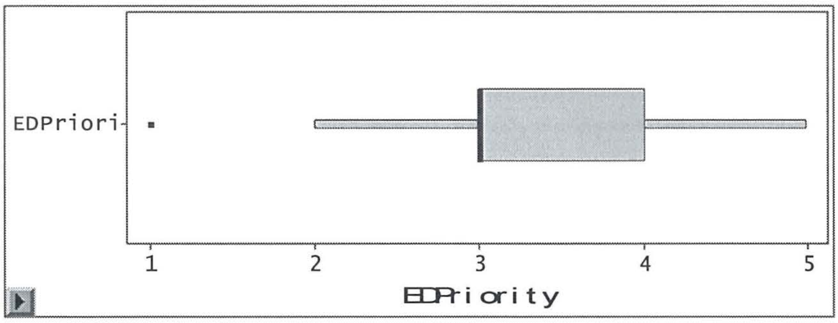
Quantiles

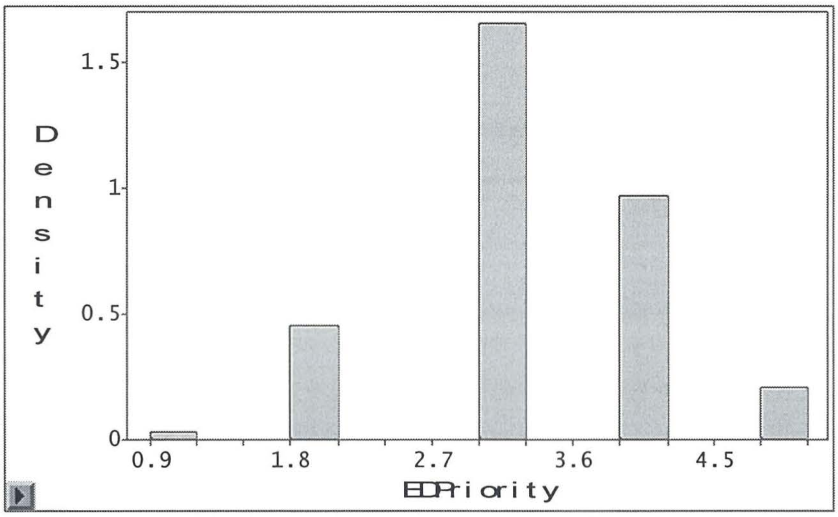
100% Max	5.0000	99.0%	5.0000
75% Q3	4.0000	97.5%	5.0000
50% Med	3.0000	95.0%	5.0000
25% Q1	3.0000	90.0%	4.0000
0% Min	1.0000	10.0%	2.0000
Range	4.0000	5.0%	2.0000
Q3-Q1	1.0000	2.5%	2.0000
Mode	3.0000	1.0%	2.0000

S9.4.1 Box Plot & Dist: TGA TRN DS - JUL 2005 Triage dist of ED Present's

TGA: Priority by T, V & T
EDData200507
VALIDATION:

EDPriority





Moments

N	858.0000	Sum Wgts	858.0000
Mean	3.2634	Sum	2800.0000
Std Dev	0.8087	Variance	0.6540
Skewness	0.1093	Kurtosis	-0.0256
USS	9698.0000	CSS	560.4709
CV	24.7808	Std Mean	0.0276

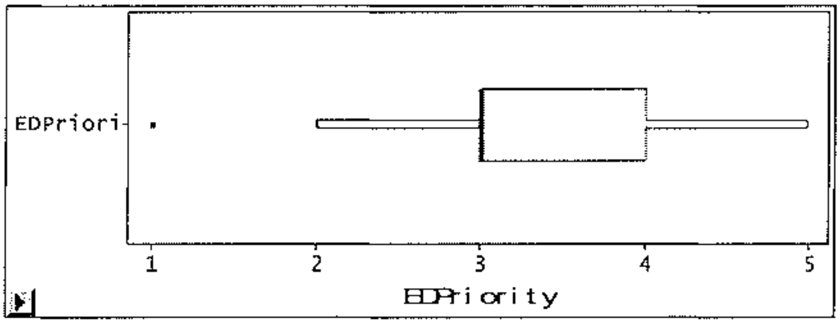
Quantiles

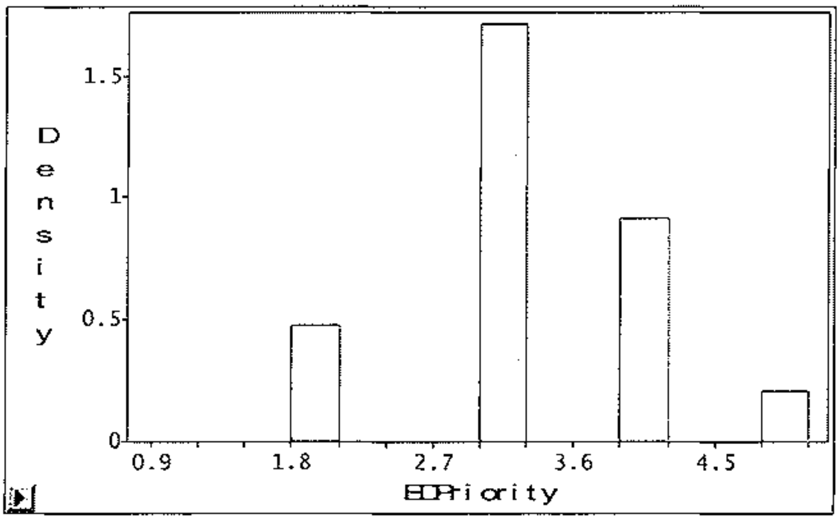
100% Max	5.0000	99.0%	5.0000
75% Q3	4.0000	97.5%	5.0000
50% Med	3.0000	95.0%	5.0000
25% Q1	3.0000	90.0%	4.0000
0% Min	1.0000	10.0%	2.0000
Range	4.0000	5.0%	2.0000
Q3-Q1	1.0000	2.5%	2.0000
Mode	3.0000	1.0%	2.0000

S9.4.2 Box Plot & Dist: TGA VAL DS - JUL 2005 Triage dist of ED Present's

TGA: Priority by T, V & T
EDData200507
TEST:

EDPriority





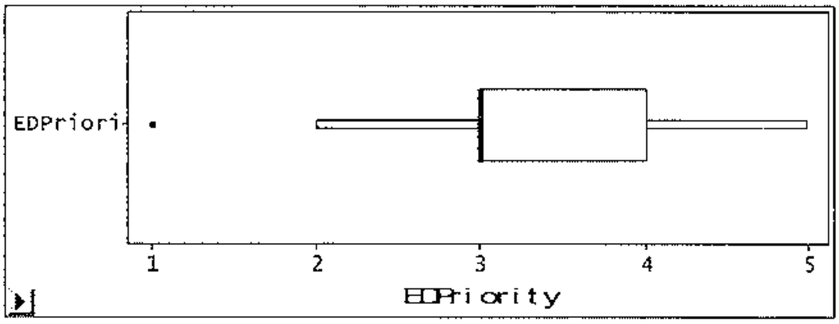
Moments			
N	857.0000	Sum Wgts	857.0000
Mean	3.2532	Sum	2788.0000
Std Dev	0.7854	Variance	0.6169
Skewness	0.2754	Kurtosis	-0.1265
USS	9598.0000	CSS	528.0537
CV	24.1429	Std Mean	0.0268

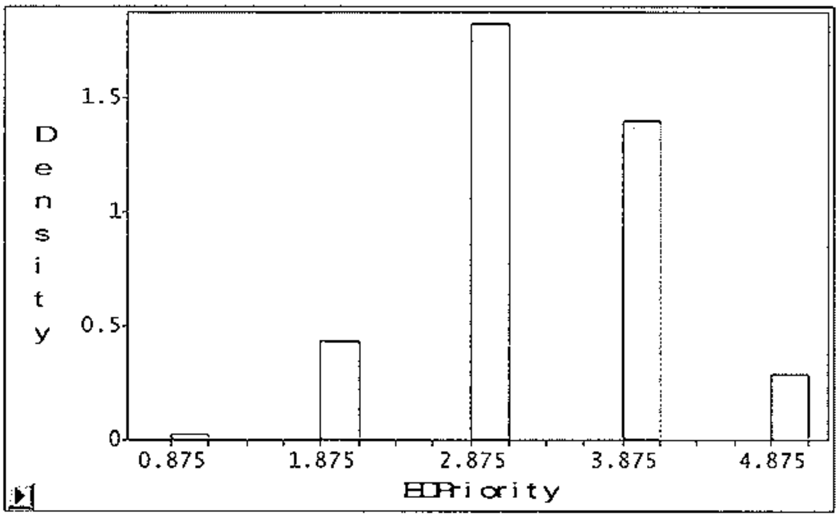
Quantiles			
100% Max	5.0000	99.0%	5.0000
75% Q3	4.0000	97.5%	5.0000
50% Med	3.0000	95.0%	5.0000
25% Q1	3.0000	90.0%	4.0000
0% Min	1.0000	10.0%	2.0000
Range	4.0000	5.0%	2.0000
Q3-Q1	1.0000	2.5%	2.0000
Mode	3.0000	1.0%	2.0000

S9.4.3 <u>Box Plot & Dist</u>: TGA TST DS - JUL 2005 Triage dist of ED Present's

TGA: Priority by T, V & T
EDData200607
TRAINING:

EDPriority





Moments

N	1238.0000	Sum Wgts	1238.0000
Mean	3.3740	Sum	4177.0000
Std Dev	0.8011	Variance	0.6417
Skewness	-0.0101	Kurtosis	-0.0995
USS	14887.0000	CSS	793.8425
CV	23.7432	Std Mean	0.0228

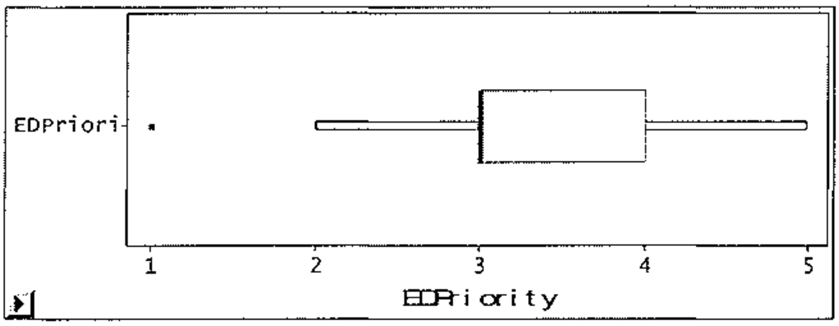
Quantiles

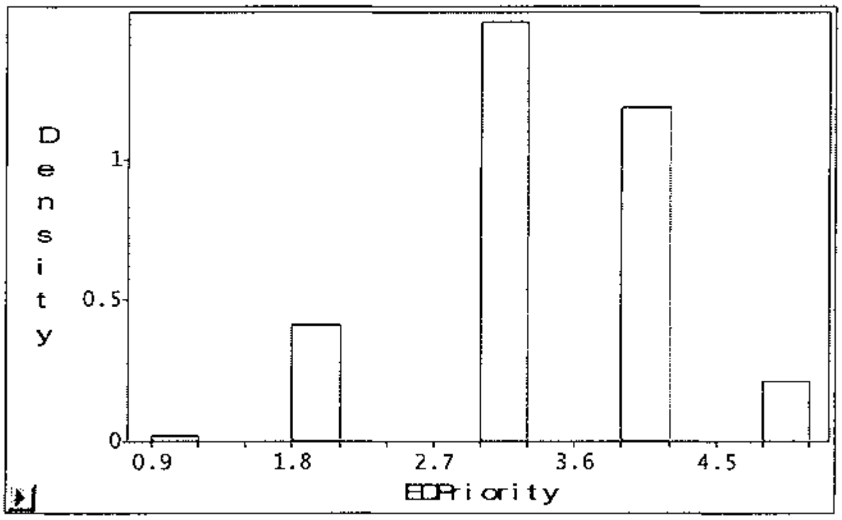
100% Max	5.0000	99.0%	5.0000
75% Q3	4.0000	97.5%	5.0000
50% Med	3.0000	95.0%	5.0000
25% Q1	3.0000	90.0%	4.0000
0% Min	1.0000	10.0%	2.0000
Range	4.0000	5.0%	2.0000
Q3-Q1	1.0000	2.5%	2.0000
Mode	3.0000	1.0%	2.0000

S9.4.4 Box Plot & Dist: TGA TRN DS - JUL 2006 Triage dist of ED Present's

TGA: Priority by T, V & T
EDData200607
VALIDATION:

EDPriority





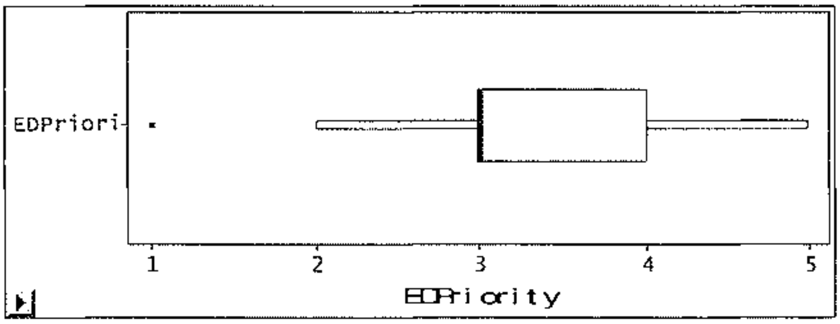
Moments			
N	929.0000	Sum Wgts	929.0000
Mean	3.3466	Sum	3109.0000
Std Dev	0.8043	Variance	0.6470
Skewness	-0.0353	Kurtosis	-0.2078
USS	11005.0000	CSS	600.3918
CV	24.0347	Std Mean	0.0264

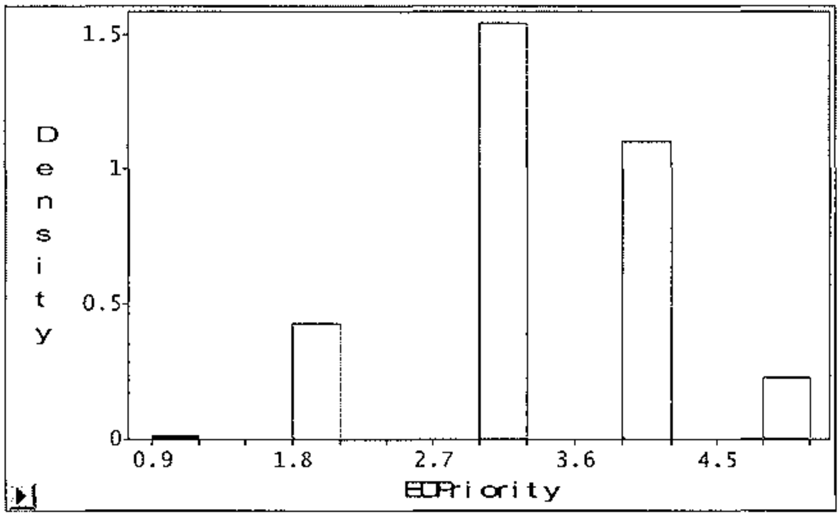
Quantiles			
100% Max	5.0000	99.0%	5.0000
75% Q3	4.0000	97.5%	5.0000
50% Med	3.0000	95.0%	5.0000
25% Q1	3.0000	90.0%	4.0000
0% Min	1.0000	10.0%	2.0000
Range	4.0000	5.0%	2.0000
Q3-Q1	1.0000	2.5%	2.0000
Mode	3.0000	1.0%	2.0000

S9.4.5 Box Plot & Dist: TGA VAL DS - JUL 2006 Triage dist of ED Present's

TGA: Priority by T, V & I
EDData200607
TEST:

EDPriority





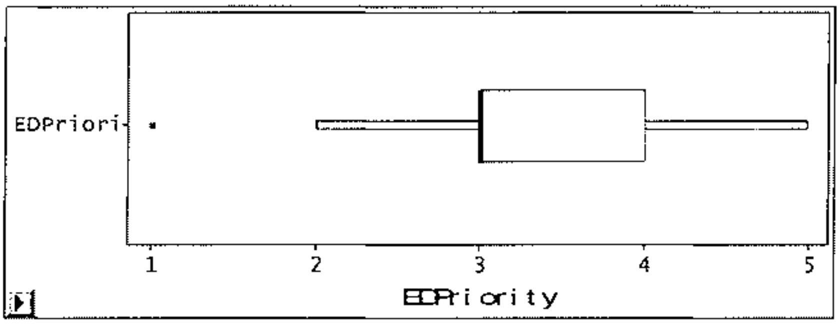
Moments			
N	928.0000	Sum Wgts	928.0000
Mean	3.3341	Sum	3094.0000
Std Dev	0.8048	Variance	0.6477
Skewness	0.0823	Kurtosis	-0.2526
USS	10916.0000	CSS	600.4440
CV	24.1393	Std Mean	0.0264

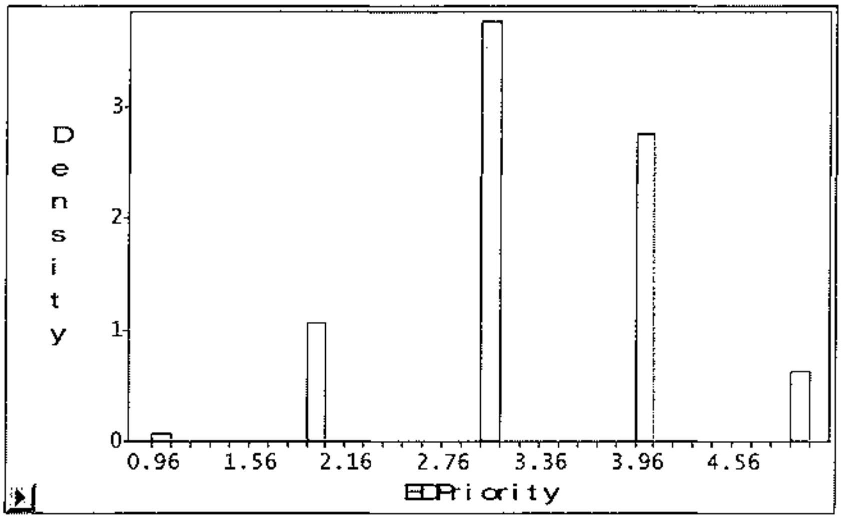
Quantiles			
100% Max	5.0000	99.0%	5.0000
75% Q3	4.0000	97.5%	5.0000
50% Med	3.0000	95.0%	5.0000
25% Q1	3.0000	90.0%	4.0000
0% Min	1.0000	10.0%	2.0000
Range	4.0000	5.0%	2.0000
Q3-Q1	1.0000	2.5%	2.0000
Mode	3.0000	1.0%	2.0000

S9.4.6 Box Plot & Dist: TGA TST DS - JUL 2006 Triage dist of ED Present's

TGA: Priority by T, V & T
EDDataFinYr2006
TRAINING:

EDPriority





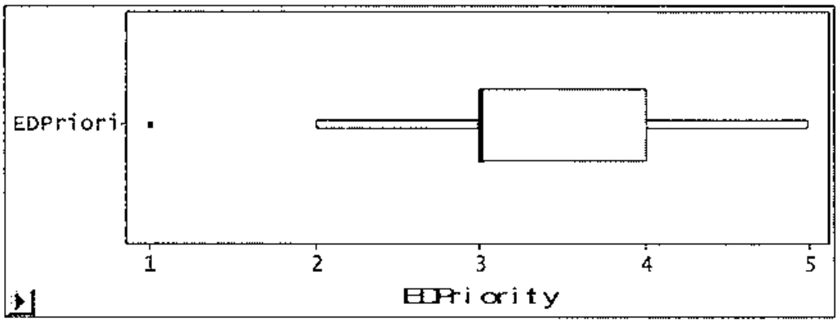
Moments			
N	14098.0000	Sum Wgts	14098.0000
Mean	3.3349	Sum	47015.0000
Std Dev	0.8317	Variance	0.6916
Skewness	-0.0036	Kurtosis	-0.1717
USS	166539.000	CSS	9750.0778
CV	24.9380	Std Mean	0.0070

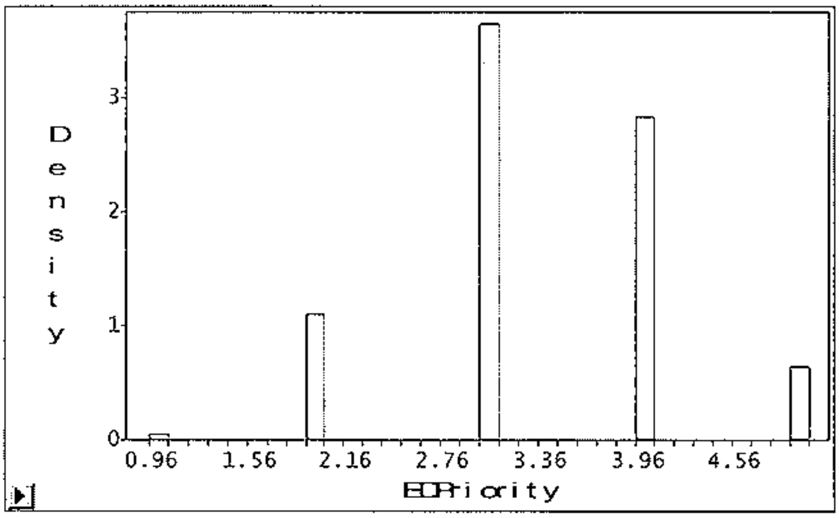
Quantiles			
100% Max	5.0000	99.0%	5.0000
75% Q3	4.0000	97.5%	5.0000
50% Med	3.0000	95.0%	5.0000
25% Q1	3.0000	90.0%	4.0000
0% Min	1.0000	10.0%	2.0000
Range	4.0000	5.0%	2.0000
Q3-Q1	1.0000	2.5%	2.0000
Mode	3.0000	1.0%	2.0000

S9.4.7 Box Plot & Dist: TGA TRN DS – Fin Yr 2006 Triage dist of ED Present's

TGA: Priority by T, V & T
EDDataFinYr2006
VALIDATION:

EDPriority





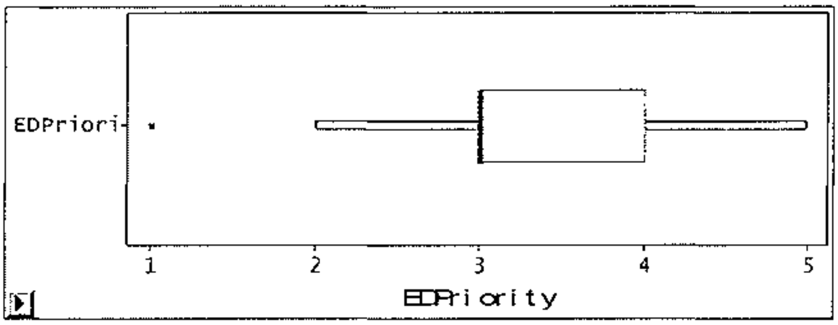
Moments			
N	10573.0000	Sum Wgts	10573.0000
Mean	3.3467	Sum	35385.0000
Std Dev	0.8345	Variance	0.6965
Skewness	-0.0038	Kurtosis	-0.2616
USS	125787.000	CSS	7362.8796
CV	24.9359	Std Mean	0.0081

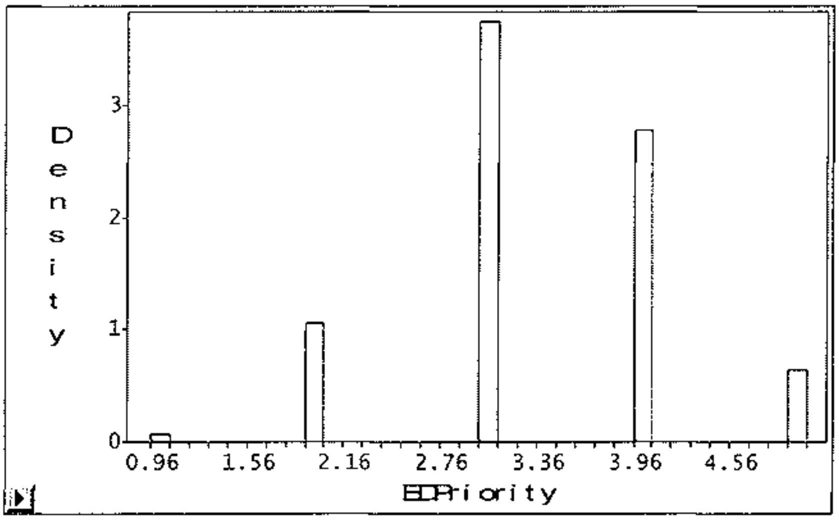
Quantiles			
100% Max	5.0000	99.0%	5.0000
75% Q3	4.0000	97.5%	5.0000
50% Med	3.0000	95.0%	5.0000
25% Q1	3.0000	90.0%	4.0000
0% Min	1.0000	10.0%	2.0000
Range	4.0000	5.0%	2.0000
Q3-Q1	1.0000	2.5%	2.0000
Mode	3.0000	1.0%	2.0000

S9.4.8 Box Plot & Dist: TGA VAL DS – Fin Yr 2006 Triage dist of ED Present's

TGA: Priority by T, V & T
EDDataFinYr2006
TEST:

EDPriority





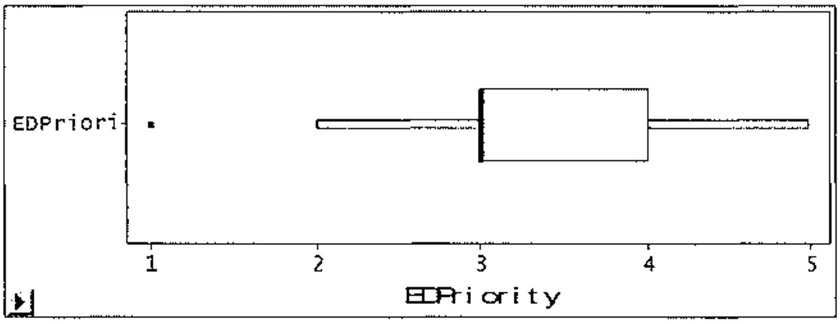
Moments			
N	10573.0000	Sum Wgts	10573.0000
Mean	3.3459	Sum	35376.0000
Std Dev	0.8325	Variance	0.6930
Skewness	0.0163	Kurtosis	-0.2134
USS	125690.000	CSS	7326.1131
CV	24.8798	Std Mean	0.0081

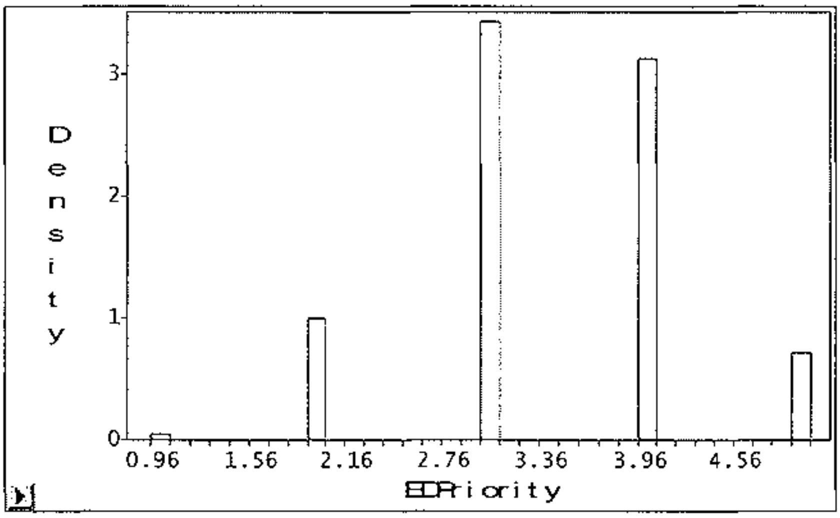
Quantiles			
100% Max	5.0000	99.0%	5.0000
75% Q3	4.0000	97.5%	5.0000
50% Med	3.0000	95.0%	5.0000
25% Q1	3.0000	90.0%	4.0000
0% Min	1.0000	10.0%	2.0000
Range	4.0000	5.0%	2.0000
Q3-Q1	1.0000	2.5%	2.0000
Mode	3.0000	1.0%	2.0000

