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TRENDS OF ADULT ADMISSIONS IN A DISTRICT HOSPITAL IN LIMPOPO PROVINCE

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A RESEARCH REPORT SUBMITTED TO THE FACULTY OF HEALTH SCIENCES, UNIVERSITY OF THE WITWATERSRAND, IN PARTIAL FULFILMENT OF THE REQUIREMENT FOR THE DEGREE OF MASTERS OF PUBLIC HEALTH

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DECLARATION

I, ADRIAAN EKSTEEN LOURENS, declare that this research report is my own work. It is being submitted for the degree of Master of Public Health (Hospital Management) at the University of Witwatersrand, Johannesburg. It has not been submitted before for any degree or for any examination at this or any other university.

.....

November 2010

DEDICATION

I dedicate this work to:

My wife, Sienie, for the support and encouragement she provided me during the course of my studies and for proof reading my assignments and draft reports, and coping with my stress moods.

My Parents, for providing a solid home and upbringing. Your constant encouragement to study, without ever doubting my abilities, even when I so frequently have disappointed you, is much appreciated. I will always remember your parental support and guidance.

Last but by far not the least, to my Heavenly Farther for creating me the person that I am, and depositing in me all the abilities required to glorify His name, even through my studies.

Praise His Name!

ABSTRACT

BACKGROUND: District hospitals play an intermediary role between primary health care (PHC) clinics and community health centres; (CHC), (predominantly run by nurses) and regional hospitals, (predominantly run by specialists and doctors). However, in the absence of efficient and adequate network of PHC clinics and CHC's, district hospitals often have to render these services. In addition, due to geographic distances between district hospitals and regional hospitals, it often has to offer specialist services such as Orthopaedics, Gynaecology, as well. This increases the burden on district hospitals. The profile of patients admitted to district hospitals have not been clearly described and this study seeks to describe and to compare trends over a two year period and factors influencing these trends, to allow for informed decisions to be made for future planning. No formal study on the trends for admissions to District hospitals have been conducted, as far as could be determined, and this study aimed to look into and describe the trends of admissions over a two year period from April 2007 to March 2009, to allow for informed decisions to be made to guide future plans.

AIM: To determine the trends of adult admissions in a district hospital in Limpopo Province.

METHODOLOGY: A cross-sectional study design was used for this study. A descriptive retrospective review of existing hospital records was conducted from routine information captured on the MEDICOM patient administration system and in ward and OPD/casualty registers. No intervention was done for this study.

The setting was F. H. Odendaal Hospital in Modimolle, which is a district hospital situated in a rural area of the Limpopo Province. It serves a catchments population of over 103 000 people. Data was collected from 4481 admitted adult patients from which a random sample (n=800) was selected consisting of males (n=400) and females (n=400). Data on variables such as the case load (number of adult admissions during the research period), patient profile (gender, age, hospital classification and geographic location) and clinical profile (mode of admission,

diagnoses and associated ICD-10 code/s as well as the mode of discharge) were collected.

RESULTS: This study revealed that this hospital experienced an increase number of adult admissions during the two years study period. During the same period it could reduce the length of stay, thereby improve usable bed utilisation rate. This reflected in more discharges and less death. This was probably due to availability of more experienced medical officers and the fact that outreach services has been conducted on a weekly basis by doctors and Clinical Support Services since 2008/09 financial year.

The majority of the patients who were admitted over the study period were Africans residing in and around Modimolle. The majority was also classified as H1, meaning that most of the patients admitted to this hospital are capable of paying the nominal fee for services. The institution experienced an increase in the number of admission over the two years by 11.7%. The mean age was 42.5 years for adults.

Of the top 5 diseases/conditions for which patients were admitted, Pneumonia, Diarrhoea and Gastroenteritis, Retrovirus infections and Diabetes Mellitus were present for both males and females. Although this disease pattern persists for a number of years, it seems as if services provided manage to reverse discharge trends as more patients were discharged home in the second year than in the first year and the mortality rate decreased by 4.5% for adults between the two years.

CONCLUSION: Information obtained through this research could be extrapolated to other district hospitals for the management of services, including the management of beds. It could also serve as the basis for future research, as a reference base to students and the teaching of students.