S9.4.9 Box Plot & Dist: TGA TST DS – Fin Yr 2006 Triage dist of ED Present's

TGA: Priority by T, V & T
EDDataFinYr2007
TRAINING:

EDPriority





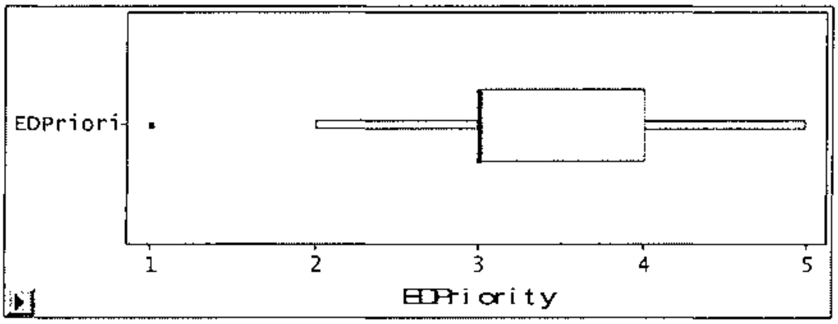
Moments			
N	14478.0000	Sum Wgts	14478.0000
Mean	3.4131	Sum	49415.0000
Std Dev	0.8347	Variance	0.6967
Skewness	-0.0781	Kurtosis	-0.2942
USS	178745.000	CSS	10086.1918
CV	24.4554	Std Mean	0.0069

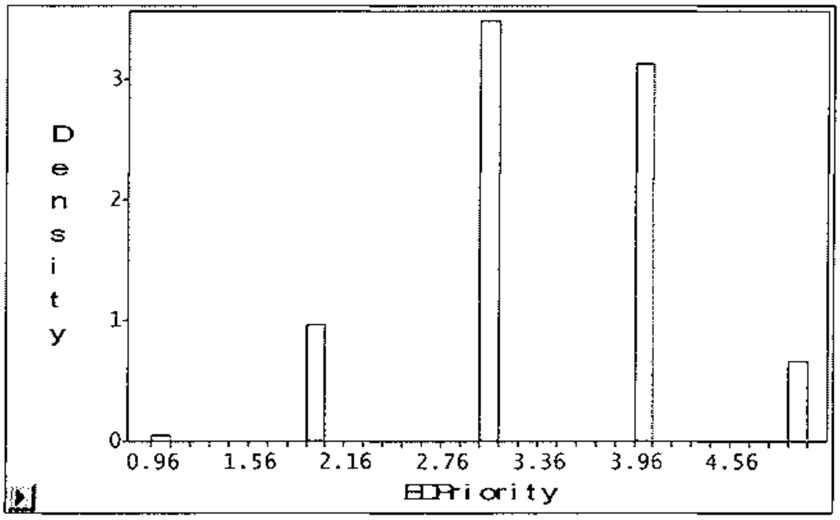
Quantiles			
100% Max	5.0000	99.0%	5.0000
75% Q3	4.0000	97.5%	5.0000
50% Med	3.0000	95.0%	5.0000
25% Q1	3.0000	90.0%	4.0000
0% Min	1.0000	10.0%	2.0000
Range	4.0000	5.0%	2.0000
Q3-Q1	1.0000	2.5%	2.0000
Mode	3.0000	1.0%	2.0000

S9.4.10 <u>Box Plot & Dist</u>: TGA TRN DS – Fin Yr 2007 Triage dist of ED Present's

TGA: Priority by T, V & T
EDDataFinYr2007
VALIDATION:

EDPriority





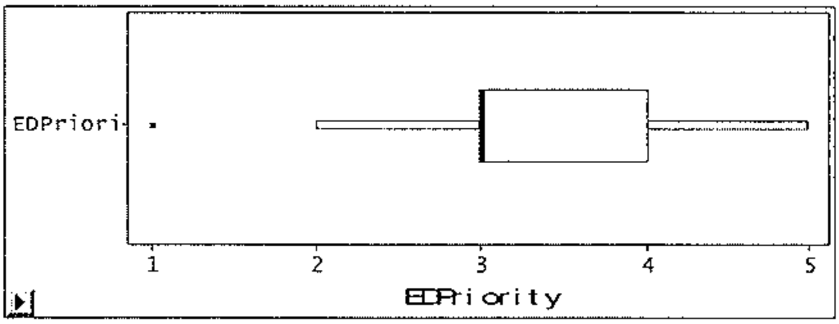
Moments			
N	10859.0000	Sum Wgts	10859.0000
Mean	3.4092	Sum	37020.0000
Std Dev	0.8225	Variance	0.6765
Skewness	-0.0736	Kurtosis	-0.2605
USS	133552.000	CSS	7345.1301
CV	24.1256	Std Mean	0.0079

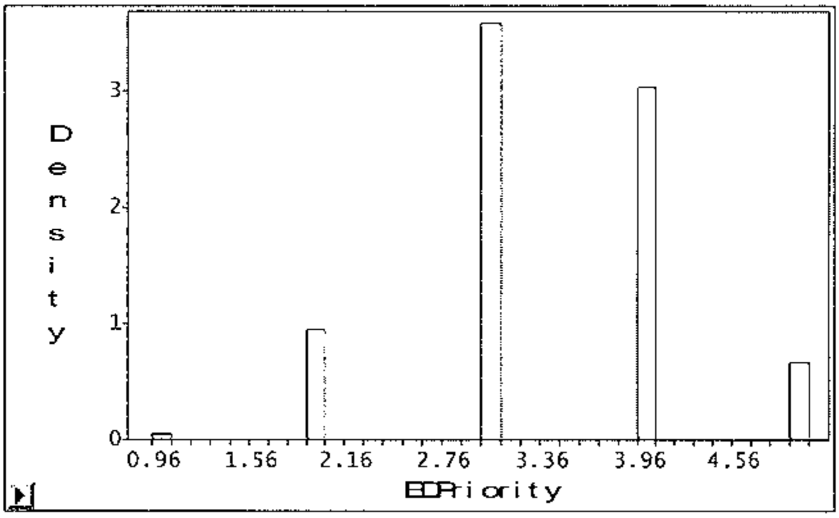
Quantiles			
100% Max	5.0000	99.0%	5.0000
75% Q3	4.0000	97.5%	5.0000
50% Med	3.0000	95.0%	5.0000
25% Q1	3.0000	90.0%	4.0000
0% Min	1.0000	10.0%	2.0000
Range	4.0000	5.0%	2.0000
Q3-Q1	1.0000	2.5%	2.0000
Mode	3.0000	1.0%	2.0000

S9.4.11 Box Plot & Dist: TGA VAL DS – Fin Yr 2007 Triage dist of ED Present's

TGA: Priority by T, V & T
EDDataFinYr2007
TEST:

EDPriority





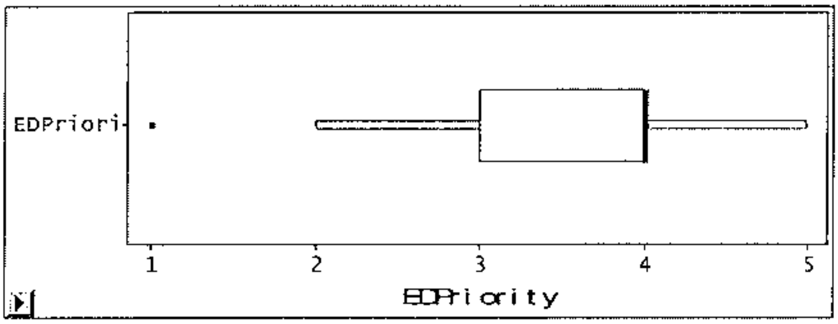
Moments			
N	10858.0000	Sum Wgts	10858.0000
Mean	3.3976	Sum	36891.0000
Std Dev	0.8199	Variance	0.6722
Skewness	-0.0433	Kurtosis	-0.2207
USS	132639.000	CSS	7298.6168
CV	24.1321	Std Mean	0.0079

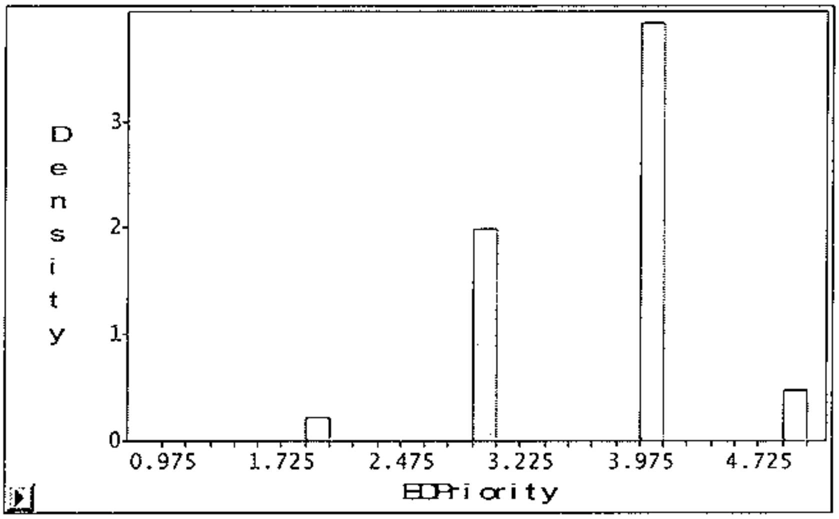
Quantiles			
100% Max	5.0000	99.0%	5.0000
75% Q3	4.0000	97.5%	5.0000
50% Med	3.0000	95.0%	5.0000
25% Q1	3.0000	90.0%	4.0000
0% Min	1.0000	10.0%	2.0000
Range	4.0000	5.0%	2.0000
Q3-Q1	1.0000	2.5%	2.0000
Mode	3.0000	1.0%	2.0000

S9.4.12 Box Plot & Dist: TGA TST DS – Fin Yr 2007 Triage dist of ED Present's

WHK: Priority by T, V & T
EDDataFinYr2006
TRAINING:

EDPriority





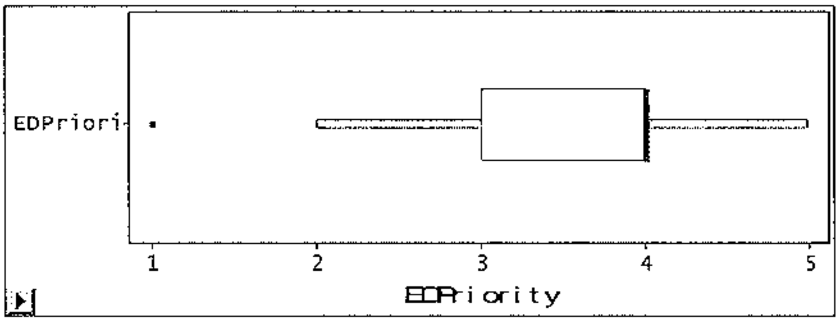
Moments			
N	7221.0000	Sum Wgts	7221.0000
Mean	3.7023	Sum	26734.0000
Std Dev	0.6548	Variance	0.4288
Skewness	-0.4076	Kurtosis	0.3769
USS	102072.000	CSS	3095.8532
CV	17.6870	Std Mean	0.0077

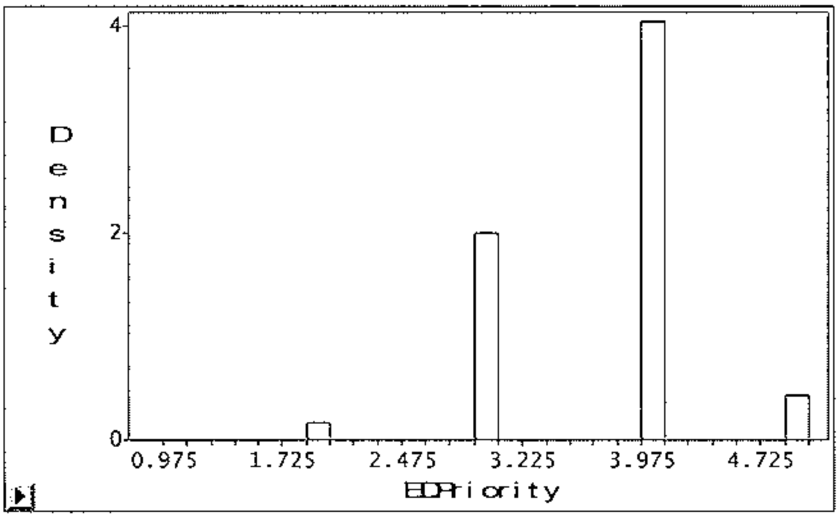
Quantiles			
100% Max	5.0000	99.0%	5.0000
75% Q3	4.0000	97.5%	5.0000
50% Med	4.0000	95.0%	5.0000
25% Q1	3.0000	90.0%	4.0000
0% Min	1.0000	10.0%	3.0000
Range	4.0000	5.0%	3.0000
Q3-Q1	1.0000	2.5%	2.0000
Mode	4.0000	1.0%	2.0000

S9.4.13 Box Plot & Dist: WHK TRN DS – Fin Yr 2006 Triage dist of ED Present's

WHK: Priority by T, V & T
EDDataFinYr2006
VALIDATION:

EDPriority





Moments

N	5416.0000	Sum Wgts	5416.0000
Mean	3.7061	Sum	20072.0000
Std Dev	0.6313	Variance	0.3985
Skewness	-0.4196	Kurtosis	0.4659
USS	76546.0000	CSS	2158.0414
CV	17.0341	Std Mean	0.0086

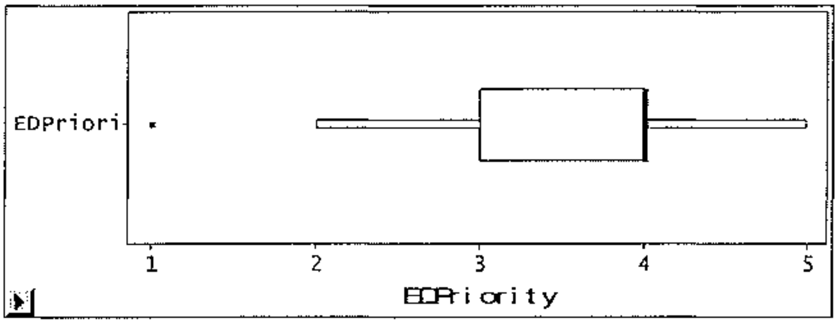
Quantiles

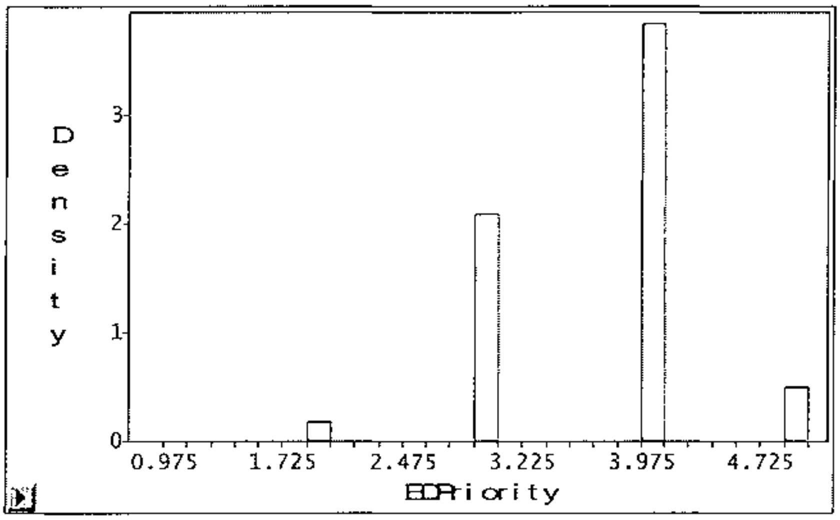
100% Max	5.0000	99.0%	5.0000
75% Q3	4.0000	97.5%	5.0000
50% Med	4.0000	95.0%	5.0000
25% Q1	3.0000	90.0%	4.0000
0% Min	1.0000	10.0%	3.0000
Range	4.0000	5.0%	3.0000
Q3-Q1	1.0000	2.5%	2.0000
Mode	4.0000	1.0%	2.0000

S9.4.14 Box Plot & Dist: WHK VAL DS – Fin Yr 2006 Triage dist of ED Present's

WHK: Priority by T, V & T
EDDataFinYr2006
TEST:

EDPriority





Moments			
N	5416.0000	Sum Wgts	5416.0000
Mean	3.6992	Sum	20035.0000
Std Dev	0.6547	Variance	0.4286
Skewness	-0.3313	Kurtosis	0.3445
USS	76435.0000	CSS	2321.0367
CV	17.6983	Std Mean	0.0089

Quantiles			
100% Max	5.0000	99.0%	5.0000
75% Q3	4.0000	97.5%	5.0000
50% Med	4.0000	95.0%	5.0000
25% Q1	3.0000	90.0%	4.0000
0% Min	1.0000	10.0%	3.0000
Range	4.0000	5.0%	3.0000
Q3-Q1	1.0000	2.5%	2.0000
Mode	4.0000	1.0%	2.0000

S9.4.15 Box Plot & Dist: WHK TST DS – Fin Yr 2006 Triage dist of ED Present's

13.2 APPENDIX B5: RESULTS: CHAPTER 9.5

RESULTS HELD IN THIS APPENDIX

S9.5.1	S9.5.2	S9.5.3	S9.5.4	S9.5.5	S9.5.6
S9.5.7	S9.5.8	S9.5.9	S9.5.10	S9.5.11	S9.5.12
S9.5.13	S9.5.14	S9.5.15	S9.5.16	S9.5.17	S9.5.18
S9.5.19	S9.5.20	S9.5.21	S9.5.22	S9.5.23	S9.5.24

C9.5.1	C9.5.2	C9.5.3	C9.5.4	C9.5.5	C9.5.6

9.5 RESULTS: Using PART DS: PER DAY OF WEEK – PREVALENCE OF TRIAGE RATINGS PER TIME OF DAY

- **(Postulate5)** Per Day of Week: To determine prevalence of various **Triage** / "urgency" ratings **per Time of Day**

9.5.1 Using PART DS: FINDINGS

FINDINGS AND COMMENTS

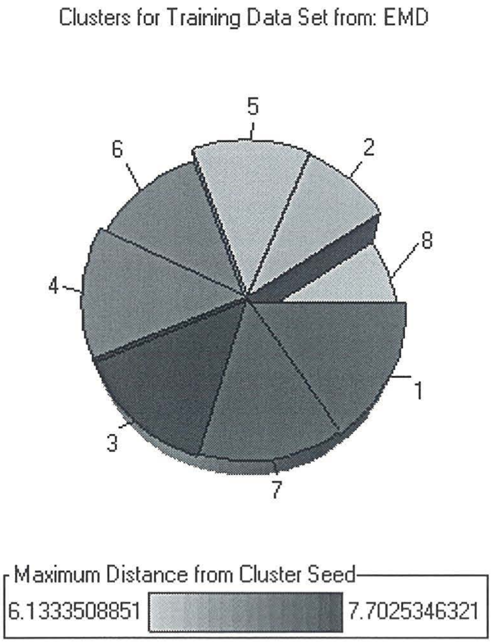
Cf. Earlier Pages **162 - 171**

9.5.2 Using PART DS: SAS RESULTS

All of 2006 - TRAINING

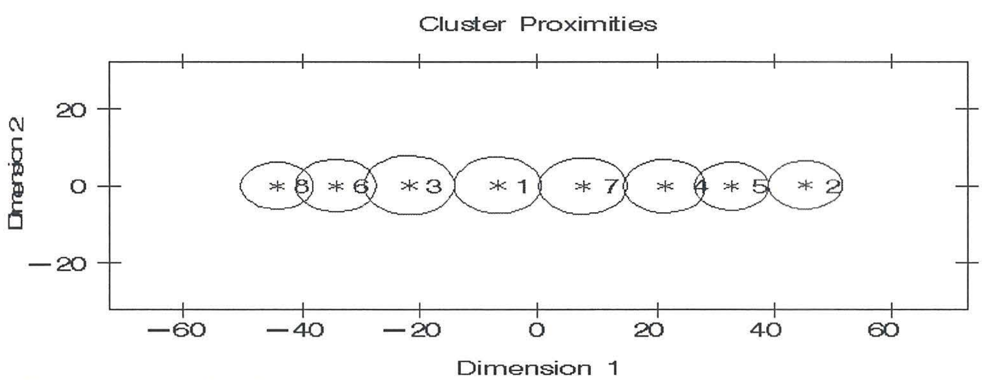
TGA
EDDataFinYr2006
TRAINING:

CLUSTER PIE CHART



S9.5.1 Pie Chart: TGA TRN Data – FIN YR 2006

CLUSTER DISTANCES



S9.5.2 Distances: TGA TRN Data – FIN YR 2006

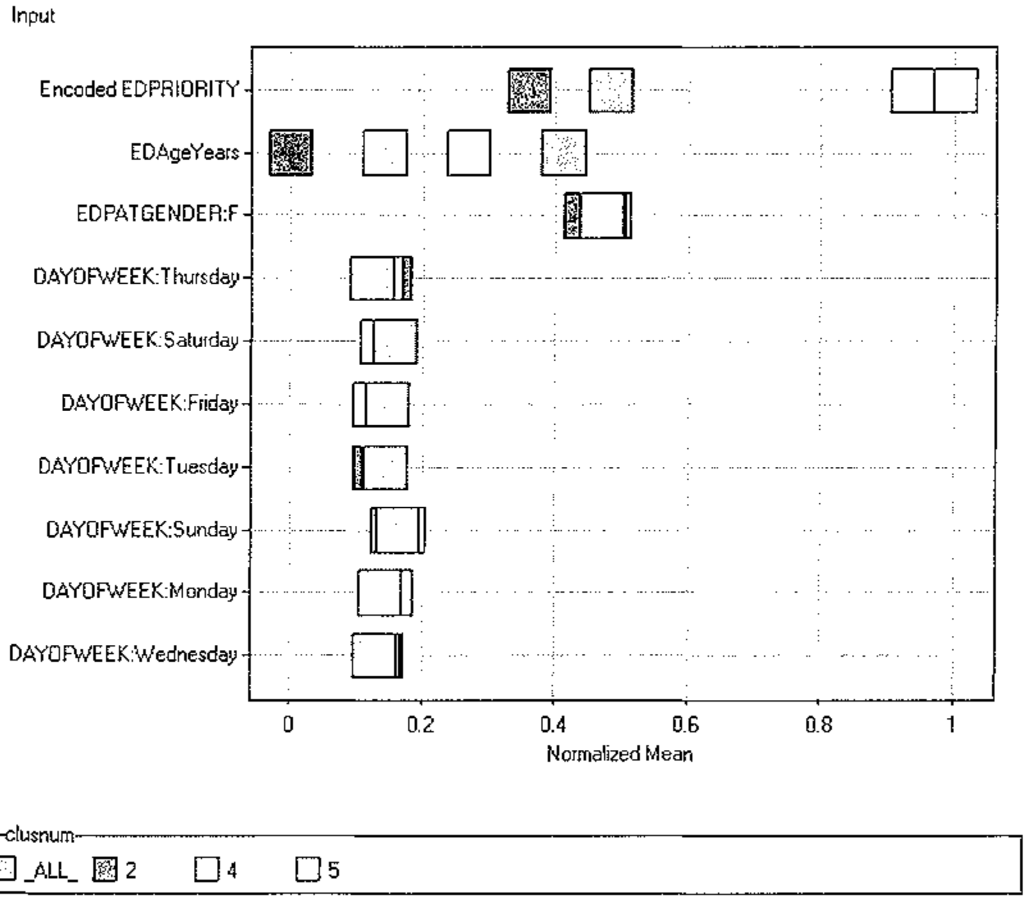
CLUSTER STATISTICS

CLUSTER	Frequency of Cluster	Root-Mean-Square Standard Deviation	Maximum Distance from Cluster Seed	Nearest Cluster	Distance to Nearest Cluster	EDAgeYears	Encoded EDPRIORITY
1	1754	1.4608973681	7.3912977971	7	14.261603424	54.776510832	3.1550741163
2	2168	0.8925990319	6.3392802847	5	12.620691833	2.8118081181	3.2689114391
3	1808	1.3437032453	7.7025346321	6	12.443321595	63.817477876	3.0763274336
4	2135	1.2798650211	6.9991755417	5	11.309102846	26.73676815	3.5779859485
5	2312	1.1361959468	6.3046025315	4	11.309102846	15.427768166	3.6115916955
6	1606	1.1724745624	6.9275069241	8	10.106130465	82.260273973	3.104607721
7	2077	1.3469424601	7.3451102965	4	13.781649069	40.517573423	3.4270582571
8	238	0.6614760049	6.1333508851	6	10.106130465	92.365546218	3.1050420168

CLUSTER	EDPATGENDER:F	DAYOFWEEK:Friday	DAYOFWEEK:Monday	DAYOFWEEK:Saturday	DAYOFWEEK:Sunday	DAYOFWEEK:Thursday	DAYOFWEEK:Tuesday	DAYOFWEEK:Wedn
1	0.4937286203	0.149372862	0.1596351197	0.1311288483	0.1459521096	0.1288483466	0.141391106	0.1436716078
2	0.4460332103	0.1342250923	0.1423389299	0.1420664207	0.167896679	0.1494464945	0.1282287823	0.1351476015
3	0.455199115	0.1449115044	0.1521017699	0.1200221239	0.1498893805	0.141039823	0.1449115044	0.1471238939
4	0.4707259953	0.1274004684	0.1522248244	0.1395784543	0.1704918033	0.1358313817	0.1414519906	0.1330210773
5	0.4688581315	0.1466262976	0.1366782007	0.1578719723	0.1630622837	0.1228373702	0.1440311419	0.1288927336
6	0.5591531756	0.1556662516	0.1569115816	0.1288916563	0.1158156912	0.1494396015	0.1468169365	0.1444582814
7	0.4607607126	0.1391429947	0.1449205595	0.1425132403	0.1598459316	0.1429947039	0.1376986038	0.1328839673
8	0.6806722689	0.1344537815	0.1764705882	0.1512605042	0.1344537815	0.1260504202	0.1302521008	0.1470588235

S9.5.3 Stats: TGA TRN Data – FIN YR 2006

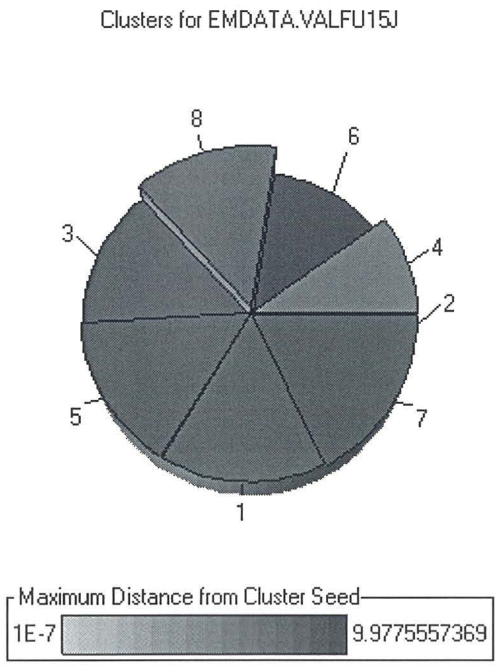
CLUSTER INPUT MEANS PLOT



S9.5.4 Input Means Plot: TGA TRN Data – FIN YR 2006

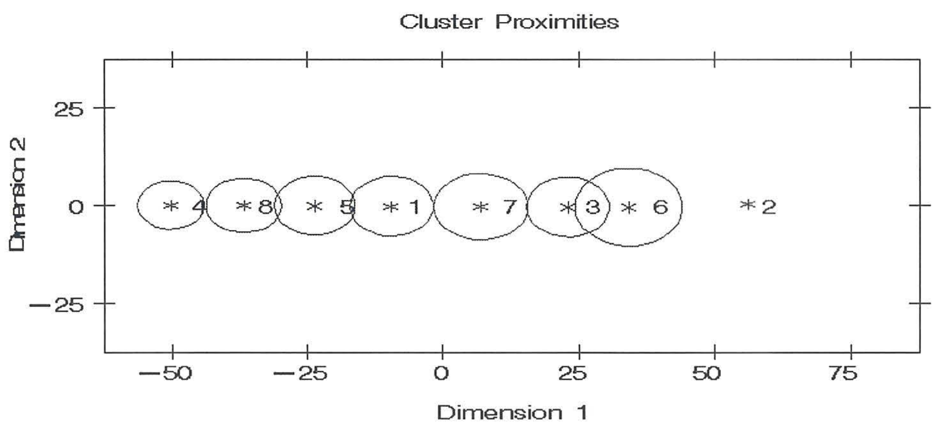
All of 2006 - VALIDATION
TGA
EDDataFinYr2006
VALIDATION:

CLUSTER PIE CHART



S9.5.5 Pie Chart: TGA VAL Data – FIN YR 2006

CLUSTER DISTANCES



S9.5.6 Distances: TGA VAL Data – FIN YR 2006

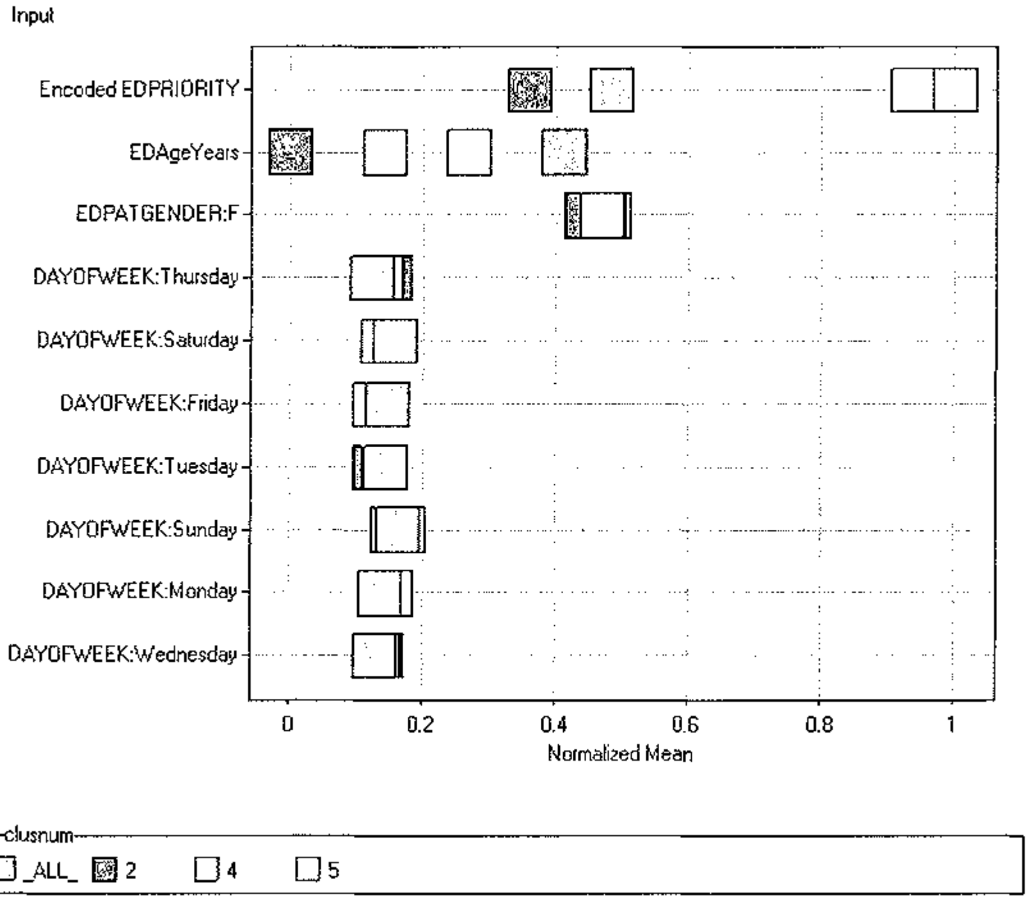
CLUSTER STATISTICS

CLUSTER	Frequency of Cluster	Root-Mean-Square Standard Deviation	Maximum Distance from Cluster Seed	Nearest Cluster	Distance to Nearest Cluster	EDAgeYears	Encoded EDPRIORITY
1	1630	1.4231169578	7.6279807748	5	14.199194065	43.625153374	3.3791411043
2	1	.	0	6	21.961754453	109	3
3	1344	1.30127405	7.6499669459	6	11.328472703	75.733630952	3.0736607143
4	1656	0.6920977144	6.174059108	8	13.490576758	2.7626911594	3.2457729469
5	1672	1.3822167062	7.4937666163	8	13.179879499	29.427033493	3.5508373206
6	687	1.1420967824	9.9775557369	3	11.328472703	87.061135371	3.1048034934
7	1486	1.6130174066	8.4716482162	3	15.658339118	59.875504711	3.1419919246
8	2097	1.2684535208	6.988411667	5	13.179879499	16.247496423	3.6380543634

CLUSTER	EDPATGENDER:F	DAYOFWEEK:Friday	DAYOFWEEK:Monday	DAYOFWEEK:Saturday	DAYOFWEEK:Sunday	DAYOFWEEK:Thursday	DAYOFWEEK:Tuesday	DAYOFWEEK:Wed
1	0.4871165644	0.1374233129	0.173006135	0.1349693252	0.1466257669	0.1202453988	0.1411042945	0.146625766
2	1	0	0	0	0	0	0	1
3	0.4791666667	0.1540176571	0.1540178571	0.1436011905	0.1324404762	0.1376488095	0.1391369048	0.139136904
4	0.4492753623	0.1437198069	0.1407004831	0.1328502415	0.1570048309	0.1322463768	0.145531401	0.147946859
5	0.4982057416	0.1267942584	0.1662679426	0.1435406699	0.1656698565	0.1244019139	0.1435406699	0.12978468
6	0.6200873362	0.1310043669	0.154294032	0.1426491994	0.135371179	0.1566608443	0.1310043668	0.147016011
7	0.4562584118	0.1386271871	0.166218035	0.1218034993	0.1467025572	0.1238223419	0.1507402423	0.152096137
8	0.4687649022	0.121602289	0.1597982833	0.1368621941	0.1564139247	0.1397234144	0.1530758226	0.13352408

S9.5.7 Stats: TGA VAL Data – FIN YR 2006

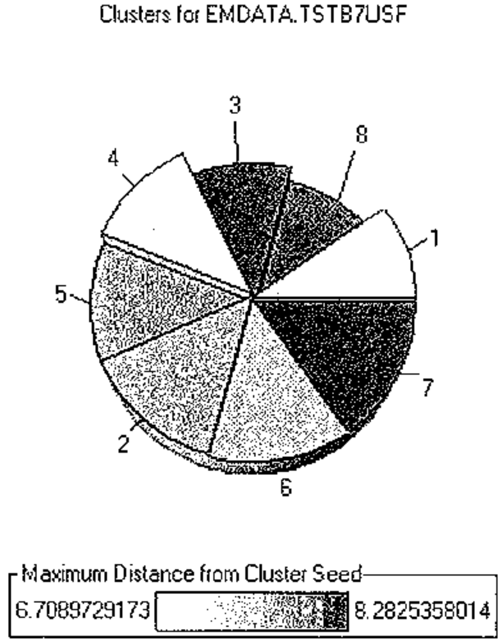
CLUSTER INPUT MEANS PLOT



S9.5.8 Input Means Plot: TGA VAL Data – FIN YR 2006

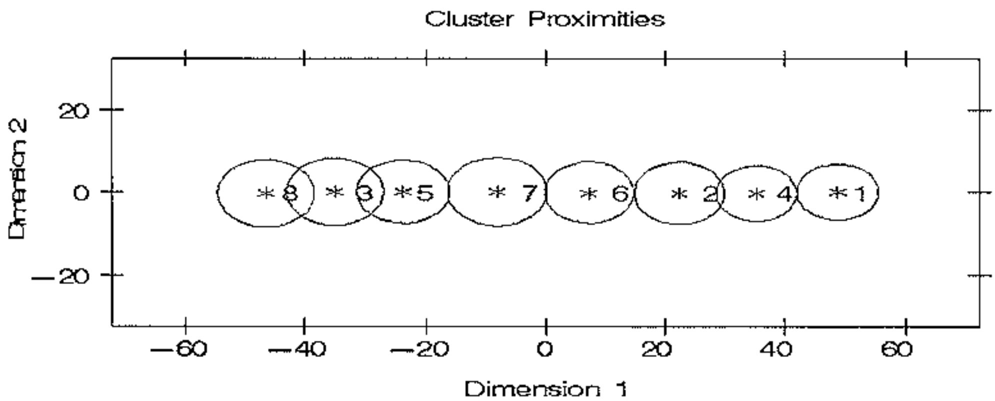
All of 2006 - TEST
TGA
EDDataFinYr2006
TEST:

CLUSTER PIE CHART



S9.5.9 Pie Chart: TGA TST Data – FIN YR 2006

CLUSTER DISTANCES



S9.5.10 Distances: TGA TST Data – FIN YR 2006

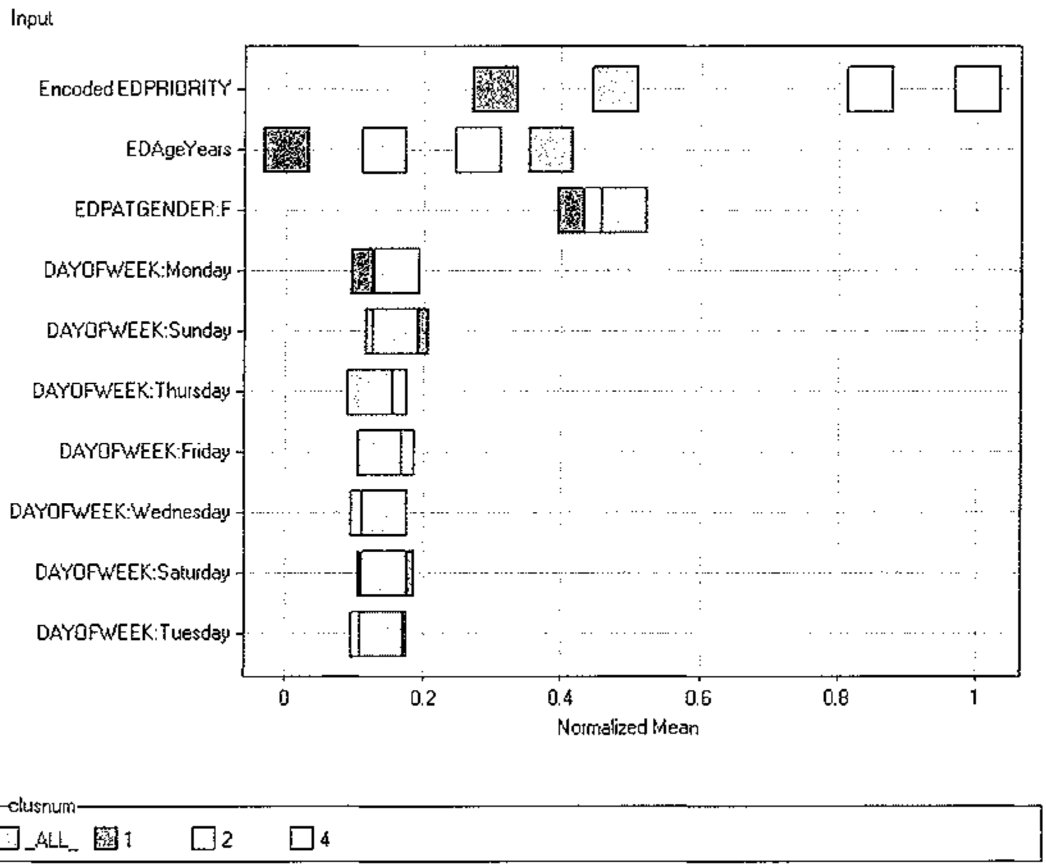
CLUSTER STATISTICS

CLUSTER	Frequency of Cluster	Root-Mean-Square Standard Deviation	Maximum Distance from Cluster Seed	Nearest Cluster	Distance to Nearest Cluster	EDAgeYears	Encoded EDPRIORITY
1	1656	0.9878216397	6.7839696752	4	13.416495162	3.2922705314	3.2954347826
2	1839	1.4215741356	7.5795595359	4	12.954428962	29.657780196	3.5375408052
3	728	1.1459400844	8.1100025166	5	11.231530428	87.042582418	3.1098901099
4	1964	1.1635092983	6.7069729173	2	12.954428962	16.703665988	3.6176171079
5	1455	1.3097761448	7.6452395319	3	11.231530428	75.811683849	3.0992817669
6	1491	1.4256618672	7.4932822489	2	15.10091707	44.757880617	3.3995713615
7	1428	1.5379947825	8.2825358014	6	15.430897566	60.18697479	3.1568627451
8	13	1.1288750925	8.1547532152	3	11.50347784	93.538461538	3.3846153846

CLUSTER	EDPATGENDER:F	DAYOFWEEK:Friday	DAYOFWEEK:Monday	DAYOFWEEK:Saturday	DAYOFWEEK:Sunday	DAYOFWEEK:Thursday	DAYOFWEEK:Tuesday	DAYOFWEEK:We
1	0.4263285024	0.1473429952	0.1262077295	0.152173913	0.172705314	0.1292270531	0.134057971	0.1382850242
2	0.4640914037	0.1523394995	0.1561479869	0.1381936888	0.1561479869	0.1430903156	0.127312296	0.1267682263
3	0.6112637363	0.1648351648	0.1442307692	0.1456043956	0.1263736264	0.1456043956	0.1456043956	0.1277472527
4	0.4893075356	0.1359470468	0.1598778004	0.1420570265	0.1578411405	0.1227087576	0.1384928717	0.1430753564
5	0.4989690722	0.1587628866	0.1470790378	0.1182130584	0.1189003436	0.1498281787	0.1608247423	0.1463917526
6	0.498323273	0.1509054326	0.1455399061	0.1435278337	0.1341381623	0.1307847082	0.149564051	0.1455399061
7	0.481092437	0.1645658263	0.1470588235	0.1169467787	0.1351540616	0.1463585434	0.1456582633	0.1442577031
8	0.6923076923	0.3076923077	0.3076923077	0	0.0769230769	0	0.1538461538	0.1538461538

S9.5.11 Stats: TGA TST Data – FIN YR 2006

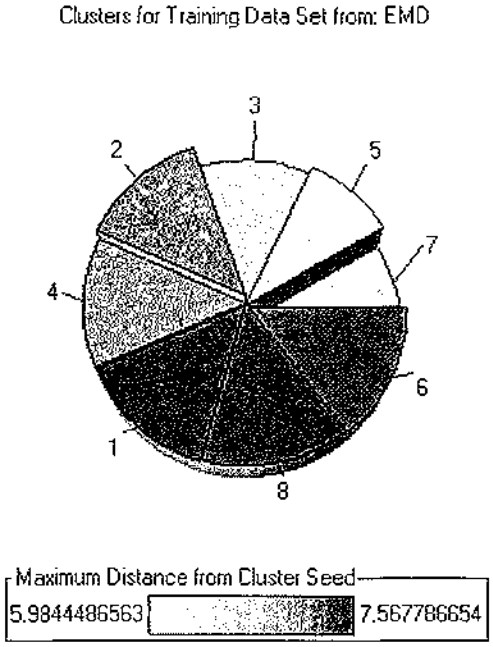
CLUSTER INPUT MEANS PLOT



S9.5.12 Input Means Plot: TGA TST Data – FIN YR 2006

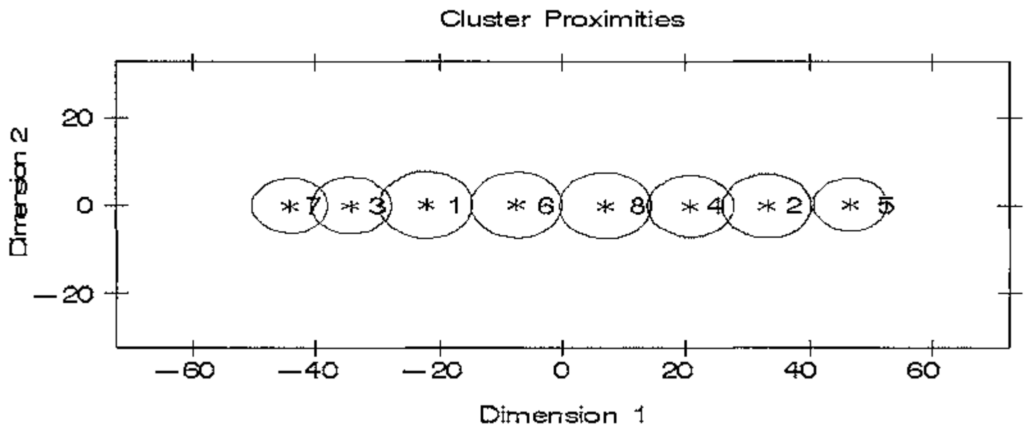
All of 2007 - TRAINING
TGA
EDDataFinYr2007
TRAINING:

CLUSTER PIE CHART



S9.5.13 Pie Chart: TGA TRN Data – FIN YR 2007

CLUSTER DISTANCES



S9.5.14 Distances: TGA TRN Data – FIN YR 2007

CLUSTER STATISTICS

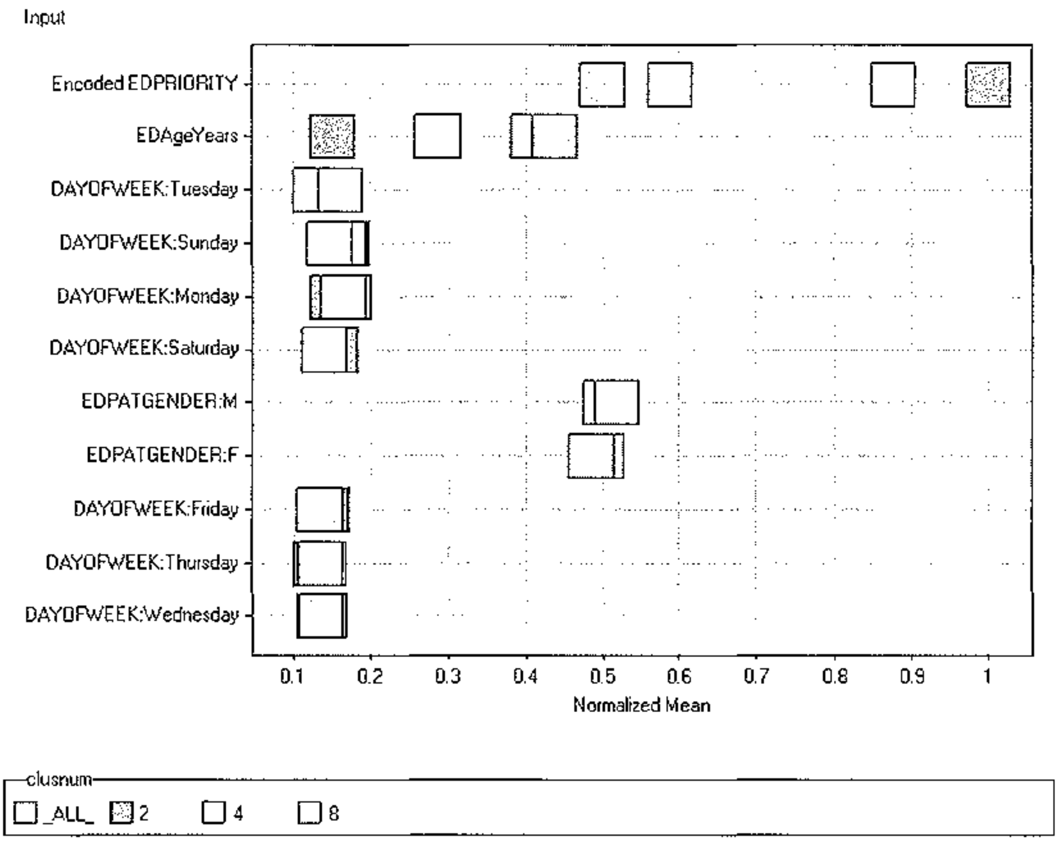
CLUSTER	Frequency of Cluster	Root-Mean-Square Standard Deviation	Maximum Distance from Cluster Seed	Nearest Cluster	Distance to Nearest Cluster	EDAgeYears	Encoded EDPRIORITY
1	1889	1.3120588324	7.567786654	3	12.120671251	71.666490206	3.1667548968
2	2912	1.2073235087	7.1900512377	4	12.339280673	16.377403846	3.6610576923
3	1414	1.1264053157	6.4183365008	7	9.8509812866	83.786421499	3.2149929279
4	2215	1.228643573	6.9834445158	2	12.339280673	28.716478555	3.5995485327
5	1977	0.8865090743	5.9844486563	2	13.474772048	2.9064238746	3.3490136571
6	1757	1.3472384057	7.4669659683	8	14.452541991	56.974388162	3.2265224815
7	143	0.7762952026	6.1990902626	3	9.8509812866	93.636363636	3.2027972028
8	2171	1.3428749764	7.4785690935	4	13.808053556	42.523721787	3.4569322693

CLUSTER	EDPATGENDER:F	EDPATGENDER:M	DAYOFWEEK:Friday	DAYOFWEEK:Monday	DAYOFWEEK:Saturday	DAYOFWEEK:Sunday	DAYOFWEEK:Thursday	DAYOFWEEK:Tuesday
1	0.475383801	0.524616199	0.1556379037	0.1588141874	0.1259925887	0.1376389624	0.1318157755	0.1434621493
2	0.489010989	0.510989011	0.1380494505	0.1473214286	0.1517857143	0.1662087912	0.126717033	0.1401098901
3	0.5615275813	0.4384724187	0.1584158416	0.1562942008	0.1230551627	0.1364922207	0.1548797737	0.1301272984
4	0.49751693	0.50248307	0.1304740406	0.1702031603	0.1372460497	0.1634311512	0.1363431151	0.1255079007
5	0.4436014163	0.5563985837	0.1365705615	0.1583206879	0.1446636318	0.1517450683	0.1421345473	0.1330298432
6	0.4826408651	0.5173591349	0.1439954468	0.1599317018	0.1343198634	0.1587933978	0.1394422311	0.1331815595
7	0.5874125874	0.4125874126	0.2167832168	0.1538461538	0.1258741259	0.1048951049	0.0559440559	0.1328671329
8	0.482726854	0.517273146	0.1312759097	0.1621372639	0.1377245509	0.1446338093	0.1321971442	0.1593735606

CLUSTER	DAYOFWEEK:Friday	DAYOFWEEK:Monday	DAYOFWEEK:Saturday	DAYOFWEEK:Sunday	DAYOFWEEK:Thursday	DAYOFWEEK:Tuesday	DAYOFWEEK:Wednesday
1	0.1556379037	0.1588141874	0.1259925887	0.1376389624	0.1318157755	0.1434621493	0.146638433
2	0.1380494505	0.1473214286	0.1517857143	0.1662087912	0.126717033	0.1401098901	0.1298076923
3	0.1584158416	0.1562942008	0.1230551627	0.1364922207	0.1548797737	0.1301272984	0.1407355021
4	0.1304740406	0.1702031603	0.1372460497	0.1634311512	0.1363431151	0.1255079007	0.1367945824
5	0.1365705615	0.1583206879	0.1446636318	0.1517450683	0.1421345473	0.1330298432	0.1335356601
6	0.1439954468	0.1599317018	0.1343198634	0.1587933978	0.1394422311	0.1331815595	0.1303357997
7	0.2167832168	0.1538461538	0.1258741259	0.1048951049	0.0559440559	0.1328671329	0.2097902098
8	0.1312759097	0.1621372639	0.1377245509	0.1446338093	0.1321971442	0.1593735606	0.1326577614

S9.5.15 Stats: TGA TRN Data – FIN YR 2007

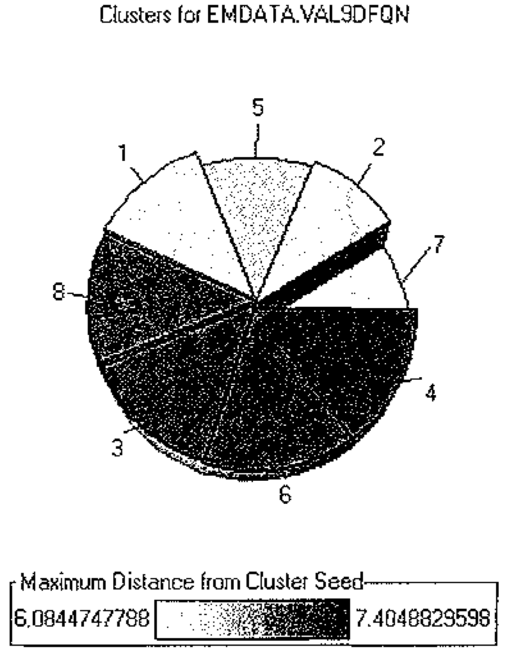
CLUSTER INPUT MEANS PLOT



S9.5.16 Input Means Plot: TGA TRN Data – FIN YR 2007

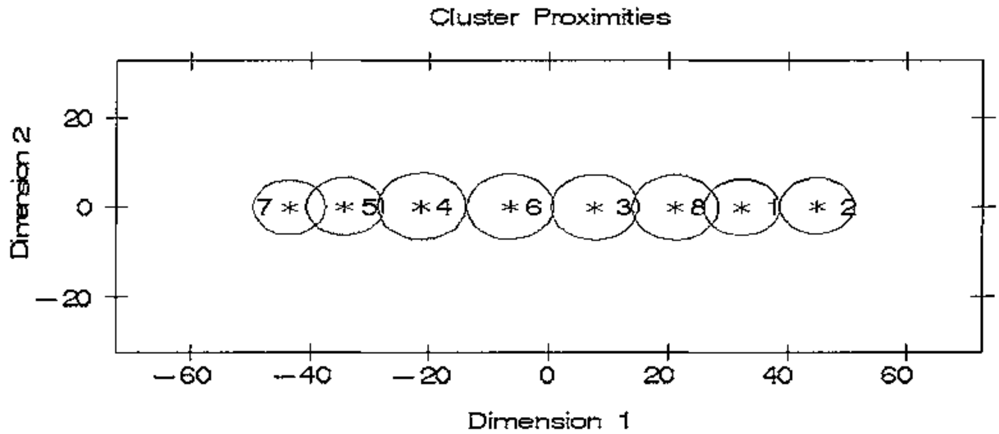
All of 2007 - VALIDATION
TGA
EDDataFinYr2007
<u>VALIDATION</u>:

CLUSTER PIE CHART



S9.5.17 <u>Pie Chart</u>: TGA VAL Data – FIN YR 2007

CLUSTER DISTANCES



S9.5.18 <u>Distances</u>: TGA VAL Data – FIN YR 2007

CLUSTER STATISTICS

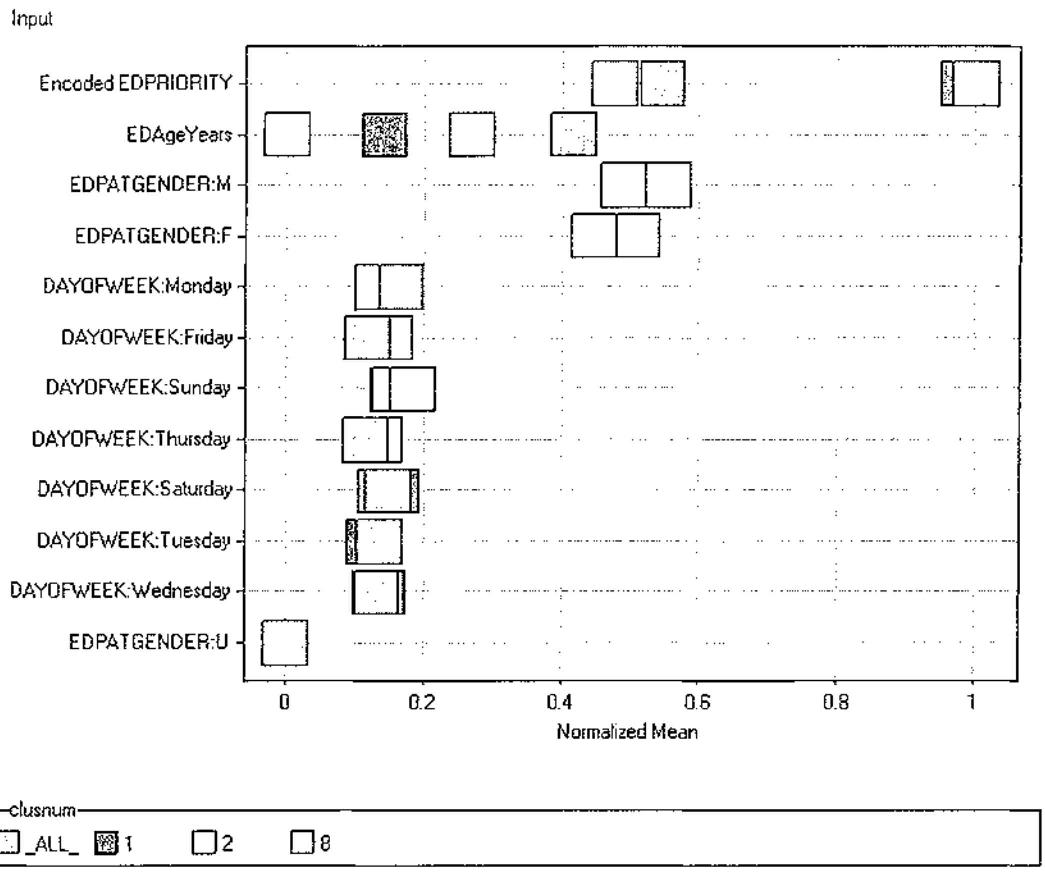
CLUSTER	Frequency of Cluster	Root-Mean-Square Standard Deviation	Maximum Distance from Cluster Seed	Nearest Cluster	Distance to Nearest Cluster	EDAgeYears	Encoded EDPRIORITY
1	1897	1.0396121939	6.3229900763	8	11.225731283	15.393779552	3.6373220875
2	1526	0.8484730204	6.2636767426	1	12.571633978	2.8250327654	3.372870249
3	1523	1.1979726949	7.3080658238	8	13.484257529	40.102429416	3.483913329
4	1342	1.29179975	7.4048829599	5	12.923318932	69.064828614	3.1236559762
5	1251	1.0253506676	6.4458598441	7	9.2818346934	81.988009592	3.1606714628
6	1306	1.2728297914	7.2697173372	3	14.17482109	54.275650842	3.2863705972
7	257	0.7769213741	6.0844747769	5	9.2818346934	91.26848249	3.1906614786
8	1757	1.1643530632	7.2331181166	1	11.225731283	26.619237336	3.6476949345

CLUSTER	EDPATGENDER:F	EDPATGENDER:M	EDPATGENDER:U	DAYOFWEEK:Friday	DAYOFWEEK:Monday	DAYOFWEEK:Saturday	DAYOFWEEK:Sunday	DAYOFWEEK:Thursday
1	0.45914602	0.54085398	0	0.1307327359	0.1634159199	0.1602530311	0.1718502899	0.1217712177
2	0.4456094364	0.5543905636	0	0.1520314548	0.1323722149	0.1480996068	0.1566186107	0.1363040629
3	0.5101772817	0.4898227183	0	0.1378857518	0.151674327	0.1286933684	0.166119501	0.1365725542
4	0.4858420268	0.5141579732	0	0.1564828614	0.1631892697	0.1199701937	0.1244411326	0.1400894188
5	0.5091926459	0.4908073541	0	0.1366906475	0.1582733813	0.1231015188	0.1462829736	0.1510791367
6	0.4686064319	0.5313935681	0	0.1294027565	0.17381317	0.1255742726	0.1385911179	0.1370597243
7	0.6070038911	0.3929961089	0	0.1634241245	0.1245136187	0.1556420233	0.1011673152	0.1478599222
8	0.5105293113	0.4889015367	0.000569152	0.1178144565	0.1667615253	0.1485486625	0.1832669323	0.1161070006

CLUSTER	DAYOFWEEK:Friday	DAYOFWEEK:Monday	DAYOFWEEK:Saturday	DAYOFWEEK:Sunday	DAYOFWEEK:Thursday	DAYOFWEEK:Tuesday	DAYOFWEEK:Wednesday
1	0.1307327359	0.1634159199	0.1602530311	0.1718502899	0.1217712177	0.1207169215	0.131259884
2	0.1520314548	0.1323722149	0.1480996068	0.1566186107	0.1363040629	0.1349934469	0.1395806029
3	0.1378857518	0.151674327	0.1286933684	0.166119501	0.1365725542	0.1483913329	0.1306631648
4	0.1564828614	0.1631892697	0.1199701937	0.1244411326	0.1400894188	0.1430700447	0.152757079
5	0.1366906475	0.1582733813	0.1231015188	0.1462829736	0.1510791367	0.14068745	0.1438848921
6	0.1294027565	0.17381317	0.1255742726	0.1385911179	0.1370597243	0.1301684533	0.1653905054
7	0.1634241245	0.1245136187	0.1556420233	0.1011673152	0.1478599222	0.1556420233	0.1517509728
8	0.1178144565	0.1667615253	0.1485486625	0.1832669323	0.1161070006	0.1354581673	0.1320432555

S9.5.19 Stats: TGA VAL Data – FIN YR 2007

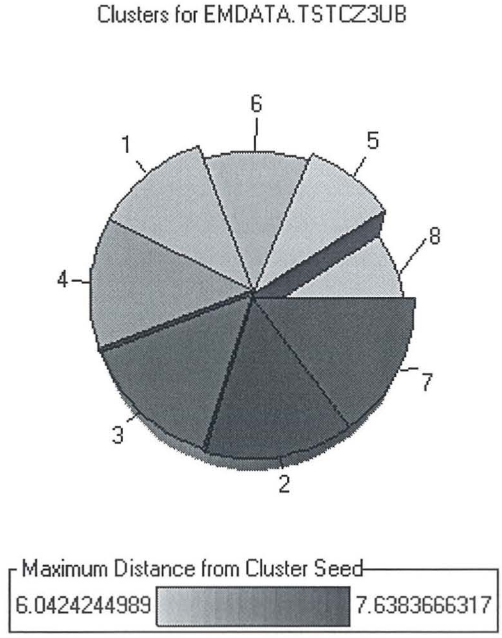
CLUSTER INPUT MEANS PLOT



S9.5.20 Input Means Plot: TGA VAL Data – FIN YR 2007

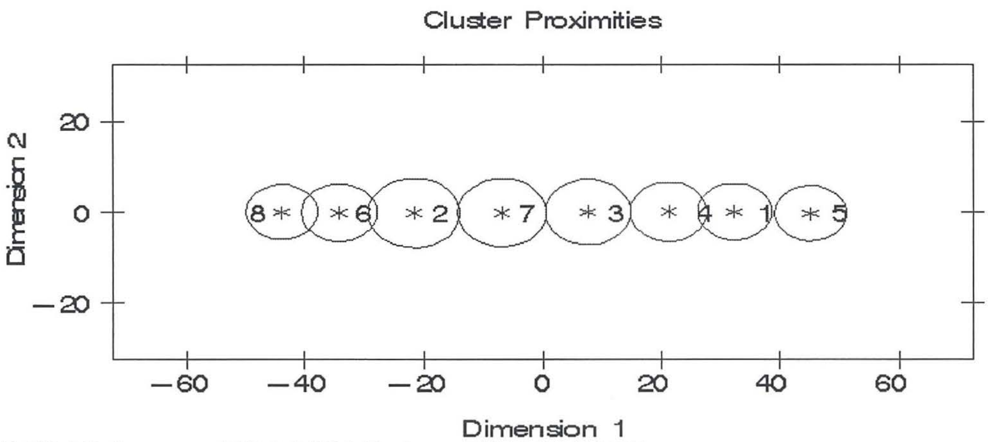
All of 2007 - TEST
TGA
EDDataFinYr2007
TEST:

CLUSTER PIE CHART



S9.5.21 Pie Chart: TGA TST Data – FIN YR 2007

CLUSTER DISTANCES



S9.5.22 Distances: TGA TST Data – FIN YR 2007

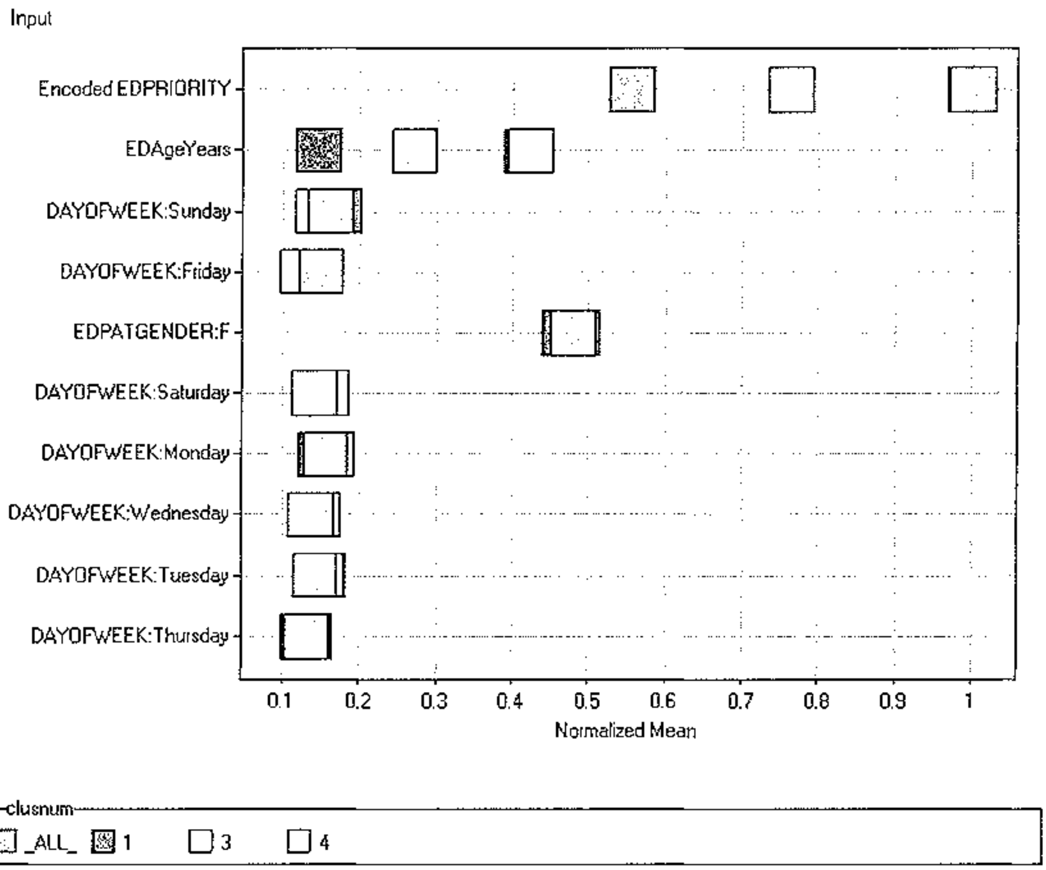
CLUSTER STATISTICS

CLUSTER	Frequency of Cluster	Root-Mean-Square Standard Deviation	Maximum Distance from Cluster Seed	Nearest Cluster	Distance to Nearest Cluster	EDAgeYears	Encoded EDPRIORITY
1	1810	1.1326934984	6.2142536645	4	11.091365341	15.493607735	3.6198895028
2	1328	1.3936959268	7.6383666317	6	12.456483643	69.517319277	3.1197289157
3	1569	1.3482042574	7.2352273265	4	13.609191301	40.19056724	3.5022307202
4	1806	1.2678784847	6.4706049631	1	11.091365341	26.581949059	3.6212624585
5	1537	0.8937461659	6.076288889	1	12.73179234	2.7618737801	3.3415744958
6	1206	1.1056926616	6.300634928	8	9.6065283596	81.973466003	3.1592039801
7	1361	1.4037882144	7.5195131872	3	14.538904612	54.727406319	3.2601028655
8	241	0.8757194237	6.0424244969	6	9.6065283596	91.580912863	3.2282157676

CLUSTER	EDPATGENDER:F	DAYOFWEEK:Friday	DAYOFWEEK:Monday	DAYOFWEEK:Saturday	DAYOFWEEK:Sunday	DAYOFWEEK:Thursday	DAYOFWEEK:Tuesday	DAYOFWEEK:Wednesday
1	0.464640884	0.126519337	0.146961326	0.1480662983	0.1712707182	0.1237569061	0.1497237569	0.1337016575
2	0.4676204819	0.1671686747	0.1543674699	0.1370481928	0.109186747	0.1325301205	0.1591325301	0.1415662651
3	0.4773741236	0.1210962396	0.1606118547	0.154875717	0.1414913958	0.1306564691	0.1478648821	0.1434034417
4	0.4778516058	0.1467331118	0.1533776301	0.1389811739	0.1589147287	0.1284606866	0.1400885936	0.1334440753
5	0.4534808068	0.1359791802	0.1392322707	0.1528952505	0.1659076122	0.1307742355	0.1457384515	0.1294729993
6	0.5331674959	0.1351575456	0.1616915423	0.1343283582	0.1326699834	0.1484245439	0.1351575456	0.1525704809
7	0.4988978692	0.1396032329	0.1542983101	0.1388684791	0.1506245408	0.1388684791	0.1476855253	0.1300514328
8	0.643153527	0.1452282158	0.1078838174	0.1576763485	0.1286307054	0.153526971	0.153526971	0.153526971

S9.5.23 Stats: TGA TST Data – FIN YR 2007

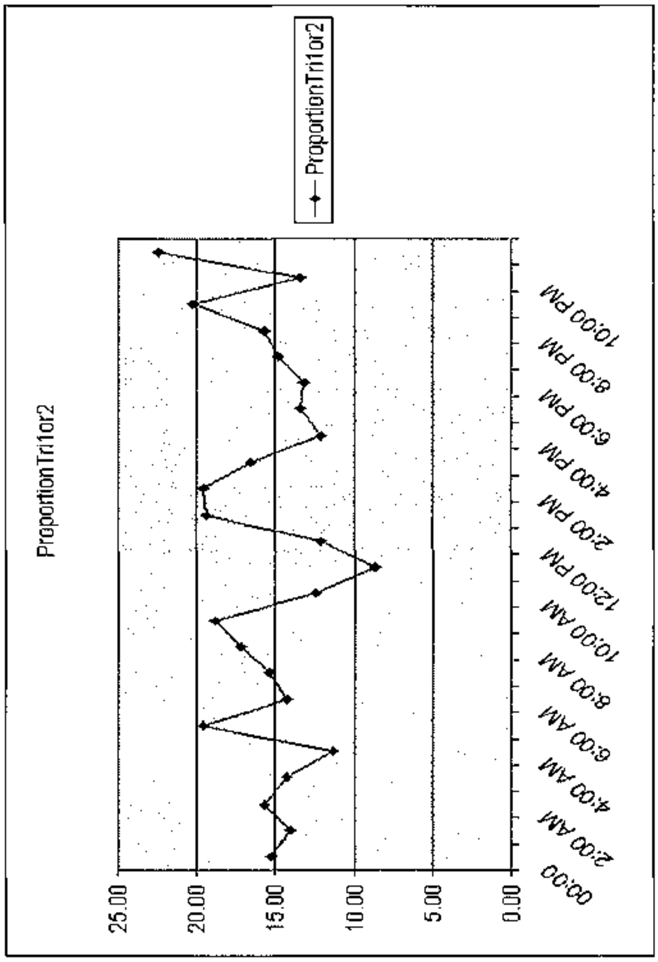
CLUSTER INPUT MEANS PLOT



S9.5.24 Input Means Plot: TGA TST Data – FIN YR 2007

9.5.3 Using PART DS: CUBES RESULTS

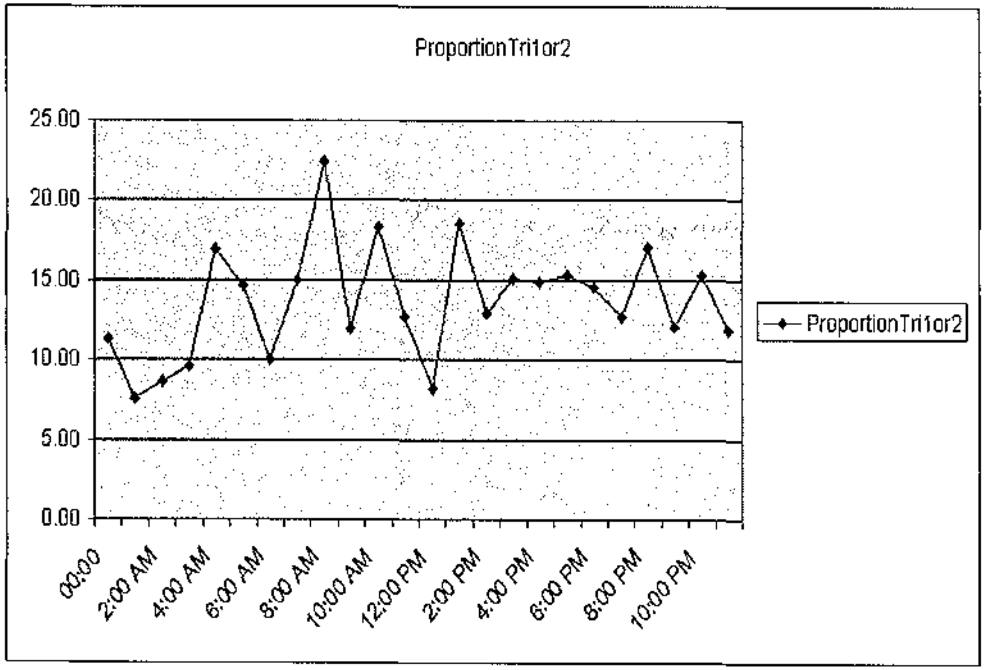
TimeOfDay	ProportionTri1or2
00:00	15.24
1:00 AM	14.02
2:00 AM	15.71
3:00 AM	14.29
4:00 AM	11.36
5:00 AM	19.57
6:00 AM	14.29
7:00 AM	15.38
8:00 AM	17.24
9:00 AM	18.84
10:00 AM	12.50
11:00 AM	8.65
12:00 PM	12.07
1:00 PM	19.40
2:00 PM	19.55
3:00 PM	16.57
4:00 PM	12.17
5:00 PM	13.40
6:00 PM	13.25
7:00 PM	14.88
8:00 PM	15.73
9:00 PM	20.20
10:00 PM	13.38
11:00 PM	22.42



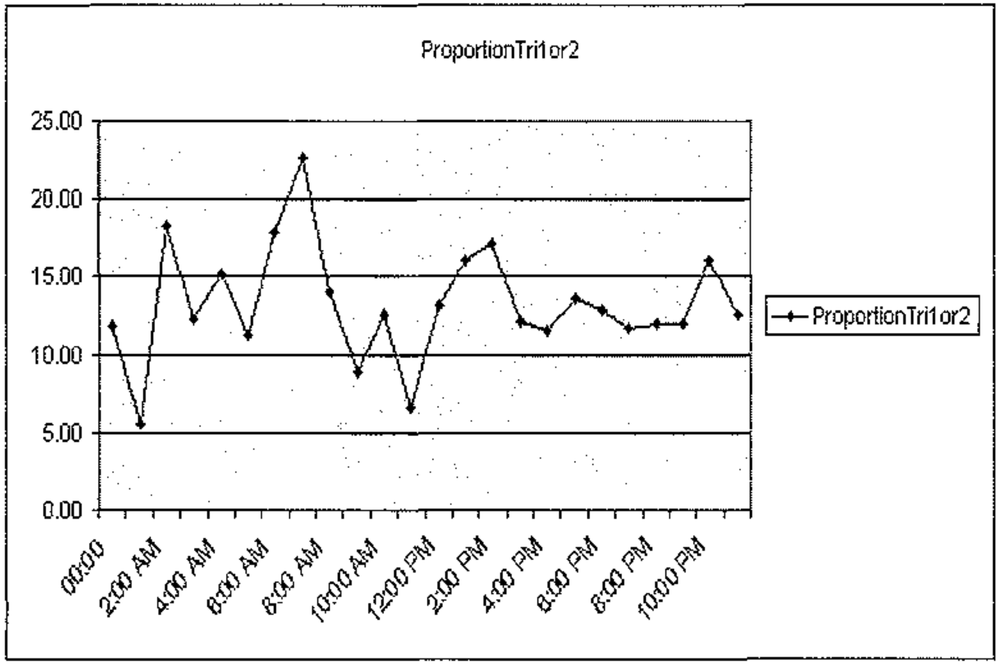
C9.5.1 Cube Pivot Table: TGA – July Fin Year 2005 – Triage Levels 1 & 2 Combined Derivation

C9.5.2 Cube Pivot Table: TGA – July Fin Year 2006 – Triage Levels 1 & 2 Combined Derivation

TimeOfDay	ProportionTri1or2
00:00	11.28
1:00 AM	7.55
2:00 AM	8.60
3:00 AM	9.62
4:00 AM	16.92
5:00 AM	14.71
6:00 AM	10.00
7:00 AM	15.00
8:00 AM	22.39
9:00 AM	11.94
10:00 AM	18.35
11:00 AM	12.73
12:00 PM	8.20
1:00 PM	18.52
2:00 PM	12.95
3:00 PM	15.06
4:00 PM	14.86
5:00 PM	15.26
6:00 PM	14.55
7:00 PM	12.77
8:00 PM	17.03
9:00 PM	12.12
10:00 PM	15.34
11:00 PM	11.86



TimeOfDay	ProportionTri1or2
00:00	11.90
1:00 AM	5.51
2:00 AM	18.27
3:00 AM	12.35
4:00 AM	15.25
5:00 AM	11.32
6:00 AM	17.78
7:00 AM	22.73
8:00 AM	14.08
9:00 AM	8.86
10:00 AM	12.63
11:00 AM	6.54
12:00 PM	13.11
1:00 PM	16.13
2:00 PM	17.09
3:00 PM	12.21
4:00 PM	11.56
5:00 PM	13.61
6:00 PM	12.85
7:00 PM	11.76
8:00 PM	12.00
9:00 PM	12.04
10:00 PM	16.15
11:00 PM	12.57



C9.5.3 Cube Pivot Table: TGA – July Fin Year 2007 – Triage Levels 1 & 2 Combined Derivation

Site	TGA
Financial	2005

Attendances					ArrWeekDay								
Fin Year	Fin Qu	Month	Diurl	TriageLevel	Sunday	Monday	Tuesday	Wednes	Thursday	Friday	Saturday	Grand Total	
2005	Q1_200	July	12midn	RESUSCITATION (IMME)							1	1	
				EMERGENCY (10MINS	3	1		2	5	1	3	15	15.24
				URGENT (30MINS)	6	8	8	4	9	8	6	49	
				SEMI-URGENT (60MI	3	4	3	9	7	5	1	32	
				NON-URGENT (2HRS)		1	1	1	5			8	
			12midnight Total		12	14	12	16	26	14	11	105	
			1am	RESUSCITATION (IMME)		1						1	
				EMERGENCY (10MINS	5	1		3	2	3		14	14.02
				URGENT (30MINS)	13	6	7	7	6	6	9	54	
				SEMI-URGENT (60MI	7	2	6	2	5	8	3	33	
				NON-URGENT (2HRS	1		1	1		1	1	5	
			1am Total		26	10	14	13	13	18	13	107	
			2am	RESUSCITATION (IMME)						1		1	
				EMERGENCY (10MINS)		2	1	3	2	1	1	10	15.71
				URGENT (30MINS)	6	3	5	5	12	3	7	41	
				SEMI-URGENT (60MI	3		2		2	6	3	16	
				NON-URGENT (2HRS)					1	1		2	
			2am Total		9	5	8	8	17	12	11	70	
			3am	RESUSCITATION (IMME)							2	2	
				EMERGENCY (10MINS	2	1		1		2	1	7	14.29
				URGENT (30MINS)	4	7	3	7	5	5	3	34	
				SEMI-URGENT (60MI	3	1	3		3	3	4	17	
				NON-URGENT (2HRS	1		1			1		3	
			3am Total		10	9	7	8	8	11	10	63	
			4am	EMERGENCY (10MINS	2		1			1	1	5	11.36
				URGENT (30MINS)		2	1	8	3	6	4	24	
				SEMI-URGENT (60MI	2	1	1	1	1	3	3	12	
				NON-URGENT (2HRS)					1	1	1	3	
			4am Total		4	3	3	9	5	11	9	44	
			5am	RESUSCITATION (IMME)			1					1	
				EMERGENCY (10MINS	2	2		2			2	8	19.57
				URGENT (30MINS)	2	4	5	4	2	3	5	25	
				SEMI-URGENT (60MI	2		2	1	1	2	1	9	
				NON-URGENT (2HRS)						2	1	3	
			5am Total		6	6	8	7	3	7	9	46	
			6am	EMERGENCY (10MINS	2	1			1		1	5	14.29
				URGENT (30MINS)	3	2	1	2	4	2	2	16	
				SEMI-URGENT (60MI	4	1	1	2	2		2	12	
				NON-URGENT (2HRS)						1	1	2	
			6am Total		9	4	2	4	7	3	6	35	
			7am	EMERGENCY (10MINS	1				1	1	3	6	15.38
				URGENT (30MINS)	3	2	3	4	2	4	4	22	
				SEMI-URGENT (60MI	2	1	1	1			3	8	
				NON-URGENT (2HRS)				1	1	1		3	
			7am Total		6	3	4	6	4	6	10	39	
			8am	EMERGENCY (10MINS)		2	2	2		3	1	10	17.24
				URGENT (30MINS)	2		3	3	4	3	1	16	
				SEMI-URGENT (60MI	7	1	3	2	5	1	3	22	
				NON-URGENT (2HRS)		2	1		4	2	1	10	
			8am Total		9	5	9	7	13	9	6	58	
			9am	EMERGENCY (10MINS	3	2		3	2	1	2	13	18.84
				URGENT (30MINS)	2	1	2	1	3	2	4	15	
				SEMI-URGENT (60MI	5	4	3	1	5	6	5	29	
				NON-URGENT (2HRS	3	1	2	1		4	1	12	
			9am Total		13	8	7	6	10	13	12	69	
			10am	RESUSCITATION (IMME)				1				1	
				EMERGENCY (10MINS	1		1	2	4	1	2	11	12.50
				URGENT (30MINS)	4	6	4	1	6	5	11	37	
				SEMI-URGENT (60MI	5	7	4	5	7	1	8	37	
				NON-URGENT (2HRS)		3		3	1	3		10	
			10am Total		10	16	9	12	18	10	21	96	
			11am	EMERGENCY (10MINS	1		3	1	1	3		9	8.65
				URGENT (30MINS)	5	10	10	5	8	8	10	56	
				SEMI-URGENT (60MI	1	8	7	2	5	3	4	30	
				NON-URGENT (2HRS	6			1	1		1	9	
			11am Total		13	18	20	9	15	14	15	104	

C9.5.4 Cube Pivot Table: TGA – July 2004 of Fin Year 2005 – Triage Levels – And Proportions Triage 1 & 2 Combined
(**Midnight – 11am**)

(...Continued from previous page)

12noon	RESUSCITATION (IMM	1				2	1	1	5	
	EMERGENCY (10MINS	1	2	2	1	2	1		9	12.07
	URGENT (30MINS)	4	8	5	7	7	9	11	51	
	SEMI-URGENT (60MI	7	6	6	3	11	4	3	40	
	NON-URGENT (2HRS)	1	4		1	1		4	11	
12noon Total		14	20	13	12	23	15	19	116	
1pm	RESUSCITATION (IMM	1			1		1		3	
	EMERGENCY (10MINS	4	3	3	1	4	6	2	23	19.40
	URGENT (30MINS)	6	12	6	9	4	5	10	52	
	SEMI-URGENT (60MI	5	10	11	4	9	5	3	47	
	NON-URGENT (2HRS)	3	1	1			1	3	9	
1pm Total		19	26	21	15	17	18	18	134	
2pm	RESUSCITATION (IMME)					1		1	2	
	EMERGENCY (10MINS	3	2	3	4	5	2	5	24	19.55
	URGENT (30MINS)	4	11	7	6	11	6	13	58	
	SEMI-URGENT (60MI	7	6	8	3	7	5	6	42	
	NON-URGENT (2HRS)		1	1	2		2	1	7	
2pm Total		14	20	19	15	24	15	26	133	
3pm	RESUSCITATION (IMM	1			1				2	
	EMERGENCY (10MINS	5	1	4	1	4	5	7	27	16.57
	URGENT (30MINS)	7	3	15	13	13	11	13	75	
	SEMI-URGENT (60MI	12	7	12	5	11	9	9	65	
	NON-URGENT (2HRS)	1		1	1	1		2	6	
3pm Total		26	11	32	21	29	25	31	175	
4pm	RESUSCITATION (IMME)							1	1	
	EMERGENCY (10MINS	5	5	2	1	2	4	3	22	12.17
	URGENT (30MINS)	12	13	21	13	14	20	12	105	
	SEMI-URGENT (60MI	5	9	7	11	5	6	9	52	
	NON-URGENT (2HRS)	1	1	3	1		2	1	9	
4pm Total		23	28	33	26	21	32	26	189	
5pm	RESUSCITATION (IMM	1	1						2	
	EMERGENCY (10MINS	3	8	3	5	2	3	2	26	13.40
	URGENT (30MINS)	9	19	16	14	11	26	14	109	
	SEMI-URGENT (60MI	7	4	8	10	9	10	13	61	
	NON-URGENT (2HRS)	1	2	1	1	3	3		11	
5pm Total		21	34	28	30	25	42	29	209	
6pm	EMERGENCY (10MINS	3	2	2	5	4	3	1	20	13.25
	URGENT (30MINS)	12	9	11	9	8	11	14	74	
	SEMI-URGENT (60MI	12	5	5	9	8	5	6	50	
	NON-URGENT (2HRS)	1		2		1	2	1	7	
6pm Total		28	16	20	23	21	21	22	151	
7pm	RESUSCITATION (IMME)							1	1	
	EMERGENCY (10MINS	3	1	1	8	5	1	5	24	14.88
	URGENT (30MINS)	8	3	12	5	19	11	8	66	
	SEMI-URGENT (60MI	6	11	5	6	18	11	13	70	
	NON-URGENT (2HRS)	1			1	4	1		7	
7pm Total		18	15	18	20	46	24	27	168	
8pm	RESUSCITATION (IMM	1							1	
	EMERGENCY (10MINS	2		3	4	7	9	2	27	15.73
	URGENT (30MINS)	17	13	7	12	10	12	12	83	
	SEMI-URGENT (60MI	12	6	8	2	10	12	9	59	
	NON-URGENT (2HRS)	1		5			2		8	
8pm Total		33	19	23	18	27	35	23	178	
9pm	RESUSCITATION (IMM	1						2	3	
	EMERGENCY (10MINS	7	5	8	3	6	5	4	38	20.20
	URGENT (30MINS)	7	14	16	14	13	14	17	95	
	SEMI-URGENT (60MI	8	7	8	11	8	10	9	61	
	NON-URGENT (2HRS)	1	1	1		2	1		6	
9pm Total		24	27	33	28	29	30	32	203	
10pm	RESUSCITATION (IMM	1							1	
	EMERGENCY (10MINS	3	3	2	2	3	4	3	20	13.38
	URGENT (30MINS)	10	9	13	17	17	7	13	86	
	SEMI-URGENT (60MI	8	4	9	5	8	9	2	45	
	NON-URGENT (2HRS)	1	1	2		1			5	
10pm Total		23	17	26	24	29	20	18	157	
11pm	RESUSCITATION (IMME)					1	1	1	3	
	EMERGENCY (10MINS	5	5	5	3	7	6	3	34	22.42
	URGENT (30MINS)	13	9	8	12	14	10	10	76	
	SEMI-URGENT (60MI	5	7	7	9	6	8	6	48	
	NON-URGENT (2HRS)	2			1	1			4	
11pm Total		25	21	20	25	29	25	20	165	
July Total		395	355	389	362	459	430	424	2814	

C9.5.4 Cube Pivot Table: TGA – July 2004 of Fin Year 2005 – Triage Levels – And Proportions Triage 1 & 2 Combined
(**Noon – 11pm**)

Site	TGA
FinancialY	2006

Attendances					ArrW	kDay							
Fisc Year	Fisc Qu	Month	Dircl	TriageLevel	Sunday	Monday	Tuesday	Wednes	Thursday	Friday	Saturday	Grand Total	
2006	Q1_200	July	12midn	RESUSCITATION (IMME)				1		1		2	
				EMERGENCY (10MINS)			2	1	4	3	3	13	11.28
				URGENT (30MINS)	12	6	4	15	11	15	10	73	
				SEMI-URGENT (60MI	4	9	6	3	7	10	4	43	
				NON-URGENT (2HRS)	1						1	2	
			12midnight Total		17	15	12	20	22	29	18	133	
			1am	EMERGENCY (10MINS	1	2	1			2	2	8	7.55
				URGENT (30MINS)	11	5	8	8	12	10	11	65	
				SEMI-URGENT (60MI	6	1	5	3	7	7	2	31	
				NON-URGENT (2HRS)				1	1			2	
			1am Total		18	8	14	12	20	19	15	106	
			2am	EMERGENCY (10MINS	1	2	1		1	1	2	8	8.60
				URGENT (30MINS)	9	6	7	7	13	13	5	60	
				SEMI-URGENT (60MI	5	1	3	3	5	2	2	21	
				NON-URGENT (2HRS)			3			1		4	
			2am Total		15	9	14	10	19	17	9	93	
			3am	EMERGENCY (10MINS)		1	1		1		2	5	9.62
				URGENT (30MINS)	1	6	5	6	5	4	2	29	
				SEMI-URGENT (60MI	4	2	1	1	4	1	5	18	
			3am Total		5	9	7	7	10	5	9	52	
			4am	RESUSCITATION (IM	2						1	3	
				EMERGENCY (10MINS	1	2	2	1	1		1	8	16.92
				URGENT (30MINS)	5	6	3	6	2	2	11	35	
				SEMI-URGENT (60MI	4	3		2	3	1	3	16	
				NON-URGENT (2HRS)					1	1	1	3	
			4am Total		12	11	5	9	7	4	17	65	
			5am	RESUSCITATION (IM	1						1	2	
				EMERGENCY (10MINS	1				1		1	3	14.71
				URGENT (30MINS)	4	3	1	2	3	2	4	19	
				SEMI-URGENT (60MI	5			1	1	2		9	
				NON-URGENT (2HRS)							1	1	
			5am Total		11	3	1	3	5	4	7	34	
			6am	EMERGENCY (10MINS)		1			1		3	5	10.00
				URGENT (30MINS)	9		4	1	7	3	4	28	
				SEMI-URGENT (60MI	4	1	2	2	1	2	2	14	
				NON-URGENT (2HRS)	1		1	1				3	
			6am Total		14	2	7	4	9	5	9	50	
			7am	EMERGENCY (10MINS	3		1				2	6	15.00
				URGENT (30MINS)	1	1	4	1	7	4	3	21	
				SEMI-URGENT (60MI	2	1		2	1	2	3	11	
				NON-URGENT (2HRS)					1	1		2	
			7am Total		6	2	5	3	9	7	8	40	
			8am	RESUSCITATION (IM	1		1					2	
				EMERGENCY (10MINS	2	2	3	4		1	1	13	22.39
				URGENT (30MINS)	6	1	5	3	4	7	2	28	
				SEMI-URGENT (60MI	3	2	3	1	2	2	2	15	
				NON-URGENT (2HRS)		2	2		2	2	1	9	
			8am Total		12	7	14	8	8	12	6	67	
			9am	EMERGENCY (10MINS	3	3				1	1	8	11.94
				URGENT (30MINS)	6	2	7	5	3	2	5	30	
				SEMI-URGENT (60MI	4	4	2	3	3	1	3	20	
				NON-URGENT (2HRS)	2	2	1			1	3	9	
			9am Total		15	11	10	8	6	5	12	67	
			10am	EMERGENCY (10MINS	2	1	2	4	3	1	7	20	18.35
				URGENT (30MINS)	8	4	8	5	3	6	12	46	
				SEMI-URGENT (60MI	5	1	4	2	4	15	6	37	
				NON-URGENT (2HRS)		2			1	1	2	6	
			10am Total		15	8	14	11	11	23	27	109	
			11am	EMERGENCY (10MINS	4	1	5	1	2	1		14	12.73
				URGENT (30MINS)	3	8	4	8	5	10	6	44	
				SEMI-URGENT (60MI	4	4	3	2	4	5	8	30	
				NON-URGENT (2HRS)	2	4	1	5	4	4	2	22	
			11am Total		13	17	13	16	15	20	16	110	

C9.5.5 Cube Pivot Table: TGA – July 2005 of Fin Year 2006 – Triage Levels – And Proportions Triage 1 & 2 Combined
(Midnight – 11am)

(...Continued from previous page)

12noon	EMERGENCY (10MINS	2	2			2	1	3	10	8.20
	URGENT (30MINS)	14	7	7	7	12	7	7	61	
	SEMI-URGENT (60MI	8	6	8	3	6	6	5	42	
	NON-URGENT (2HRS)	1	4	2	1		1		9	
12noon Total		25	19	17	11	20	15	15	122	
1pm	RESUSCITATION (IM	1							1	
	EMERGENCY (10MINS	5	4	3	3	3	3	3	24	18.52
	URGENT (30MINS)	14	7	7	6	5	7	13	59	
	SEMI-URGENT (60MI	9	5	8	2	6	7	2	39	
	NON-URGENT (2HRS)		3	2	2	2	1	2	12	
1pm Total		29	19	20	13	16	18	20	135	
2pm	EMERGENCY (10MINS	7	3	3	1	2	1	1	18	12.95
	URGENT (30MINS)	10	12	7	5	16	10	14	74	
	SEMI-URGENT (60MI	7	9	3	2	4	4	10	39	
	NON-URGENT (2HRS)	2		2	1	1		2	8	
2pm Total		26	24	15	9	23	15	27	139	
3pm	EMERGENCY (10MINS	3	4	6		3	4	5	25	15.06
	URGENT (30MINS)	9	13	6	8	10	7	10	63	
	SEMI-URGENT (60MI	9	7	7	5	11	8	17	64	
	NON-URGENT (2HRS)	2	1	1	4	2	1	3	14	
3pm Total		23	25	20	17	26	20	35	166	
4pm	RESUSCITATION (IMME)						1		1	
	EMERGENCY (10MINS	5	8	1	2	2	6	1	25	14.86
	URGENT (30MINS)	14	8	11	14	8	23	10	88	
	SEMI-URGENT (60MI	5	6	7	3	7	3	12	43	
	NON-URGENT (2HRS)	2	2	2	4		3	5	18	
4pm Total		26	24	21	23	17	36	28	175	
5pm	RESUSCITATION (IMME)		1		1				2	
	EMERGENCY (10MINS	4	3	3	5	2	7	3	27	15.26
	URGENT (30MINS)	20	8	9	13	10	20	17	97	
	SEMI-URGENT (60MI	7	7	3	8	12	8	6	51	
	NON-URGENT (2HRS)	1	3	2	3		1	3	13	
5pm Total		32	22	17	30	24	36	29	190	
6pm	RESUSCITATION (IMME)						1	1	2	
	EMERGENCY (10MINS	4	4	1	3	4	4	2	22	14.55
	URGENT (30MINS)	10	10	8	11	10	10	19	78	
	SEMI-URGENT (60MI	12	6	7	3	10	4	8	50	
	NON-URGENT (2HRS)	5	1		1	3	2	1	13	
6pm Total		31	21	16	18	27	21	31	165	
7pm	RESUSCITATION (IM	1							1	
	EMERGENCY (10MINS	3	3	1	3	2	3	2	17	12.77
	URGENT (30MINS)	8	7	13	7	6	11	12	64	
	SEMI-URGENT (60MI	6	8	12	3	8	6	3	46	
	NON-URGENT (2HRS)	2	1		5	1	3	1	13	
7pm Total		20	19	26	18	17	23	18	141	
8pm	RESUSCITATION (IM	1							1	
	EMERGENCY (10MINS	4	2	3	4	1	9	7	30	17.03
	URGENT (30MINS)	19	8	10	11	17	16	16	97	
	SEMI-URGENT (60MI	7	7	5	1	10	5	8	43	
	NON-URGENT (2HRS)		3	2	2	2	2		11	
8pm Total		31	20	20	18	30	32	31	182	
9pm	EMERGENCY (10MINS	1	4	2	4	4	3	2	20	12.12
	URGENT (30MINS)	17	13	10	11	9	17	15	92	
	SEMI-URGENT (60MI	8	6	5	4	3	7	11	44	
	NON-URGENT (2HRS)	1	3	2	2			1	9	
9pm Total		27	26	19	21	16	27	29	165	
10pm	EMERGENCY (10MINS	3	5	3	3	5	7	1	27	15.34
	URGENT (30MINS)	16	7	11	17	6	23	8	88	
	SEMI-URGENT (60MI	10	8	8	5	9	5	8	53	
	NON-URGENT (2HRS)		2	3	2	1			8	
10pm Total		29	22	25	27	21	35	17	176	
11pm	RESUSCITATION (IMME)					1			1	
	EMERGENCY (10MINS	4	3	1	5	2	1	4	20	11.86
	URGENT (30MINS)	11	17	13	20	15	19	13	108	
	SEMI-URGENT (60MI	4	4	8	10	5	5	7	43	
	NON-URGENT (2HRS)	2	1	1	1				5	
11pm Total		21	25	23	36	23	25	24	177	
July Total		473	368	355	352	401	453	457	2859	

C9.5.5 Cube Pivot Table: TGA – July 2005 of Fin Year 2006 – Triage Levels – And Proportions Triage 1 & 2 Combined
(**Noon – 11pm**)

Site	TGA
Financial	2007

Fin Year	Fin Qu	Month	Dirc	TriageLevel	Sunday	Monday	Tuesda	Wednes	Thursday	Friday	Saturda	Grand Total	
2007	Q1_200	July	12mida	RESUSCITATION (IM	1				1			2	
				EMERGENCY (10MINS	3	2		3	1	3	1	13	11.90
				URGENT (30MINS)	12	16	5	9	8	11	9	70	
				SEMI-URGENT (60MI	3	9	7	5	5	4	1	34	
				NON-URGENT (2HRS	3		1	3				7	
			12midnight Total		22	27	13	20	15	18	11	124	
			1am	EMERGENCY (10MINS	3	1	2				1	7	5.51
				URGENT (30MINS)	10	7	8	9	12	10	16	72	
				SEMI-URGENT (60MI	10	4	3	7	4	9	4	41	
				NON-URGENT (2HRS	5					1	1	7	
			1am Total		28	12	13	16	16	20	22	127	
			2am	RESUSCITATION (IMME)							1	1	
				EMERGENCY (10MINS	2		1			1	2	6	6.73
				URGENT (30MINS)	12	4	10	4	3	8	6	47	
				SEMI-URGENT (60MI	18	5	4	8	2	6	3	46	
				NON-URGENT (2HRS)				1		1	2	4	
			2am Total		32	9	15	13	5	16	14	104	
			3am	EMERGENCY (10MINS	2			2	1	3	2	10	12.35
				URGENT (30MINS)	6	6	5	4	4	9	8	42	
				SEMI-URGENT (60MI	8	4	1	3	1	3	9	29	
			3am Total		16	10	6	9	6	15	19	81	
			4am	RESUSCITATION (IMME)		1				1		2	
				EMERGENCY (10MINS	1	1	1	1	1		2	7	15.25
				URGENT (30MINS)	6	3	1	7	3	4	4	28	
				SEMI-URGENT (60MI	3	3		1	6	4	5	22	
			4am Total		10	8	2	9	10	9	11	59	
			5am	EMERGENCY (10MINS	2	1	1	1			1	6	11.32
				URGENT (30MINS)	6	3	3	4	3	6	4	29	
				SEMI-URGENT (60MI	6	4	3		1		2	16	
				NON-URGENT (2HRS)							2	2	
			5am Total		14	8	7	5	4	6	9	53	
			6am	RESUSCITATION (IM	1							1	
				EMERGENCY (10MINS	1		1		2	1	2	7	17.78
				URGENT (30MINS)	4	4	4	4	2	3	3	24	
				SEMI-URGENT (60MI	3	1		1	1	1	1	8	
				NON-URGENT (2HRS	1	1					3	5	
			6am Total		10	6	5	5	5	5	9	45	
			7am	RESUSCITATION (IMME)						1		1	
				EMERGENCY (10MINS	1	1	2	2	2		1	9	22.73
				URGENT (30MINS)	3	3	2	2	3	2	3	18	
				SEMI-URGENT (60MI	4		2	1	2	2	4	15	
				NON-URGENT (2HRS)							1	1	
			7am Total		8	4	6	5	7	5	9	44	
			8am	EMERGENCY (10MINS	3	3	1		1		2	10	14.08
				URGENT (30MINS)	6	2	5	5	4	5	6	33	
				SEMI-URGENT (60MI	4	4	2	1	3	5	3	22	
				NON-URGENT (2HRS	1	1	1	1		1	1	6	
			8am Total		14	10	9	7	8	11	12	71	
			9am	EMERGENCY (10MINS	2			1		1	3	7	8.86
				URGENT (30MINS)	6	4	4	5	5	5	6	35	
				SEMI-URGENT (60MI	5	1	2	1	7	6	6	28	
				NON-URGENT (2HRS	1	3	1		2	2		9	
			9am Total		14	8	7	7	14	14	15	79	
			10am	RESUSCITATION (IMME)						1		1	
				EMERGENCY (10MINS	1	3	3	1	1		2	11	12.63
				URGENT (30MINS)	9	4	7	5	4	2	7	38	
				SEMI-URGENT (60MI	11	5	3	6	5	4	3	37	
				NON-URGENT (2HRS	2	2	1		2		1	8	
			10am Total		23	14	14	12	12	7	13	95	
			11am	EMERGENCY (10MINS	2	2	1			1	1	7	6.54
				URGENT (30MINS)	8	10	9	5	3	6	7	48	
				SEMI-URGENT (60MI	6	5	6	7	8	4	4	40	
				NON-URGENT (2HRS	3	2	3	1	1	1	1	12	
			11am Total		19	19	19	13	12	12	13	107	

C9.5.6 Cube Pivot Table: TGA – July 2006 of Fin Year 2007 – Triage Levels – And Proportions Triage 1 & 2 Combined
(Midnight – 11am)

(...Continued from previous page)

12noon	RESUSCITATION (IM	1							1	
	EMERGENCY (10MINS	2	2	6	2		3		15	13.11
	URGENT (30MINS)	9	9	1	10	4	4	11	48	
	SEMI-URGENT (60MI	9	8	6	4	3	4	5	39	
	NON-URGENT (2HRS	4	7	1		2	2	3	19	
12noon Total		25	26	14	16	9	13	19	122	
1pm	RESUSCITATION (IM	1						1	2	
	EMERGENCY (10MINS	1	6	4	4	1	3	4	23	16.13
	URGENT (30MINS)	10	5	5	9	4	8	7	48	
	SEMI-URGENT (60MI	14	9	7	13	12	5	10	70	
	NON-URGENT (2HRS	2	1	1	2		2	4	12	
1pm Total		28	21	17	28	17	18	26	155	
2pm	EMERGENCY (10MINS	1	4	2	6	5	6	3	27	17.09
	URGENT (30MINS)	17	18	8	8	9	9	9	78	
	SEMI-URGENT (60MI	11	2	3	5	7	10	8	46	
	NON-URGENT (2HRS	1		1	1	1	1	2	7	
2pm Total		30	24	14	20	22	26	22	158	
3pm	RESUSCITATION (IMME)		1						1	
	EMERGENCY (10MINS	1	4	3	5	5	2	5	25	12.21
	URGENT (30MINS)	12	15	15	6	12	7	17	84	
	SEMI-URGENT (60MI	13	22	8	9	8	10	17	87	
	NON-URGENT (2HRS	4	3	1	1	1		6	16	
3pm Total		30	45	27	21	26	19	45	213	
4pm	RESUSCITATION (IMME)						2		2	
	EMERGENCY (10MINS	4	8	1	4		1	3	21	11.56
	URGENT (30MINS)	13	12	7	14	13	15	13	87	
	SEMI-URGENT (60MI	13	14	6	6	5	12	10	66	
	NON-URGENT (2HRS	1	5		6	2	4	5	23	
4pm Total		31	39	14	30	20	34	31	199	
5pm	RESUSCITATION (IMME)					1			1	
	EMERGENCY (10MINS	8	3	1	6	2		5	25	13.61
	URGENT (30MINS)	16	18	11	7	9	15	17	93	
	SEMI-URGENT (60MI	15	10	10	3	7	5	6	56	
	NON-URGENT (2HRS	1	2	2	2	1	4	4	16	
5pm Total		40	33	24	18	20	24	32	191	
6pm	RESUSCITATION (IMME)			1					1	
	EMERGENCY (10MINS	3	2	3	6	3	3	2	22	12.85
	URGENT (30MINS)	12	13	12	10	11	9	13	80	
	SEMI-URGENT (60MI	16	13	15	2	4	4	11	65	
	NON-URGENT (2HRS	3	3	1	1	2		1	11	
6pm Total		34	31	32	19	20	16	27	179	
7pm	RESUSCITATION (IMME)		1						1	
	EMERGENCY (10MINS	3	4	2	3	2	1	4	19	11.76
	URGENT (30MINS)	10	15	7	12	12	15	12	83	
	SEMI-URGENT (60MI	12	11	10	2	4	4	12	55	
	NON-URGENT (2HRS	5	1	2	1	1	1	1	12	
7pm Total		30	32	21	18	19	21	29	170	
8pm	EMERGENCY (10MINS	5	6	3	2	4	1	3	24	12.00
	URGENT (30MINS)	14	15	14	13	6	15	16	93	
	SEMI-URGENT (60MI	11	10	9	8	12	13	8	71	
	NON-URGENT (2HRS	2	2	3	3	1	1		12	
8pm Total		32	33	29	26	23	30	27	200	
9pm	EMERGENCY (10MINS	4	7	4	1	1		6	23	12.04
	URGENT (30MINS)	14	15	7	9	12	16	16	89	
	SEMI-URGENT (60MI	14	16	9	4	10	7	9	69	
	NON-URGENT (2HRS	2	3	3		1	1		10	
9pm Total		34	41	23	14	24	24	31	191	
10pm	RESUSCITATION (IMME)							1	1	
	EMERGENCY (10MINS	6	6	5	2	1	1	4	25	16.15
	URGENT (30MINS)	9	11	12	11	6	8	9	66	
	SEMI-URGENT (60MI	8	14	8	9	8	5	7	59	
	NON-URGENT (2HRS	2	1	2	2	1	1	1	10	
10pm Total		25	32	27	24	16	15	22	161	
11pm	RESUSCITATION (IM	1							1	
	EMERGENCY (10MINS	5	5	1	3	2	2	2	20	12.57
	URGENT (30MINS)	12	15	10	16	10	10	13	86	
	SEMI-URGENT (60MI	8	10	6	5	10	6	9	54	
	NON-URGENT (2HRS	1	1	1	2			1	6	
11pm Total		27	31	18	26	22	18	25	167	
July Total		576	523	376	381	352	396	493	3097	

C9.5.6 Cube Pivot Table: TGA – July 2006 of Fin Year 2007 – Triage Levels – And Proportions Triage 1 & 2 Combined
(Noon – 11pm)

13.3 APPENDICES C: RESULTS:CHAPTER 11

APPENDICES C*

RESULTS
FOR
CHAPTER 11

APPENDIX **C1**
APPENDIX **C2**
APPENDIX **C3**

13.3 APPENDIX C1: RESULTS:CHAPTER 11.1

RESULTS HELD IN THIS APPENDIX

S11.1.1 S11.1.2 S11.1.3 S11.1.4

C11.1.1 C11.1.2

11.1 RESULTS: Peripheral: ETHNICITY

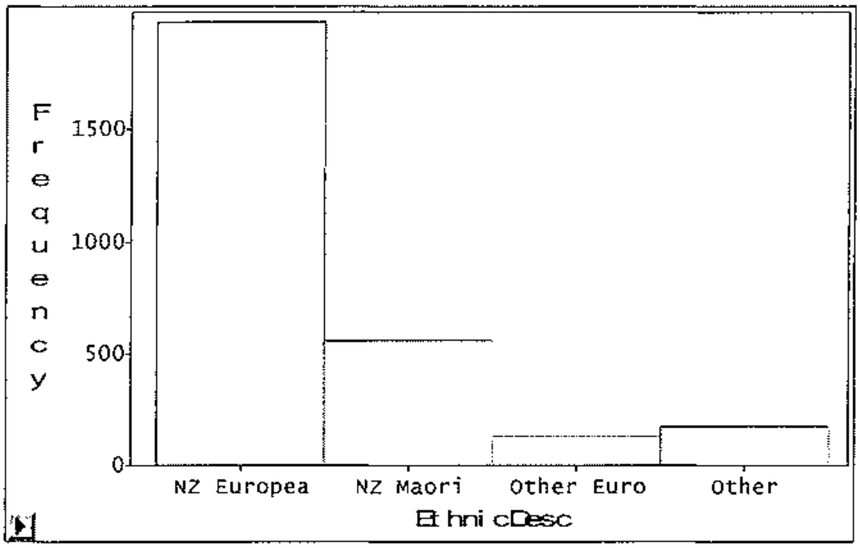
11.1.1 Peripheral: FINDINGS

FINDINGS AND COMMENTS

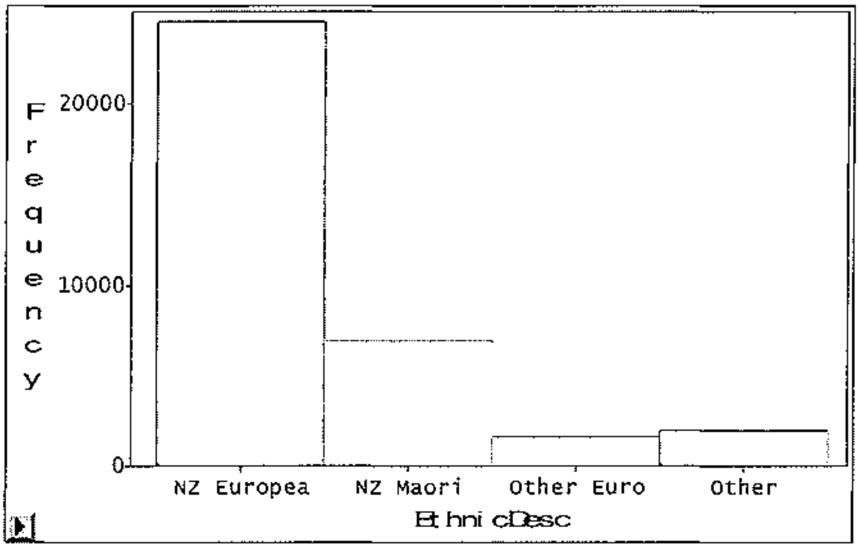
Cf. Earlier Pages **183 - 184**

11.1.2 Peripheral: SAS RESULTS

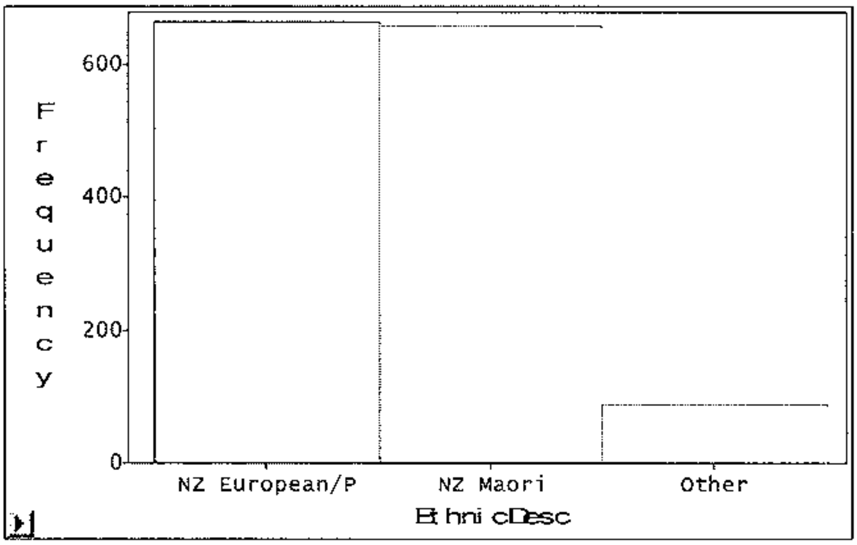
ETHNICITY



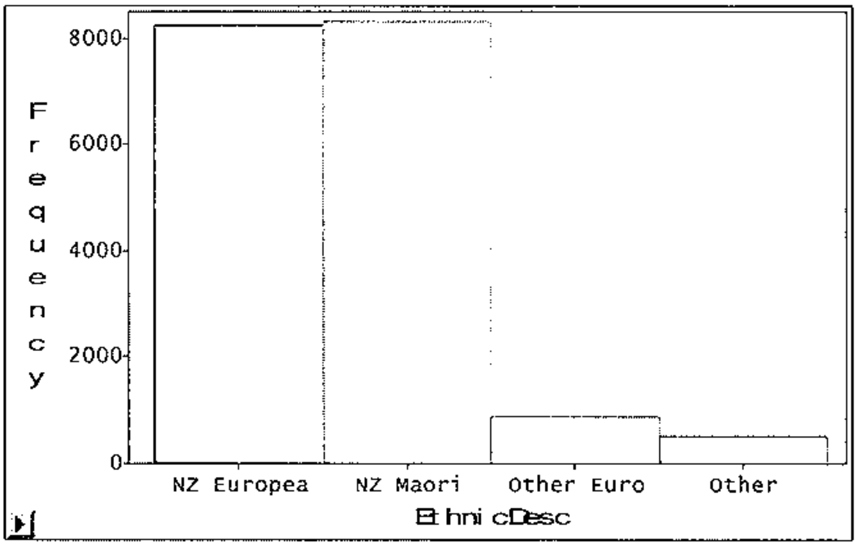
S11.1.1 Histogram: Hosp T - JULY 2005 - Ethnic Frequencies



S11.1.2 Histogram: Hosp T – FULL Fin Year 2006 - Ethnic Frequencies



S11.1.3 Histogram: Hosp W - JULY 2005 - Ethnic Frequencies



S11.1.4 Histogram: Hosp W – FULL Fin Year 2006 - Ethnic Frequencies

11.1.3 Peripheral: CUBE RESULTS

Site	TGA		
FinancialYr	All FinancialYr		
Attendance	ArrFiscYear		
Ethnic Gr	2005	2006	2007
Asian	892	889	883
European	24847	26341	26804
Maori	6661	7082	7473
Not Stated	513	345	366
Other	263	142	168
Pacific Is	392	445	501
Grand Total	33568	35244	36195

C11.1.1 Cube Pivot Table: Hosp T – Three Financial Years - Ethnic Frequencies

Site	WHK		
FinancialYr	All FinancialYr		
Attendance	ArrFiscYear		
Ethnic Gr	2005	2006	2007
Asian	166	191	189
European	9238	9187	9481
Maori	8498	8377	8886
Not Stated	89	142	105
Other	91	58	70
Pacific Is	105	98	73
Grand Total	18187	18053	18804

C11.1.2 Cube Pivot Table: Hosp W – Three Financial Years - Ethnic Frequencies

13.3 APPENDIX C2: RESULTS:CHAPTER 11.2

RESULTS HELD IN THIS APPENDIX

C11.2.1 C11.2.2 C11.2.3

11.2 RESULTS: Peripheral: REFERRALS

11.2.1 Peripheral: FINDINGS

FINDINGS AND COMMENTS

Cf. Earlier Pages **185 - 186**

11.2.2 Peripheral: CUBE RESULTS

REFERRAL DETAIL

Site	TGA
FinancialYr	(Multiple Items)

Attendances			ArrFiscYear					
SummaryGroup	Source Group	Code Desc	2005	2006	2007			
Mental Health	Mental Health	CA CHILD & FAMILY MH		1				
		INT INTAKE - MHS	1	1				
		PA PACT TEAM - MHS	8	6	2			
		PDN PSYCH.DIST.NURSE		1	4			
		PLN PSYCH LIAISON NURSE	3	3	4			
	Mental Health Total		12	12	10			
Mental Health Total			12	12	10			
Primary Referral	GP Referred	GP GENERAL PRACTITIONER	7693	7723	6892	22.92	21.91	19.05
	GP Referred Total		7693	7723	6892			
	Non Health Agency	CY CYPS		1				
		EM EMPLOYER	1					
		HS HOME SUPPORT PROVIDR		1				
		KM MAORI FACILITY			2			
		SCH SCHOOL	4	3	1			
	Non Health Agency Total		5	5	3			
	Obstetric	MW MIDWIFE	107	89	94			
	Obstetric Total		107	89	94			
	Oth Prim Health Agency	AB AMBULANCE STAFF	1358	1432	545			
		ACC WRITTEN ACC REFERRAL	1					
		DN DISTRICT NURSE	62	65	65			
		DS DENTAL SERVICES	2	7	3			
		FAM FAMILY PLANNING CLIN	4					
		OA OUTSIDE AGENCIES	463	406	261			
		OPN OPOTIKI NURSE	2					
		OPT OPTOMETRIST	2	2	1			
		PH PHYSIOTHERAPY	3	2	2			
		PS PRIVATE CONSULTANT			3			
		RH REST HOME	21	11	14			
	Oth Prim Health Agency Total		1918	1925	894			
	Other Hospital	OHP OTHER HOSP - PRIVATE	4	4	6			
	Other Hospital Total		4	4	6			
	Police / Coroner	FR FORENSIC/POLICE	26	26	45			
		JU JUSTICE COURTS ETC	2					
	Police / Coroner Total		28	26	45			
	Post Operative Compl	VOP VENTURO POST OP	1					
	Post Operative Compl Total		1					
	Self Referral	S SELF	23181	24695	27339	69.06	70.07	75.57
		SF SELF/FAMILY	16		4	0.05	0.00	0.01
	Self Referral Total		23197	24695	27343	69.10	70.07	75.58
Primary Referral Total			32953	34467	35277			
Secondary Ref	Other Hospital	OH OTH HOSPITAL PUBLIC	131	138	146			
	Other Hospital Total		131	138	146			
	Secondary Health Svce	AE ACCIDENT & EMERGENCY	108	166	348			
		CN CARDIAC NURSE	1					
		DE DIABETIC EDUCATOR	1					
		IP INPATIENT	9	5	4			
		ON ONCOLOGY NURSE	8	2	3			
		OP OUTPATIENT	86	87	76			
		OT ENT SERVICE		1				
		PAE PAEDIATRICIAN	2		1			
		REN RENAL/DIALYSIS SRVCE	1	5	2			
		RN RESPIRATORY NURSE	1					
		SP SPECIALIST	255	356	310			
		SW SOCIAL WORKERS		5	2			
	Secondary Health Svce Total		472	627	746			
Secondary Ref Total			603	765	892			
Grand Total			33568	35244	36179			

C11.2.1 Cube Pivot Tables: Hospital T – FULL Fin Years 2005, 2006 & 2007 – % GP-referred emphasized

Site	WHK
FinancialYr	(Multiple Items)

Attendances			ArrFiscYear					
SummaryGroup	Source Group	Code Desc	2005	2006	2007			
Mental Health	Mental Health	PDN PSYCH DIST NURSE		2	1			
		PLN PSYCH LIAISON NURSE	8	8	6			
	Mental Health Total		8	10	7			
Mental Health Total			8	10	7			
Primary Referral	GP Referred	GP GENERAL PRACTITIONER	2869	2741	2527	15.78	15.18	13.44
	GP Referred Total		2869	2741	2527			
	Non Health Agency	EM EMPLOYER		1				
		KP PACIFIC IS FACILITY		1				
		SCH SCHOOL	30	18	17			
	Non Health Agency Total		30	20	17			
	Obstetric	MW MIDWIFE	20	26	24			
	Obstetric Total		20	26	24			
	Oth Prim Health Agency	AB AMBULANCE STAFF	113	146	107			
		CH COMMUN HEALTH WORKER			1			
		DN DISTRICT NURSE	30	73	56			
		DS DENTAL SERVICES	1	2	1			
		DW DOM OT/PHYSIO		1				
		HCW HEALTH CARE WORKER		2	5			
		OA OUTSIDE AGENCIES	17	10	19			
		OPN OPOTIKI NURSE	176	133	129			
		PH PHYSIOTHERAPY	1	11	14			
		PS PRIVATE CONSULTANT		2				
		RH REST HOME	36	85	82			
	Oth Prim Health Agency Total		374	465	416			
	Police / Coroner	FOR FORENSIC REFERRAL	1					
		FR FORENSIC/POLICE	4	8	11			
	Police / Coroner Total		5	8	11			
	Self Referral	S SELF	2853	3444	2810	15.69	19.08	14.95
		SF SELF/FAMILY	11633	10851	12457	63.96	60.11	66.26
	Self Referral Total		14486	14295	15267	79.65	79.18	81.21
Primary Referral Total			17784	17555	18262			
Secondary Ref	Other Hospital	OH OTH HOSPITAL PUBLIC	121	176	148			
	Other Hospital Total		121	176	148			
	Secondary Health Svce	AD ALCOHOL & DRUG SVCE	1		2			
		AE ACCIDENT & EMERGENCY	155	203	275			
		AU AUDIOLOGY	3					
		DE DIABETIC EDUCATOR		2	1			
		IP INPATIENT	1	6	4			
		ON ONCOLOGY NURSE	17	17	15			
		OP OUTPATIENT	49	46	45			
		OT ENT SERVICE			1			
		PAE PAEDIATRICIAN	1		1			
		RA REHAB & ASSESS UNIT		1				
		REN RENAL/DIALYSIS SRVCE	1	1	3			
		RN RESPIRATORY NURSE		2				
		SP SPECIALIST	46	32	36			
	Secondary Health Svce Total		274	310	383			
Secondary Ref Total			395	486	531			
Grand Total			18187	18053	18800			

C11.2.2 Cube Pivot Tables: Hospital W – FULL Fin Years 2005, 2006 & 2007 – % GP-referred emphasized

Site	OPO							
FinancialYr	(Multiple Items)							
Attendances			AnFiscYei					
SummaryGroup	Source Group	Code Desc	2005	2006	2007			
Primary Referral	GP Referred	GP GENERAL PRACTITIONER	202	222	116	11.04	13.04	7.68
	GP Referred Total		202	222	116			
	Obstetric	MW MIDWIFE	1	2				
	Obstetric Total		1	2				
	Oth Prim Health Agency	AB AMBULANCE STAFF	7	10	1			
		OPN OPOTIKI NURSE	1	2	3			
		RH REST HOME	1		2			
	Oth Prim Health Agency Total		9	12	6			
	Self Referral	S SELF	1	16	25	0.05	0.94	1.65
		SF SELF/FAMILY	1594	1375	1361	87.10	80.74	90.07
	Self Referral Total		1595	1391	1386	87.16	81.68	91.73
Primary Referral Total			1807	1627	1508			
Secondary Ref	Other Hospital	OH OTH HOSPITAL PUBLIC	2	1				
	Other Hospital Total		2	1				
	Secondary Health Svce	AE ACCIDENT & EMERGENCY	2	35				
		IP INPATIENT		1				
		OP OUTPATIENT		1				
		SP SPECIALIST	19	38	3			
	Secondary Health Svce Total		21	75	3			
Secondary Ref Total			23	76	3			
Grand Total			1830	1703	1511			

C11.2.3 Cube Pivot Tables: Hospital O – FULL Fin Years 2005, 2006 & 2007 – % GP-referred emphasized

13.3 APPENDIX C3: RESULTS:CHAPTER 11.3

RESULTS HELD IN THIS APPENDIX

C11.3.1 C11.3.2 C11.3.3 C11.3.4

11.3 RESULTS: Peripheral: INJURIES

11.3.1 Peripheral: FINDINGS

FINDINGS AND COMMENTS

Cf. Earlier Pages **187 - 190**

11.3.2 Peripheral: CUBE RESULTS

INJURY DETAIL – TAURANGA HOSPITAL

Site	TGA
FinancialYr	(Multiple Items)
Gender	Male

Attendances				ArrFiscYear						
Paed Eld	Age Consol	Age Gp5yrs	Pres Grp Summary	2005	2006	2007				
Adult	15 to 19 Yrs	15-19 Yrs	Did Not Wait	16	9	7				
			Injury	952	1031	1103	66.20	68.23	68.89	67.78
			Non Injury Illness	470	471	491				
		15-19 Yrs Total		1438	1511	1601				
	15 to 19 Yrs Total			1438	1511	1601				
	20 to 39 Yrs	20-24 Yrs	Did Not Wait	13	7	8				
			Injury	742	880	887	58.56	64.19	63.90	62.22
			Non Injury Illness	512	484	493				
		20-24 Yrs Total		1267	1371	1388				
		25-29 Yrs	Did Not Wait	8	9	8				
			Injury	547	603	677	53.57	57.59	59.08	56.75
			Non Injury Illness	466	435	461				
		25-29 Yrs Total		1021	1047	1146				
		30-34 Yrs	Did Not Wait	8	5	3				
			Injury	553	524	578	55.30	54.47	59.04	56.27
			Non Injury Illness	439	433	398				
		30-34 Yrs Total		1000	962	979				
		35-39 Yrs	Did Not Wait	7	6	3				
			Injury	423	479	544	46.28	47.01	53.70	49.00
			Non Injury Illness	484	534	466				
		35-39 Yrs Total		914	1019	1013				
	20 to 39 Yrs Total			4202	4399	4526				
	40 to 64 Yrs	40-44 Yrs	Did Not Wait	3	4	3				
			Injury	425	490	462	46.81	49.95	49.15	48.63
			Non Injury Illness	480	487	475				
		40-44 Yrs Total		908	981	940				
		45-49 Yrs	Did Not Wait	4	2	4				
			Injury	333	341	379	41.89	39.56	42.68	41.38
			Non Injury Illness	458	519	505				
		45-49 Yrs Total		795	862	888				
		50-54 Yrs	Did Not Wait	2	3					
			Injury	266	268	320	36.49	35.69	38.88	37.02
			Non Injury Illness	461	480	503				
		50-54 Yrs Total		729	751	823				
		55-59 Yrs	Did Not Wait	1						
			Injury	226	224	243	31.26	29.79	34.13	31.73
			Non Injury Illness	496	528	469				
		55-59 Yrs Total		723	752	712				
		60-64 Yrs	Did Not Wait	1		1				
			Injury	157	170	170	22.59	21.79	20.94	21.77
			Non Injury Illness	537	610	641				
		60-64 Yrs Total		695	780	812				
	40 to 64 Yrs Total			3850	4126	4175				
Adult Total				9490	10036	10302				

C11.3.1 Cube Pivot Tables: Hospital T – FULL Fin Years 2005, 2006 & 2007 – % injured emphasized for **Adult MALES**

Elderly	65 to 84 Yrs	65-69 Yrs	Did Not Wait	1	1					
			Injury	136	167	182	19.77	21.27	21.59	20.88
			Non Injury Illness	551	617	661				
		65-69 Yrs Total		688	785	843				
		70-74 Yrs	Injury	104	156	124	12.28	17.45	15.82	15.18
			Non Injury Illness	743	738	660				
		70-74 Yrs Total		847	894	784				
		75-79 Yrs	Injury	130	123	158	14.10	14.49	16.60	15.06
			Non Injury Illness	792	726	794				
		75-79 Yrs Total		922	849	952				
		80-84 Yrs	Did Not Wait	1						
			Injury	98	123	139	12.16	15.36	16.47	14.66
			Non Injury Illness	707	678	705				
		80-84 Yrs Total		806	801	844				
	65 to 84 Yrs Total			3263	3329	3423				
	85+ Years	100-104 Yrs	Injury	2	1	1	40.00	100.00	50.00	63.33
			Non Injury Illness	3		1				
		100-104 Yrs Total		5	1	2				
		85-89 Yrs	Did Not Wait	1						
			Injury	62	63	86	14.83	13.55	16.20	14.86
			Non Injury Illness	355	402	445				
		85-89 Yrs Total		418	465	531				
		90-94 Yrs	Injury	37	31	44	20.67	19.14	22.80	20.87
			Non Injury Illness	142	131	149				
		90-94 Yrs Total		179	162	193				
		95-99 Yrs	Injury	4	7	9	11.11	30.43	29.03	23.53
			Non Injury Illness	32	16	22				
		95-99 Yrs Total		36	23	31				
	85+ Years Total			638	651	757				
Elderly Total				3901	3980	4180				
Paediatric	5 to 14 Yrs	05-09 Yrs	Did Not Wait	7	4	1				
			Injury	416	460	482	44.30	44.79	48.15	45.75
			Non Injury Illness	516	563	518				
		05-09 Yrs Total		939	1027	1001				
		10-14 Yrs	Did Not Wait	3	1	4				
			Injury	663	694	710	63.63	66.28	63.73	64.55
			Non Injury Illness	376	352	400				
		10-14 Yrs Total		1042	1047	1114				
	5 to 14 Yrs Total			1981	2074	2115				
	Under 5 Yrs	01-04 Yrs	Did Not Wait	10	5	10				
			Injury	323	337	332	23.87	22.14	24.89	23.63
			Non Injury Illness	1020	1180	992				
		01-04 Yrs Total		1353	1522	1334				
		Under1 Yr	Did Not Wait	4	3	4				
			Injury	30	55	38	5.10	8.63	5.86	6.53
			Non Injury Illness	554	579	606				
		Under1 Yr Total		588	637	648				
	Under 5 Yrs Total			1941	2159	1982				
Paediatric Total				3922	4233	4097				
Grand Total				17313	18249	16579				

C11.3.1 <u>Cube Pivot Tables</u>: Hospital T – FULL Fin Years 2005, 2006 & 2007 – % injured emphasized for **Elderly & Paediatric MALES**

Site	TGA
FinancialYr	(Multiple Items)
Gender	Female

Attendances				ArrFiscYe						
Paed Bld	Age Consol	Age Gp5yrs	Pres Grp Summary	2005	2006	2007				
Adult	15 to 19 Yrs	15-19 Yrs	Did Not Wait	13	12	10				
			Injury	397	520	533	30.68	34.39	31.48	32.18
			Non Injury Illness	884	980	1150				
		15-19 Yrs Total		1294	1512	1693				
	15 to 19 Yrs Total			1294	1512	1693				
	20 to 39 Yrs	20-24 Yrs	Did Not Wait	10	16	12				
			Injury	263	279	398	23.11	23.35	29.68	25,38
			Non Injury Illness	865	900	931				
		20-24 Yrs Total		1138	1195	1341				
		25-29 Yrs	Did Not Wait	1	7	5				
			Injury	242	234	273	26.19	25.55	24.66	25,47
			Non Injury Illness	681	675	829				
		25-29 Yrs Total		924	916	1107				
		30-34 Yrs	Did Not Wait	5	5	3				
			Injury	269	258	255	26.42	27.02	26.13	26.52
			Non Injury Illness	744	692	718				
		30-34 Yrs Total		1018	955	976				
		35-39 Yrs	Did Not Wait	5	4	5				
			Injury	263	251	262	28.68	26.99	26.07	27.25
			Non Injury Illness	649	675	738				
		35-39 Yrs Total		917	930	1005				
	20 to 39 Yrs Total			3997	3996	4429				
	40 to 64 Yrs	40-44 Yrs	Did Not Wait	3	1	5				
			Injury	230	248	290	28.57	29.74	32.84	30.38
			Non Injury Illness	572	585	588				
		40-44 Yrs Total		805	834	883				
		45-49 Yrs	Did Not Wait	1	4	1				
			Injury	215	228	241	30.28	26.73	29.43	28.81
			Non Injury Illness	494	621	577				
		45-49 Yrs Total		710	853	819				
		50-54 Yrs	Did Not Wait	4	2	4				
			Injury	211	211	210	29.18	27.69	26.89	27.92
			Non Injury Illness	508	549	567				
		50-54 Yrs Total		723	762	781				
		55-59 Yrs	Deceased	1						
			Did Not Wait	2	4	1				
			Injury	168	205	201	25.97	28.67	27.09	27.24
			Non Injury Illness	476	506	540				
		55-59 Yrs Total		647	715	742				
		60-64 Yrs	Did Not Wait	3						
			Injury	150	140	149	23.18	22.62	23.54	23.11
			Non Injury Illness	494	479	484				
		60-64 Yrs Total		647	618	633				
	40 to 64 Yrs Total			3532	3783	3858				
Adult Total				8823	9291	9980				

C11.3.2 <u>Cube Pivot Tables</u>: Hospital T – FULL Fin Years 2005, 2006 & 2007 – % injured emphasized for **Adult FEMALES**

Elderly	65 to 84 Yrs	65-69 Yrs	Injury	130	157	175	19.17	22.89	22.38	21.48
			Non Injury Illness	548	529	607				
		65-69 Yrs Total		678	686	782				
		70-74 Yrs	Did Not Wait	2		1				
			Injury	158	154	149	19.36	20.16	20.05	19.86
			Non Injury Illness	656	610	593				
		70-74 Yrs Total		816	764	743				
		75-79 Yrs	Did Not Wait			1				
			Injury	201	220	179	22.21	24.64	20.41	22.42
			Non Injury Illness	704	673	697				
		75-79 Yrs Total		905	893	877				
		80-84 Yrs	Did Not Wait			1				
			Injury	222	179	218	21.89	18.88	22.45	21.08
			Non Injury Illness	792	769	752				
		80-84 Yrs Total		1014	948	971				
	65 to 84 Yrs Total			3413	3291	3373				
	85+ Years	100-104 Yrs	Injury		1	2	0.00	20.00	33.33	17.78
			Non Injury Illness	2	4	4				
		100-104 Yrs Total		2	5	6				
		105-109 Yrs	Non Injury Illness		2					
		105-109 Yrs Total			2					
		85-89 Yrs	Did Not Wait	1						
			Injury	151	144	166	22.01	21.02	24.45	22.49
			Non Injury Illness	534	541	513				
		85-89 Yrs Total		686	685	679				
		90-94 Yrs	Did Not Wait	1						
			Injury	99	106	94	34.62	31.83	27.57	31.34
			Non Injury Illness	186	227	247				
		90-94 Yrs Total		286	333	341				
		95-99 Yrs	Injury	25	10	23	33.33	17.24	45.10	31.89
			Non Injury Illness	50	48	28				
		95-99 Yrs Total		75	58	51				
	85+ Years Total			1049	1083	1077				
Elderly Total				4462	4374	4450				
Paediatric	5 to 14 Yrs	05-09 Yrs	Did Not Wait	2	6	9				
			Injury	309	307	317	42.21	41.54	41.88	41.88
			Non Injury Illness	421	426	431				
		05-09 Yrs Total		732	739	757				
		10-14 Yrs	Did Not Wait	3	3	2				
			Injury	417	419	425	52.06	51.47	54.77	52.77
			Non Injury Illness	381	392	349				
		10-14 Yrs Total		801	814	776				
	5 to 14 Yrs Total			1533	1553	1533				
	Under 5 Yrs	01-04 Yrs	Did Not Wait	6	14	5				
			Injury	226	274	296	22.33	21.49	26.22	23.35
			Non Injury Illness	780	987	828				
		01-04 Yrs Total		1012	1275	1129				
		Under1 Yr	Did Not Wait	2	1	1				
			Injury	21	38	41	4.94	7.57	8.09	6.87
			Non Injury Illness	402	463	465				
		Under1 Yr Total		425	502	507				
	Under 5 Yrs Total			1437	1777	1636				
Paediatric Total				2970	3330	3169				
Grand Total				16255	16995	17599				

C11.3.2 Cube Pivot Tables: Hospital T – FULL Fin Years 2005, 2006 & 2007 – % injured emphasized for **Elderly & Paediatric FEMALES**

INJURY DETAIL – WHAKATANE HOSPITAL

Site	WHK
FinancialYr	(Multiple Items)
Gender	Male

Attendances				ArrFiscYear						
Paed Bd	Age Consol	Age Gp5yrs	Pres Grp Summary	2005	2006	2007				
Adult	15 to 19 Yrs	15-19 Yrs	Injury	554	620	692	69.60	70.62	72.16	70.79
			Non Injury Illness	242	258	267				
		15-19 Yrs Total		796	878	959				
	15 to 19 Yrs Total			796	878	959				
	20 to 39 Yrs	20-24 Yrs	Did Not Wait		1					
			Injury	356	376	483	59.93	64.49	72.20	65.54
			Non Injury Illness	238	206	186				
		20-24 Yrs Total		594	583	669				
		25-29 Yrs	Injury	328	328	337	67.77	62.12	63.95	64.61
			Non Injury Illness	156	200	190				
		25-29 Yrs Total		484	528	527				
		30-34 Yrs	Injury	318	284	307	59.33	57.49	57.06	57.96
			Non Injury Illness	218	210	231				
		30-34 Yrs Total		536	494	538				
		35-39 Yrs	Deceased	1						
			Injury	299	282	292	58.97	60.78	60.83	60.19
			Non Injury Illness	207	182	188				
		35-39 Yrs Total		507	464	480				
	20 to 39 Yrs Total			2121	2069	2214				
	40 to 64 Yrs	40-44 Yrs	Injury	255	296	286	49.90	56.38	58.13	54.80
			Non Injury Illness	256	229	206				
		40-44 Yrs Total		511	525	492				
		45-49 Yrs	Deceased	1		1				
			Did Not Wait		1					
			Injury	213	213	265	41.60	47.65	53.54	47.60
			Non Injury Illness	298	233	229				
		45-49 Yrs Total		512	447	495				
		50-54 Yrs	Deceased	1		1				
			Injury	157	173	175	37.38	40.52	42.68	40.19
			Non Injury Illness	262	254	234				
		50-54 Yrs Total		420	427	410				
		55-59 Yrs	Deceased	1	1	1				
			Injury	119	141	149	29.82	30.85	29.74	30.14
			Non Injury Illness	279	315	351				
		55-59 Yrs Total		399	457	501				
		60-64 Yrs	Deceased	1		1				
			Injury	109	107	77	27.11	29.23	20.75	25.70
			Non Injury Illness	292	259	293				
		60-64 Yrs Total		402	366	371				
	40 to 64 Yrs Total			2244	2222	2269				
Adult Total				5181	5169	5442				

C11.3.3 Cube Pivot Tables: Hospital W – FULL Fin Years 2005, 2006 & 2007 – % injured emphasized for **Adult MALES**

Elderly	65 to 84 Yrs	65-69 Yrs	Deceased	1	1	1				
			Injury	75	84	95	22.87	22.22	21.89	22.33
			Non Injury Illness	252	293	338				
		65-69 Yrs Total		328	378	434				
		70-74 Yrs	Deceased		1					
			Injury	73	80	90	19.62	19.00	19.52	19.38
			Non Injury Illness	299	340	371				
		70-74 Yrs Total		372	421	461				
		75-79 Yrs	Deceased	2						
			Injury	68	77	59	14.88	16.89	15.78	15.85
			Non Injury Illness	387	379	315				
		75-79 Yrs Total		457	456	374				
		80-84 Yrs	Deceased	1	1					
			Injury	44	45	37	17.39	18.67	12.54	16.20
			Non Injury Illness	208	195	258				
		80-84 Yrs Total		253	241	295				
	65 to 84 Yrs Total			1410	1496	1564				
	85+ Years	105-109 Yrs	Non Injury Illness		1					
		105-109 Yrs Total			1					
		85-89 Yrs	Deceased			1				
			Injury	18	25	28	16.67	17.73	19.58	17.99
			Non Injury Illness	90	116	114				
		85-89 Yrs Total		108	141	143				
		90-94 Yrs	Deceased			1				
			Injury	5	5	5	16.67	14.29	17.86	16.27
			Non Injury Illness	25	30	22				
		90-94 Yrs Total		30	35	28				
		95-99 Yrs	Injury	3	2	2	60.00	28.57	66.67	51.75
			Non Injury Illness	2	5	1				
		95-99 Yrs Total		5	7	3				
	85+ Years Total			143	184	174				
Elderly Total				1553	1680	1738				
Paediatric	5 to 14 Yrs	05-09 Yrs	Injury	349	340	389	50.87	50.82	57.72	53.14
			Non Injury Illness	337	329	285				
		05-09 Yrs Total		686	669	674				
		10-14 Yrs	Did Not Wait		1					
			Injury	580	571	641	71.34	73.39	72.76	72.50
			Non Injury Illness	233	206	240				
		10-14 Yrs Total		813	778	881				
	5 to 14 Yrs Total			1499	1447	1555				
	Under 5 Yrs	01-04 Yrs	Injury	336	344	289	33.20	34.30	32.15	33.22
			Non Injury Illness	676	659	610				
		01-04 Yrs Total		1012	1003	899				
		Under1 Yr	Injury	21	31	23	5.56	7.95	7.28	6.93
			Non Injury Illness	357	359	293				
		Under1 Yr Total		378	390	316				
	Under 5 Yrs Total			1390	1393	1215				
Paediatric Total				2889	2840	2770				
Grand Total				9603	9689	9950				

C11.3.3 Cube Pivot Tables: Hospital W – FULL Fin Years 2005, 2006 & 2007 – % injured emphasized for **Elderly & Paediatric MALES**

Site	WHK
FinancialYr	(Multiple Items)
Gender	Female

Attendences				AnFiscYe						
Paed Eld	Age Consol	Age Gp5yrs	Pres Grp Summary	2005	2006	2007				
Adult	15 to 19 Yrs	15-19 Yrs	Did Not Wait		1					
			Injury	242	275	328	31.43	34.03	38.68	34.73
			Non Injury Illness	528	531	520				
		15-19 Yrs Total		770	807	848				
	15 to 19 Yrs Total			770	807	848				
	20 to 39 Yrs	20-24 Yrs	Did Not Wait		1					
			Injury	138	179	202	27.77	30.76	32.74	30.42
			Non Injury Illness	359	402	415				
		20-24 Yrs Total		497	582	617				
		25-29 Yrs	Injury	147	145	159	31.61	32.66	30.93	31.73
			Non Injury Illness	318	299	355				
		25-29 Yrs Total		465	444	514				
		30-34 Yrs	Injury	164	161	199	34.75	34.18	38.49	35.81
			Non Injury Illness	308	310	318				
		30-34 Yrs Total		472	471	517				
		35-39 Yrs	Injury	182	153	158	37.92	36.96	32.31	35.73
			Non Injury Illness	298	261	331				
		35-39 Yrs Total		480	414	489				
	20 to 39 Yrs Total			1914	1911	2137				
	40 to 64 Yrs	40-44 Yrs	Injury	157	140	168	32.24	28.46	34.15	31.64
			Non Injury Illness	330	352	324				
		40-44 Yrs Total		487	492	492				
		45-49 Yrs	Injury	137	145	138	33.50	35.80	32.55	33.95
			Non Injury Illness	272	260	286				
		45-49 Yrs Total		409	405	424				
		50-54 Yrs	Injury	97	115	135	24.25	26.32	34.62	28.39
			Non Injury Illness	303	322	255				
		50-54 Yrs Total		400	437	390				
		55-59 Yrs	Deceased	1		1				
			Injury	116	94	112	27.95	24.54	27.86	26.79
			Non Injury Illness	298	289	289				
		55-59 Yrs Total		415	383	402				
		60-64 Yrs	Deceased	1						
			Injury	87	83	76	24.79	24.78	22.35	23.97
			Non Injury Illness	263	252	264				
		60-64 Yrs Total		351	335	340				
	40 to 64 Yrs Total			2062	2052	2048				
Adult Total				4746	4770	5033				

C11.3.4 Cube Pivot Tables: Hospital W – FULL Fin Years 2005, 2006 & 2007 – % injured emphasized for **Adult FEMALES**

Elderly	65 to 84 Yrs	65-69 Yrs	Deceased	1						
			Injury	62	66	65	16.94	19.70	16.62	17.76
			Non Injury Illness	303	269	326				
		65-69 Yrs Total		366	335	391				
		70-74 Yrs	Deceased	1						
			Injury	75	50	47	23.22	16.89	14.78	18.30
			Non Injury Illness	247	246	271				
		70-74 Yrs Total		323	296	318				
		75-79 Yrs	Deceased			1				
			Injury	79	82	79	23.51	20.92	24.01	22.81
			Non Injury Illness	257	310	249				
		75-79 Yrs Total		336	392	329				
		80-84 Yrs	Deceased		3	2				
			Injury	74	60	58	26.52	21.51	18.18	22.07
			Non Injury Illness	205	216	259				
		80-84 Yrs Total		279	279	319				
	65 to 84 Yrs Total			1304	1302	1357				
	85+ Years	100-104 Yrs	Injury		1			50.00	0.00	16.67
			Non Injury Illness		1	1				
		100-104 Yrs Total			2	1				
		85-89 Yrs	Deceased	1						
			Injury	29	38	45	21.32	20.99	28.85	23.72
			Non Injury Illness	106	143	111				
		85-89 Yrs Total		136	181	156				
		90-94 Yrs	Deceased		1	1				
			Injury	20	31	27	25.00	33.70	33.33	30.68
			Non Injury Illness	60	60	53				
		90-94 Yrs Total		80	92	81				
		95-99 Yrs	Deceased		2					
			Injury	3	2	2	30.00	25.00	28.57	27.86
			Non Injury Illness	7	4	5				
		95-99 Yrs Total		10	8	7				
	85+ Years Total			226	283	245				
Elderly Total				1530	1585	1602				
Paediatric	5 to 14 Yrs	05-09 Yrs	Did Not Wait		1					
			Injury	313	250	305	50.73	55.07	55.35	53.72
			Non Injury Illness	304	203	246				
		05-09 Yrs Total		617	454	551				
		10-14 Yrs	Deceased	1						
			Did Not Wait		1					
			Injury	379	330	411	59.69	59.25	63.62	60.85
			Non Injury Illness	255	226	235				
		10-14 Yrs Total		635	557	646				
	5 to 14 Yrs Total			1252	1011	1197				
	Under 5 Yrs	01-04 Yrs	Injury	231	211	254	30.35	30.54	33.64	31.51
			Non Injury Illness	530	480	501				
		01-04 Yrs Total		761	691	755				
		Under1 Yr	Injury	13	20	25	4.42	6.54	9.51	6.82
			Non Injury Illness	281	286	238				
		Under1 Yr Total		294	306	263				
	Under 5 Yrs Total			1055	997	1018				
Paediatric Total				2307	2008	2215				
Grand Total				8583	8363	8850				

C11.3.4 Cube Pivot Tables: Hospital W – FULL Fin Years 2005, 2006 & 2007 – % injured emphasized for **Elderly & Paediatric FEMALES**

13.4 APPENDICES D: MISCELLANEOUS

APPENDICES D*

MISCELLANEOUS APPENDICES

APPENDIX **D1**
APPENDIX **D2**
APPENDIX **D3**
APPENDIX **D4**
APPENDIX **D5**
APPENDIX **D6**
APPENDIX **D7**
APPENDIX **D8**
APPENDIX **D9**
APPENDIX **D10**
APPENDIX **D11**
APPENDIX **D12**

13.4 APPENDICES

13.4 APPENDIX D1: LETTER OF APPROVAL AND CORRESPONDENCE

D1.1 Letter of Approval to Use DHB ED Statistics

Letter of Approval received from Catherine Ross on **16 May 2007** at 10:01 AM:

Hi Derek,

The DHB has given permission to use the ED statistical data in your University research/studies. The two provisos are that there is absolutely no "patient identifying" information included in the research, and that the University is made aware of this caveat on the data use.

Hope it goes well and look forward to seeing the results.

Regards

Catherine

D1.2 Preceding Correspondence

From: Owen Wallace
Sent: Tuesday, 15 May 2007 03:06 PM
To: Catherine Ross; Derek Sage
Subject: RE: Requesting Permission to use BOP DHB ED Data in a MASTERS DEGREE Research Project - Topic: Seasonal Demand for ED Services

Catherine
The main concern I have is ensuring the patient's confidentiality hence it is essential that data contains nothing that allows for the identification of individual patients. I note that Derek has indicated that such data will not be made available to the university but this needs to be stressed to him and he needs to ensure the University is aware of this restriction.
Owen

From: Catherine Ross
Sent: Tuesday, 15 May 2007 09:30 AM
To: Owen Wallace; Derek Sage
Subject: FW: Requesting Permission to use BOP DHB ED Data in a MASTERS DEGREE Research Project - Topic: Seasonal Demand for ED Services

Hi,
Do either of you have any issue with allowing Derek Coutts access to the ED data for his personal studies?
please let me know ASAP.

Thanks
Catherine

From: Derek Coutts
Sent: Saturday, 12 May 2007 06:25 PM
To: Catherine Ross
Subject: Requesting Permission to use BOP DHB ED Data in a MASTERS DEGREE Research Project - Topic: Seasonal Demand for ED Services

Whom it May Concern

Requesting Permission: To use **DHB ED Data** in a University Research Project titled: **Seasonal Demand for ED Services**.

I'm currently busy with the last "examined" semester paper towards a **Masters Degree (Information Systems)** through **MASSEY UNIVERSITY - PALMERSTON NORTH**.

Upon completion of this Semester Paper / Project Plan I hope to start with the actual research in earnest.

I hope to be given permission by the DHB to use our ED data towards this goal.

Concerning the Data:
It will be used in a completely anonymous manner.
That is, no potentially identifying Patient information will be included in Data Sets / Extracts.
No electronic data of any sort will be included with the research.
Each record will only be identifiable by its ED Visit Number – and only I will be privy to this "column" of information.
It will also most certainly not be included in any "hard-copied" illustrations used in the Research.
Only derived statistical information will be supplied.
(Take Note: ED data will be imported into / and Data Mined in a SAS environment.)
I'll even be using "pseudonyms" for the respective hospitals – in order to maintain "blanket" anonymity.

I'm doing a presentation at MASSEY in PALMERSTON NORTH in about ten days' time.
The final Research Plan is also due to be submitted to the Faculty by mid June 2007.

Incidentally:
The rationale behind choosing this topic is to produce something with practical application potential for my place of employment, not just some theoretical discourse.
I have already run the idea past the odd person in ED, and there is a definite interest in the outcomes of the research.

I hope to submit the completed Research Project by about February / March of 2008. If successful in this endeavour then I'll have completed the Masters.

Regards

Derek Coutts

PS:
If possible, could you get an answer back to me within the week?
If it's to the affirmative then I'd like to include a screen-dump of such permission in the Appendix to the Project Plan – with any identifying detail "blacked" out.

13.4 APPENDIX D2: SOME STATISTICAL TERMS USED IN DISCUSSIONS

Here are some very brief "definitions" (Berry & Linoff, 1997, pp. 101-106):

Sample:
A sample is a subset chosen randomly from the population so that it can be representative of it.

Range:
The range is the difference between the smallest and the largest observation in the sample.

Mean or Arithmetic Mean:
This is what is called an average in everyday speech. It is obtained by dividing the sum of the observations by the number of observations.

Median:
It is the value that splits the observations into two equally sized groups, one having observations smaller than the median, the other containing observations larger than the median.

Mode:
The mode of a sample is its most frequently occurring value.

Distribution:
That is the description of how the values are distributed. It is usually shown graphically by using the X-axis to represent the range of values in the population, and the Y-axis to represent the number of observations of each value.

Variance:
It is the measure of the dispersion of a sample, or how closely the observations cluster around the mean.

Standard Deviation:
It is defined as the square root of the variance. It is the most frequently used measure of dispersion. It is more convenient to use that the variance because it is expressed in the same units as the observations – which thus allows for the usage of standard deviation itself as a unit of measurement. An associated term used to describe the curve of the standard deviation is that of the point of inflection, i.e. the point where the bell-shaped curve stops curving downwards and starts curving outwards. This point is exactly one standard deviation from the mean. Furthermore, with a normal curve one standard deviation away from the mean on either side of the curve represents 68% of observations, and over 90% of observations will be within two standard deviations of the mean. These proportions hold for all normal curves, whether tall and skinny (low variance) or short and flat (high variance).

Significance:
It is a measure of how unlikely it is that a difference between two samples happened by chance. The statistical approach is to assume that samples were drawn from the same population, and then to calculate the probability of the means of two such samples differing. As a rule of thumb [Berry and Linoff, 1997, p. 105], if the observed difference is more than 2.5 standard deviations we call it "statistically significant".

Correlation:
It is the measure of the extent to which a change in one variable is related to a change in another. Correlation ranges from -1 to 1. A correlation of 0 (zero) means the two variables are not related. A correlation of 1 means that as the first variable changes the second is guaranteed to change.

Regression:
It is the process of using the value of one pair of correlated variable in order to predict the value of the second. The most common form of regression is linear regression, so called because it attempts to form a straight line through the observed X and Y pairs. Once the line has been established it can be used to predict a value of Y given any X, and X given every Y.

Kurtosis (NST Website):
Kurtosis is a measure of whether data is peaked or flat relative to a normal distribution. That is, data sets with high kurtosis have a distinct peak near the mean, decline rather rapidly, and have heavy tails. Data sets with low kurtosis have a flat top near the mean rather than a sharp peak. The kurtosis for a standard normal distribution is 3. Thus a kurtosis score near 3 would verify symmetry. The histogram is an effective graphical technique for showing both kurtosis and skewness (cf. next definition) of a data set.

Skewness (NST Website):
Skewness is a measure of symmetry, or more precisely, lack of symmetry. The skewness for a normal distribution is zero, and any symmetric data should have a skewness near zero. Negatice values for skewness would indicate data which is skewed left, and positive values would indicate data which is skewed right. By skewed left is meant that the left tail is long relative to the right tail, and by skewed right is meant that the right tail is long relative to the left tail.

13.4 APPENDIX D3: CURRENT TAURANGA ED BACKGROUND

D3.1 Current TAURANGA ED Practices

Some comments sent to the Student from the Clerical Team Leader in TAURANGA ED:

"...

Here is the ED Locator.

When we input the patients on IBA, they show on the left side of the screen as patients currently waiting. The colour of the "patient icon" differs according to their triage code.

Once the coordinator allocates a bed to the patient, the coordinator drags the icon on the locator to a treatment area, which are the ones you can see on the locator. They all have names as on the locator, let me know if you want the list of their names.

I blanked the names so you don't have privacy issues.

..."

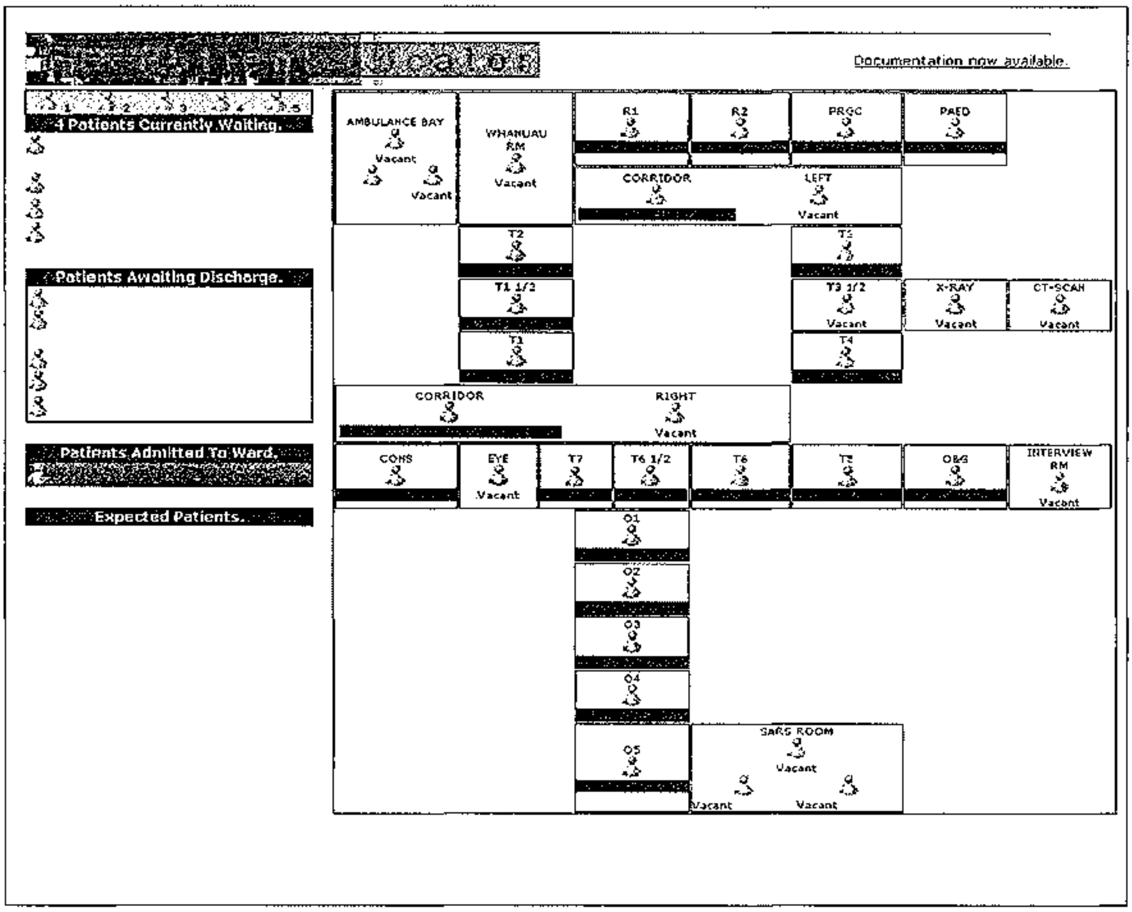
The **colour-coded icons** representing patients appear in one of four colours, i.e. grey, green, orange and red. Grey for example represents "bed available", whereas green icons represent "beds currently occupied". Furthermore, for reasons of privacy the names of the patients waiting and / or occupying beds are "blacked out".

The "boxes" representing beds are also "highlighted" using the following five colours to represent Triage classification / urgency, namely:

Red	=	Triage 1	=	Resuscitation
Orange	=	Triage 2	=	Emergency
Yellow	=	Triage 3	=	Urgent
Green	=	Triage 4	=	Semi-Urgent
Blue	=	Triage 5	=	Non-Urgent

The Triage classification levels are thus ordinal – i.e. in order of seriousness / urgency - from least urgent, viz. "non-urgent" (Triage = 5) to most urgent, viz. "resuscitation" (Triage = 1).

D3..2 The TAURANGA ED Locater



13.4 APPENDIX D4: TAURANGA ED CHRISTMAS / NEW YEAR SERVICES

D4.1 Some Comments Pertaining to Excerpts to Follow

See below an "edited" version of the cover letter which explains some of the intricacies of the subsequent pages, especially the 2nd page (viz. p. 4 of the attached document.)

From: Priscilla Borges Sent: Wed 10/10/2007 14:34
To: Derek Coutts
Cc:
Subject: RE: Info from ED

Here is some more info for your study. Attached is our xmas and new year plan. Let me know if you have any queries. My team has an extra 4 hours cover a day in the weeks between 24/12/07 and 06/01/08 due to the increase of presentations and paperwork.

I talked to Ra this week and here are some information:

Shifts:
AM - 8 nurses (07:00 to 15:30 normally but varies) E - 1 nurse (11:30 to 20:00)
PM - 8 nurses (14:30 to 23:00) n - 1 nurse (19:00 to 03:30) N - 5 nurses (22:45 tp 07:15)

Distribution of staff:

Observation unit: 1x nurse to 5 patients - breaks patient x staff ratio safety

Resus: 1x nurse to 2 acute patients

Main department area (cubicles): 1x nurse to 3 patients.

Triage: 1x triage nurse (cover only 16 hours per day, although 24 hours should be required).

Nurse coordinator: 1x nurse per shift (24h a day cover)

Due to budget constraints numbers of nurses can not be increased. At incredibly busy times where patients are at risks it is required that the clinical nurse manager responds to the situation at that time. Call for extra nurses as the situation is unsafe, if no nurses available there is no other option - unsafe situation.

This is now followed by excerpts of pp. 1 & 4 of an 11-page document – viz. the one "attached" to the excerpt from the email included above.

D4.2 Excerpts from Christmas / New Yr Services Planning

Excerpt – i.e. p.1 of 11 pp. document

BAY OF PLENTY
DISTRICT HEALTH BOARD

TAURANGA HOSPITAL

Christmas/New Year Services
2007/2008
*This year's **Christmas Barbecue** for all staff will be held on **Tuesday 12 December 11.30am – 2.00pm** on the Roof Garden. This will be held regardless of the weather.*

Night Staff breakfast Saturday 9 December 7.00am - 8.00am

Duty Managers
Normal duties.
Q. Please explain to me the criteria for short notice leave is?

Ambulance Co-ordinator
Normal duties apply. During statutory days contact the Duty Manager

Antenatal Outpatients
One clinic week of 27 December.

Audiology
Closed from 21 December and re-open 3 January

Bureau
Normal arrangements for Bureau-staffing except increase of NRT staff from 21 December to 5 January.
Q. What is the NRT increasing to?

Deleted: ¶

Chaplaincy
Thanksgiving Service for staff in Learning Centre Tuesday 19 Dec at 2.00 pm
Christmas Day/New Years day – Bedside communion available
Statutory Holidays - emergency on call 24 hours
Normal on site/on call service at all other times
Carol singing this year will be by the Harmonised Singers group on 11 December

::::

Excerpt – i.e. p.4 of 11 pp. document

Emergency Department considerations:

The emergency department will have commenced the construction of the ED extension and will have renovations occurring in the exisiting department over this period. There are concerns about the impact on the ED patient flow during this time because of the construction in the existing building and due to the problems the paediatric areas are experiencing av present?

Further migration planning is required and will be sent to all services by end of October.

Emergency Department – Nursing Levels:

Dec	24	25	26	27	28	29	30	31	Jan	1	2	3	4	5
AM	9	9	9	9	9	9	9	9		9	9	9	9	9
PM	10	10	10	10	10	10	10	10		10	10	10	10	10
								0.5 [illegible]		0.5 [illegible]	0.5 [illegible]			
N	6.5	6.5	6.5	6.5	6.5	6.5	6.5	7		7	7	6.5	6.5	6.5

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Emergency Department – Doctor Levels:

Dec	24	25	26	27	28	29	30	31	Jan 1
AM	1 MOSS 2.5 EDSHO	1 MOSS 2.5 EDSHO	1 MOSS 2.5 EDSHO	1 MOSS 2.5 EDSHO	1 MOSS 2.5 EDSHO	1 MOSS 2.5 EDSHO	1 MOSS 2.5 EDSHO	1 MOSS 2.5 EDSHO	1 MOSS 3.5 EDSHO
PM	1 MOSS 2.5 EDSHO	1 MOSS 2.5 EDSHO	1 MOSS 2.5 EDSHO	1 MOSS 2.5 EDSHO	1 MOSS 2.5 EDSHO	1 MOSS 2.5 EDSHO	1 MOSS 2.5 EDSHO	1 MOSS 2.5 EDSHO	1 MOSS 2.5 EDSHO
N	2 EDSHO	2 EDSHO	2 EDSHO	2 EDSHO	2 EDSHO	2 EDSHO	2 EDSHO	3 EDSHO	3 EDSHO

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Emergency Department – Clerical Level:

Dec	24	25	26	27	28	29	30	31	Jan	1	2	3	4	5
AM	2	2.5	2.5	2	2	2	2	2.5		3	2	2	2	2
PM	2.5	2.5	2.5	2.5	2.5	2.5	2.5	3		3	2.5	2.5	2.5	2
N	2	2.5	2.5	2.5	2.5	2.5	2.5	3		3	2.5	2.5	2.5	2

MedXus will be supplying ED with additional loan monitors over this period to help ☺

Engineering
Normal cover for non statutory days. Normal weekend cover for statutory days

Financial Accounting
Closed statutory holidays
Minimum staff over Christmas and New Year holidays. Normal complement from 8 January. However, will meet all essential requirements over this period

Food Services
Christmas Day dinner for staff 11.30am – 1.30pm. 5.00 pm – 7.00pm. Christmas 'snacks' for staff working the nightshift on 24/25 December

Christmas/New Year Services [illegible] 4

13.4 APPENDIX D5: INPUT/THROUGHPUT/OUTPUT MODEL NZ ADAPTED

REPLICATED MODEL OF WILSON & NGUYEN

INPUT – critical access point

Factors that create demand for ED include:

Demographics

Health Status

Affordability

Availability of alternatives: AHGP

Perception of Quality

DHB process for entry: GP versus Self

ED THROUGHPUT

Triage 24 hour cover optimal, Registration processes

Care processes I.e. GP versus Self

Staffing resources: RN and Medical

Skill of staff RN and Medical

Diagnostic services and availability

IT Systems within ED

OUTPUT – Death

OUTPUT – Hospital admission

Capacity of OT/ICU/CCU

Acute Capacity of Medical / Surgical beds

Bed management processes

ED staff ability to discharge or transfer patients to admission bed

ED staff ability to secure mental health assessments

Transport services: orderly capacity, St John capacity, retrieval team availability

OUTPUT – Community discharge

Availability of post acute care

Community mental health services

HIA resources in community

Primary and Speciality Care

Reference:
Urgent Matters Input / Throughput / Output Model NZ adapted
From BURSTING AT THE SEAMS – Improving Patient flow to help American Emergency Departments, Marcia J Wilson, MBA and Khoa Nguyen, MPH. September 2004

13.4 APPENDIX D6: SOME DEMOGRAPHIC INFORMATION

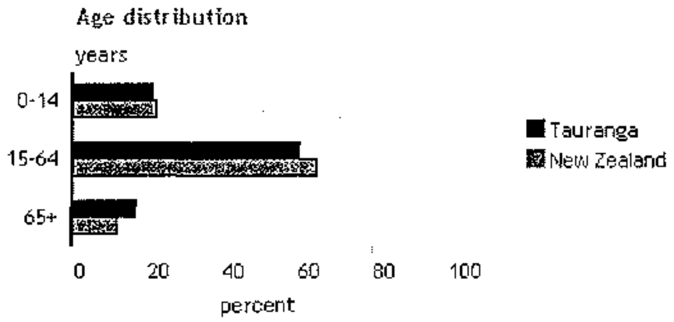
D6.1 Some demographic data for TAURANGA

Age (Statistics New Zealand)

Age profile

At the 2001 Census:

- 21.7 percent of people in Tauranga were under the age of 15 years, compared with 22.7 percent for all of New Zealand.
- 17.4 percent of people in Tauranga were aged 65 years and over compared with 12.1 percent for all of New Zealand.

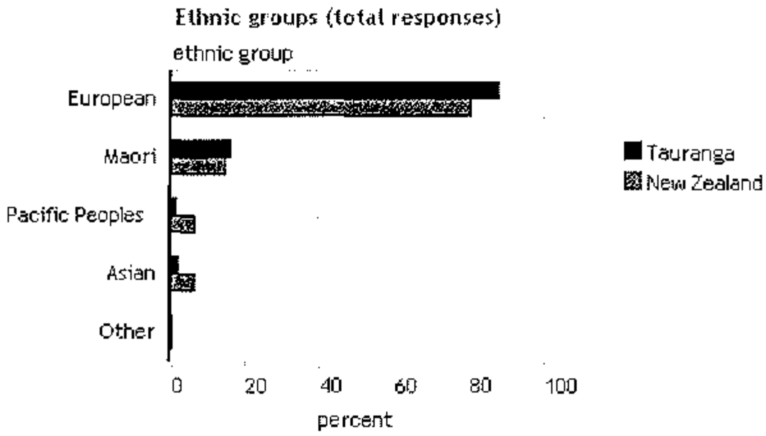


Ethnicity (Statistics New Zealand)

Ethnic groups (total responses)

At the 2001 Census:

- 87.8 percent of people in Tauranga said they belong to the European ethnic group, compared with 80.1 percent for all of New Zealand.



Population (Statistics New Zealand)

Population

At the 2001 Census of Population and Dwellings:

- The census usually resident population count for Tauranga[1] was 95,694, a change of 16.6 percent since 1996.
- In comparison, the population for New Zealand as a whole has changed by 3.3 percent since 1996.

Numbers of people counted

	Tauranga	New Zealand
Males	45,654	1,823,007
Females	50,040	1,914,273
Total	95,694	3,737,277
Change since 1996 Census	13,602	118,974

[1]The area used for this profile is based on Statistics New Zealand's urban area.

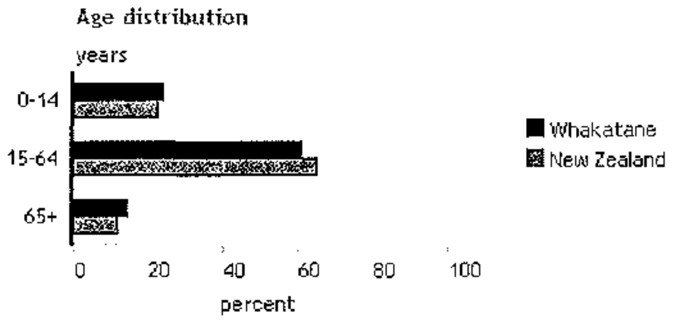
D6.2 Some demographic data for WHAKATANE

Age (Statistics New Zealand)

Age profile

At the 2001 Census:

- 24.3 percent of people in Whakatane were under the age of 15 years, compared with 22.7 percent for all of New Zealand.
- 14.6 percent of people in Whakatane were aged 65 years and over compared with 12.1 percent for all of New Zealand.

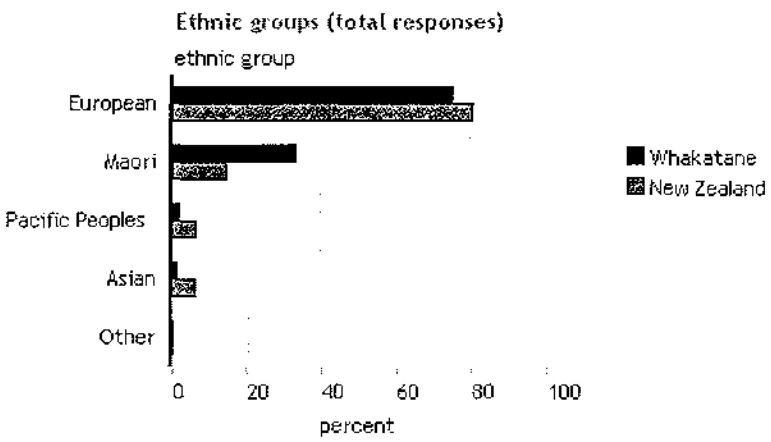


Ethnicity (Statistics New Zealand)

Ethnic groups (total responses)

At the 2001 Census:

- 74.6 percent of people in Whakatane said they belong to the European ethnic group, compared with 80.1 percent for all of New Zealand.



Population (Statistics New Zealand)

Population

At the 2001 Census of Population and Dwellings:

- The census usually resident population count for Whakatane[1] was 17,778, a change of 1.6 percent since 1996.
- In comparison, the population for New Zealand as a whole has changed by 3.3 percent since 1996.

Numbers of people counted

	Whakatane	New Zealand
Males	8,577	1,823,007
Females	9,201	1,914,273
Total	17,778	3,737,277
Change since 1996 Census	282	118,974

[1]The area used for this profile is based on Statistics New Zealand's urban area.

13.4 APPENDIX D7: DEPARTMENT OF LABOUR "SYNOPSIS" 2001 - 2006

Quoted verbatim:

"...

Key Bay of Plenty population information:

In 2006 just over 257,000 people lived in the Bay of Plenty region, with 103,632 people living in Tauranga city in 2006, up 14% from 2001. The second most populous territorial authority was Rotorua district, with 65,898 residents, up 2.2% from 2001. The regional population grew by just under 18,000 people, or 7%, between 2001 and 2006. There is a relatively large Maori population, particularly in the east of the region – 26% of the regional population in 2006, compared with 14% nationally. The migrant population is relatively small. In 2006, 14% of the regional population was born overseas compared with 22% nationally.

..."

13.4 APPENDIX D8: STATISTICS NZ SUPPLIED CENSUS 2006 DATA FOR THE BOP DHB

The following statistics, gotten from Statistics NZ care of the DHB, is specific to the BOP DHB. This is a reworked variation on the Statistics NZ supplied data emanating from Census 2006 data recorded on December 7th 2006.

Reproduced / Derived from 2006 Census Data supplied to the BAY OF PLENTY DHB

2006 Census Usually Resident Population

Source Statistics NZ - 7 December 2006

Maori

	0-14 Years	15-24 Years	25-44 Years	45-64 Years	65+	Total
Western Bay of Plenty District	2331	1104	1755	1308	432	6930
Tauranga City	6045	2940	4521	2418	651	16575
Western BOP Total	**8376**	**4044**	**6276**	**3726**	**1083**	**23505**
Whakatane District	4662	2016	3429	2391	702	13200
Kawerau District	1521	609	1044	726	156	4056
Opotiki District	1749	654	1170	909	393	4875
Eastern BOP Total	**7932**	**3279**	**5643**	**4026**	**1251**	**22131**
BOPDHB	16308	7323	11919	7752	2334	45636

non-Maori

	0-14 Years	15-24 Years	25-44 Years	45-64 Years	65+	Total
Western Bay of Plenty District	6777	3216	8190	10857	6105	35145
Tauranga City	15537	9528	22305	22281	17403	87054
Western BOP Total	**22314**	**12744**	**30495**	**33138**	**23508**	**122199**
Whakatane District	3834	1983	4908	5871	3498	20094
Kawerau District	429	216	669	849	708	2871
Opotiki District	717	336	846	1341	852	4092
Eastern BOP Total	**4980**	**2535**	**6423**	**8061**	**5058**	**27057**
BOPDHB	27294	15279	36918	41199	28566	149256

Total

	0-14 Years	15-24 Years	25-44 Years	45-64 Years	65+	Total
Western Bay of Plenty District	9108	4320	9945	12165	6537	42075
Tauranga City	21582	12468	26826	24699	18054	103629
Western BOP Total	**30690**	**16788**	**36771**	**36864**	**24591**	**145704**
Whakatane District	8496	3999	8337	8262	4200	33294
Kawerau District	1950	825	1713	1575	864	6927
Opotiki District	2466	990	2016	2250	1245	8967
Eastern BOP Total	**12912**	**5814**	**12066**	**12087**	**6309**	**49188**
BOPDHB	43602	22602	48837	48951	30900	194892

13.4 APPENDIX D9: POPULATION PROJECTIONS

The following two sub-sections contain transcribed population projections. The student could not locate electronic versions of the two paper-based documents used in this Appendix. He therefore "transcribed" the essence of these projections.

D9.1 TAURANGA District Population Projections to 2021

This information was produced by the **Tauranga District Council.**

In "Chapter 2" of this four-"chapter" document contains a graphical area map of what comprises TAURANGA and its "Census Area Units" is presented. It identifies many of the suburbs as well.

"Chapter 3" supplies the projections down to the level of suburbs within areas – for example the projections for MOUNT MAUNGANUI NORTH & OMANU (etc.) are two of the eight "suburbs" within the higher level grouping comprising mentioned Coastal Strip. Likewise SULPHUR POINT, YATTON PARK & GREERTON three of the seven "suburbs" within Area Unit = TAURANGA CENTRAL

TRANSCRIBED "Table 2": Population Projections						
Area Unit	1996	2001	2006	2011	2016	2021
Coastal Strip						
:::Eight suburbs:::	Mount Maunganui North, Omanu, Inlet - Tauranga Harbour, Matapihi, Arataki,					
	Te Maunga, Papmoa Beach West, Papamoa Beach East					
Total	**25168**	**30111**	**37053**	**45265**	**53737**	**62209**
Tauranga Central						
:::Seven suburbs:::	Sulpher Point, Tauranga Central, Tauranga Hospital, Tauranga South,					
	Gate Pa, Yatton Park, Greerton					
Total	**17494**	**19859**	**20893**	**22435**	**23976**	**25518**
Tauranga South East						
:::Four suburbs:::	Maungatapu, Poike, Jairina, Welcome Bay					
Total	**11037**	**13772**	**15915**	**18140**	**20366**	**22591**
Tauranga West						
:::Eight suburbs:::	Matua, Bellevue, Outumotai South, Outumotai North, Bethlehem,					
	Brookfield, Te Reti, Judea					
Total	**24028**	**26954**	**30439**	**32450**	**34462**	**36473**
District Total	**77727**	**90696**	**104300**	**118290**	**132541**	**146791**
		#			#	

[# = correction by 1 in each case - totalling appear to be wrong on the original]

D9.2 TAURANGA Quarterly Review September 2006

This quarterly review was prepared by **Statistics New Zealand**.

In the "Chapter" titled "Population Projections" 25 year projections are given for the various districts comprising the Bay of Plenty.

TRANSCRIBED Projected Resident Population Change 2001-2026
As at 30th June

Area	Projected	Population	Change	2001-2026
	2001	2026	Number	Percent
Tauranga City	93,300	139,800	46,600	50
Taupo District	32,500	36,600	4,100	13
Western Bay of Plenty District	39,300	57,000	17,800	45
Rotorua District	66,900	72,800	5,900	9
Whakatane District	34,000	33,600	-400	-1
Kawerau District	7,300	5,300	-1,900	-27
Opotiki District	9,500	10,100	600	6
New Zealand	3,880,500	4,730,000	849,500	22

13.4 APPENDIX D10: RESULTS BROWSERS – HELP

D10.1 K-Means Clustering Results Browser – Partition Tab

Results Browser: Partition Tab

The Partition tab of the Clustering Results Browser provides a graphical representation of key characteristics of the clusters from the training data set you specified in the Preliminary Training and Profiles subtab of the Data tab. On the left side of the tab is a three-dimensional pie chart that has the following default settings:

- Slice width set to Std. deviation, which is the root-mean-square standard deviation (root mean square distance) between cases in the cluster.
- Height set to Frequency.
- Color set to Radius, which is the distance of the farthest cluster member from the cluster seed.

Each pie slice represents a cluster, or segment. Each segment is labeled with a number. You want to identify the input means for the cluster or clusters that differ substantially from the overall input means.

A grid plot of the input means for the input variables that are used in the clustering analysis over all of the cluster segments displays on the right side of the tab.

D10.2 SOM / Kohonen Results Browser – Map Tab

Results Browser: Map Tab

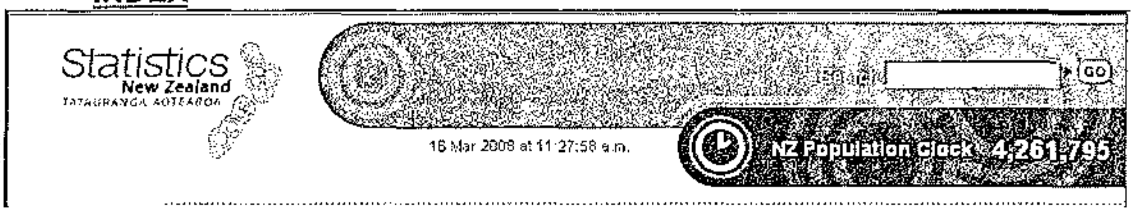
The Map tab of the SOM/Kohonen Results Browser contains the following plots:

- a topological mapping of the input space to the clusters (left side of the tab)
- a plot of the input means for the entire training data set over all the clusters (right side of the tab).

:::

By default, the clusters in the map are color coded by the frequency counts over all the input variables. The colors in the map legend correspond to the frequency counts in the clusters. Clusters with lighter colors have lower frequency counts. Clusters with darker colors have higher frequency counts. The maximum and minimum frequency values are displayed to the left and right of the legend, respectively. To display a reference line on the legend that corresponds to the frequency count for a cluster, click the Select Points tool icon on the tool box and then click on a cluster.

13.4 APPENDIX D11: STATISTICS NZ SUPPLIED MOH DEPRIVATION INDEX



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Ministry of Health, 2001 Social Deprivation Index

The Social Deprivation Index is a measure of socio-economic status calculated for small geographic areas. The calculation uses a range of variables from the 2001 Census of Population and Dwellings which represent nine dimensions of social deprivation. The Social Deprivation Index is calculated at meshblock level, and built up to the relevant geographic scale using weighted average census usually resident population counts. The nine variables (proportions in small areas) in decreasing weight in the index are:

1	Income	People aged 18–59 receiving a means tests benefit
2	Employment	People aged 18–59 years who are unemployed
3	Income	People living in equivalised[1] households with income below an income threshold
4	Communication	People with no access to a telephone
5	Transport	People with no access to a car
6	Support	People aged less than 60 years living in a single parent family
7	Qualifications	People aged 18–59 years without any qualifications
8	Living Space	People living in equivalised1 households below a bedroom occupancy threshold
9	Owned Home	People not living in own home

(1) Equivalisation: method used to standardise household composition and size.

The Social Deprivation Index is provided in two forms, a continuous score and an ordinal scale.

The first principle component score is the result of the calculation using the nine weighted census variables. The scores are scaled to have a mean 1000 index points and standard deviation 100 index points.

The decile rating is derived from the first principle component score. The ordinal scale ranges from 1 to 10, where 1 represents the areas with the least deprived scores and 10 the areas with the most deprived scores.

Note that the deprivation index applies to areas rather than individuals who live in those areas.

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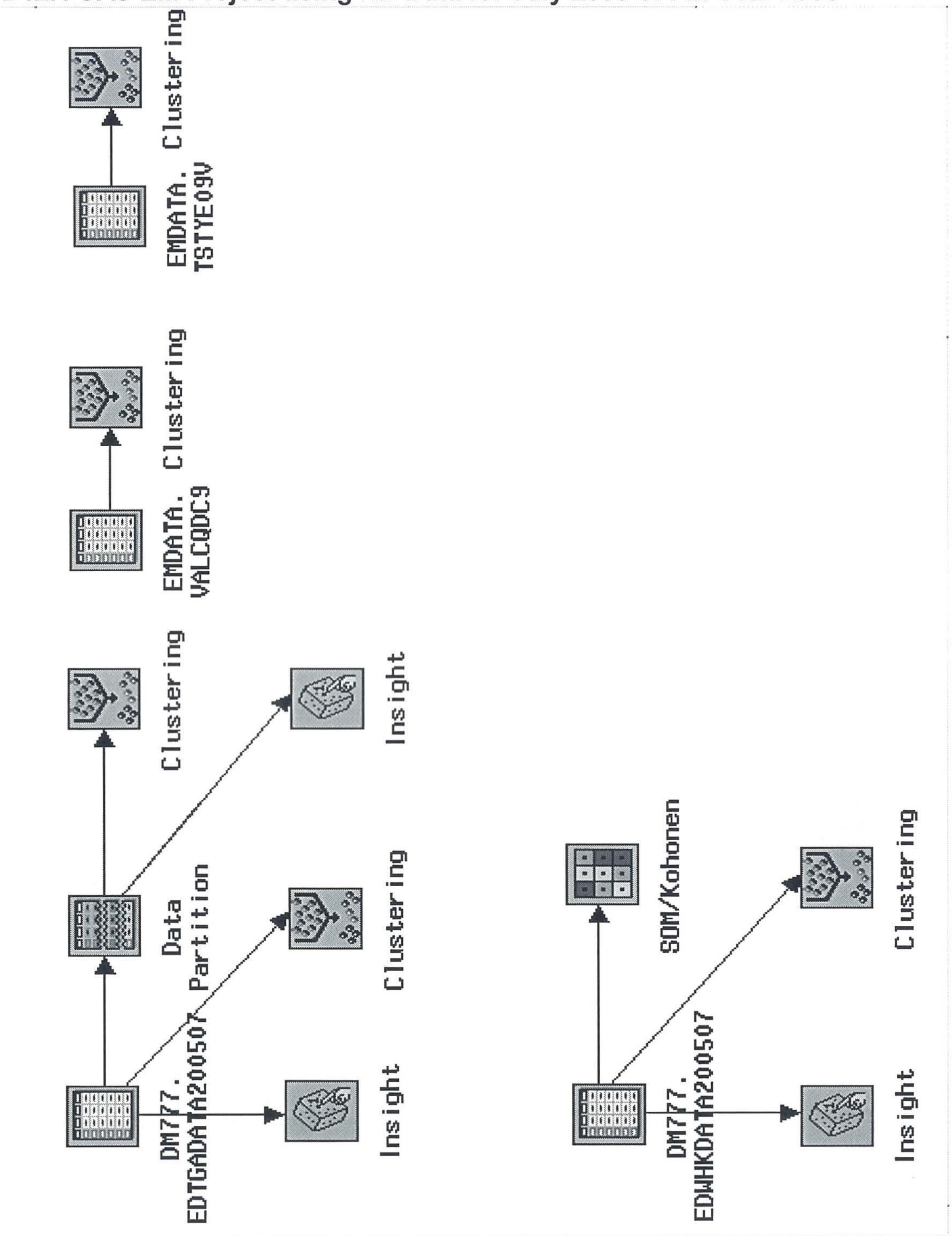
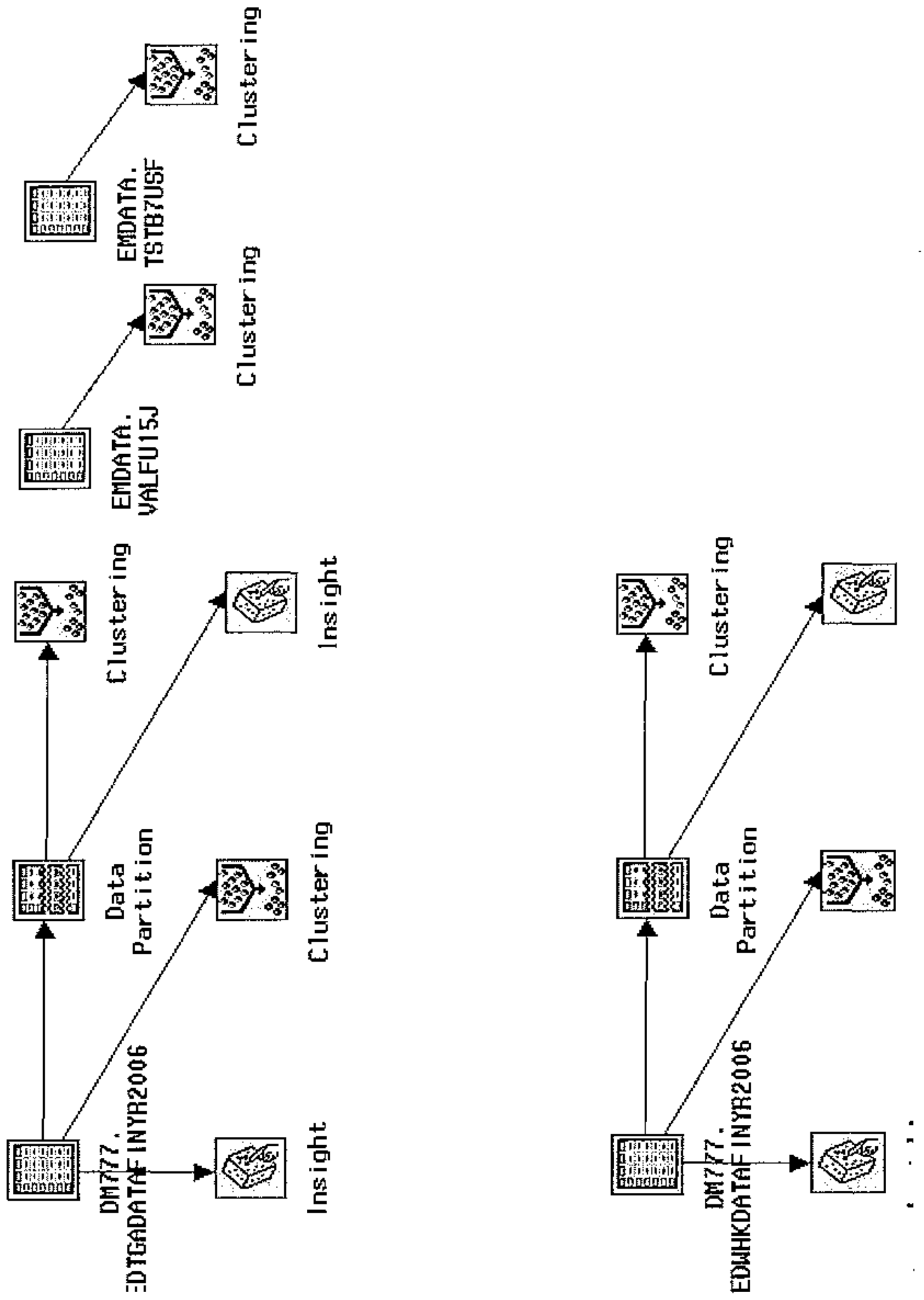
13.4 APPENDIX D12: SAS ENTERPRISE MINER PROJECTS

D12.1 SAS EM Project using ED Data for July 2005 of Fin Year 2006



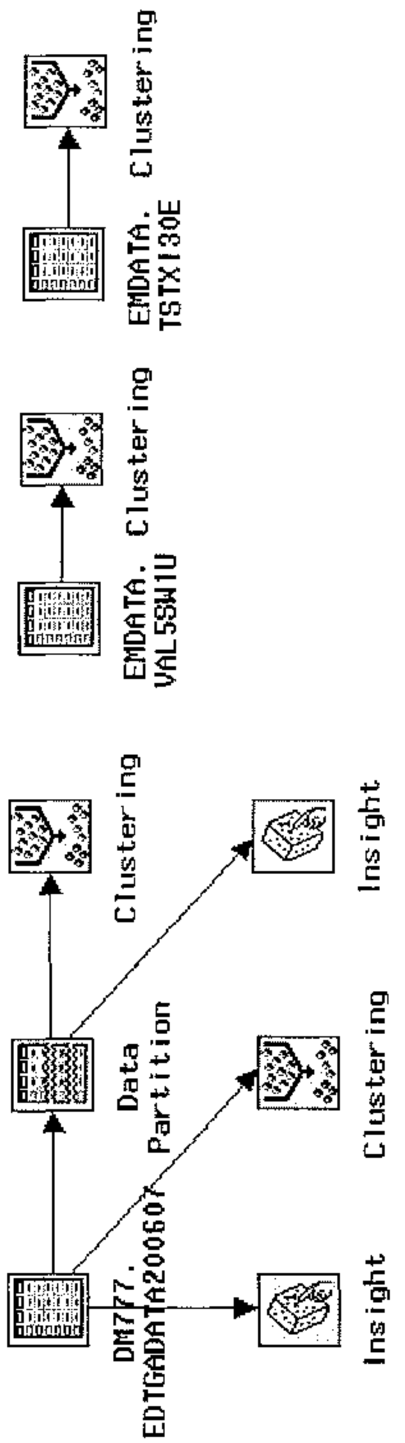
S13.4.1 SAS Enterprise Miner – PROJECT [**EDData200507**]

D12.2 SAS EM Project using ED Data for Fin Year 2006



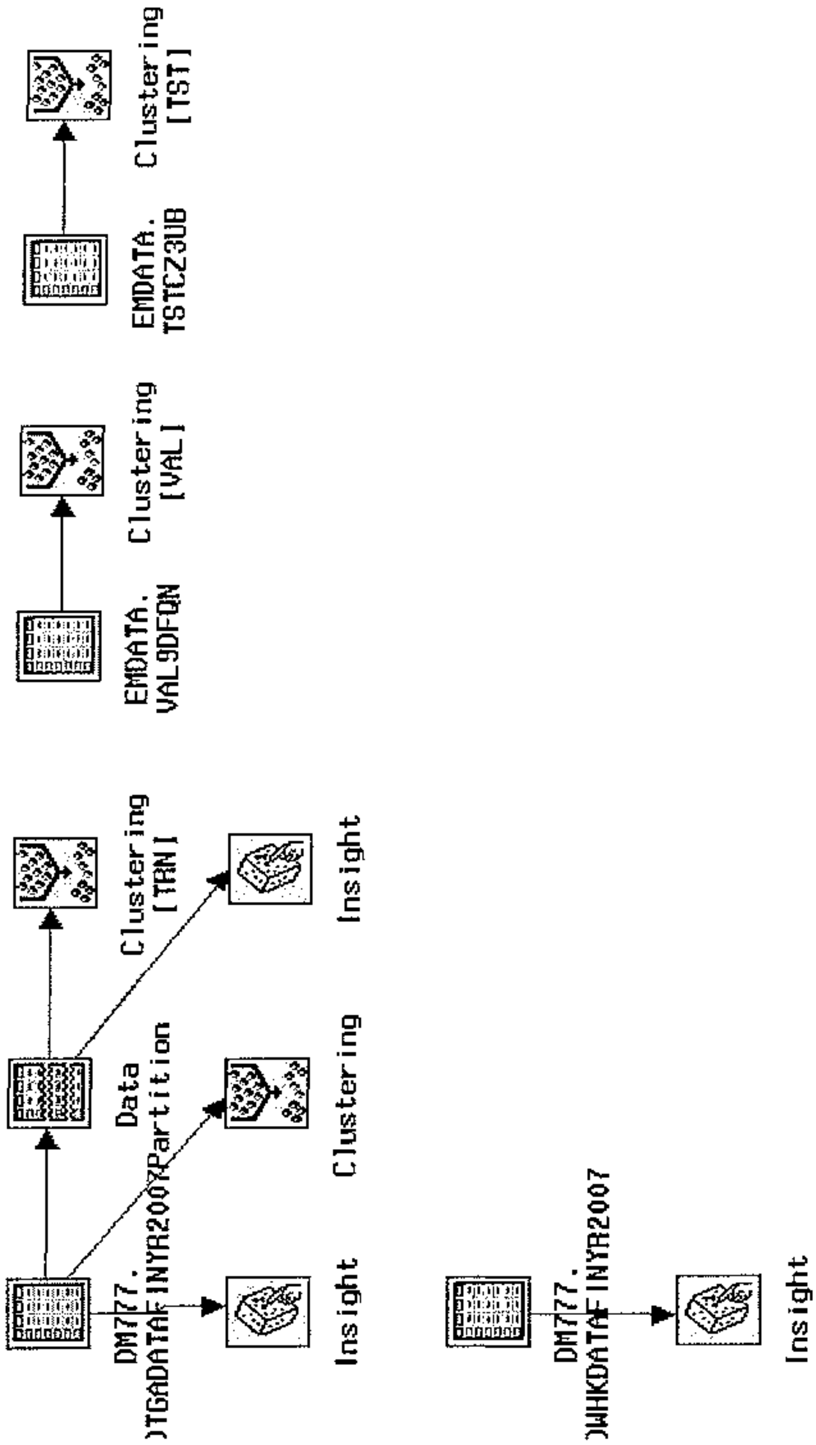
S13.4.2 SAS Enterprise Miner – PROJECT [**EDDataFinYr2006**]

D12.3 SAS EM Project using ED Data for July 2006 of Fin Year 2007



S13.4.3 SAS Enterprise Miner – PROJECT [**EDData200607**]

D12.4 SAS EM Project using ED Data for Fin Year 2007



S13.4.1 SAS Enterprise Miner – PROJECT [**EDDataFinYr2007**]

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BIBLIOGRAPHY

14 BIBLIOGRAPHY

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