ACKNOWLEDGEMENT

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My sincere thanks to Ms Johanna Kaka and Operational Managers, especially in male and female wards, for providing me with the required registers and assistance in understanding the data.

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LIST OF ABBREVIATIONS

A & E	Accident and Emergency
AIDS	Acquired Immuno deficiency Syndrome
ALOS	Average Length of Stay
CHC	Community Health Centres
DHIS	District Health Information System
EPI-Info	Public Domain Statistical Software for Epidemiology
FHO Hospital	F H Odendaal Hospital
F U	Follow-up
HIV	Human Immuno-deficiency Virus
ICD-10	10^{th} Revision of the International Statistical Class of Diseases and Related Health Problems
ID	Identification
MEDICOM	Medical Products Electronic Commerce
MoA	Mode of Admission
MoD	Mode of Discharge
OPD	Out Patient Department
PHC	Primary Health Care
RHT	Refusal of Hospital Treatment
STI	Sexually Transmitted Infections
UBUR	Usable Bed Utilisation Rate
USA	United States of America
WHO	World Health Organization

GLOSSARY OF TERMS

- Admission = acceptance of a patient into the hospital as an inpatient for a medical intervention or observation.
- Admission unit = the actual unit or ward into which a patient has been admitted: (re. male medical/surgical or female medical/surgical)
- Bed Occupancy = the total patient days during the reporting period, expressed as a percentage of number of registered bed days. (It assumes that a day patient occupies a bed for half a day and there are on average 30.42 days in a month).
- Bed Utilisation = the total patient days during the reporting period, expressed as a percentage of number of usable bed days. (it assumes that a day patient occupies a bed for half a day and there are on average 30.42 days in a month)
- Diagnosis = the diagnosis resulting in a patient being admitted to the institution.
- District Hospital = Provides first level of care. It also provides support to the surrounding clinics and Community Health Centres.
- DHIS = District Health Information System used for the general collection and collation of all health related data and not just patient data.
- Employment status = whether a patient is employed, either formal or self employed.
- Hospital number = a unique, system generated identification number awarded to each patient on opening a patient file for the first time.
- Income status = the level of income of patients who do have an income, based on the income scales as per the Uniform Patient Fee Schedule.
- Inpatient admissions = the number of patients admitted to the hospital over a period.
- ICD-10 coding = the 10^{th} revision of the International Statistical Class of Diseases and related Health Problems.
- MEDICOM = patient administration system used for the registration of patients.
- Mode of admission = the way through which a patient's admission was initiated: (re. Emergency, self, up or down referral).

- Mode of discharge = the outcome of discharge to home, transferred out, refusal of hospital treatment, abscondment and death.
- Patterns = the reason/s for patient admissions to the hospital over a period.
- Regional Hospital = Provides secondary level of care. In the case of Limpopo Province a large number of patients are seen at this facility.
- Residence = the town or village where patients reside or if on a farm, the nearest of a town or village.
- Tertiary Hospital = A health care facility in which all first, second and third level emergency patients are received and managed.
- Trends = the tendency of admissions to the hospital in future.
- Usable beds = beds available for use within the facility and includes acute, chronic and surgical beds.

CHAPTER 1
INTRODUCTION

The purpose of this study was to determine the trends of adult admissions in a district hospital in Limpopo Province. This introductory chapter will cover the background to the study, statement of the problem, its aims and objectives and an outline of subsequent chapters.

1.1 BACKGROUND

District hospitals play a pivotal role in supporting primary health care on the one hand and being a gateway to more specialized care on the other (South Africa Department of Health, 2002). In terms of the 'Policy for Development of a District Health System for South Africa', district hospitals are categorised as level one health facilities (South Africa Department of Health: Health Policy Coordinating Unit, 1995). Level one care is more of a generalist hospital service to in- and out patients on a 24/7 basis. It includes diagnostic, treatment, care, counselling and rehabilitation services in the following clinical disciplines; Family medicine, Medical, Obstetrics, Psychiatry, Eye care, Rehabilitation, Surgical, Paediatrics and Geriatric services.

District hospitals play an intermediary role between primary health care (PHC) clinics and community health centres; (CHC), (predominantly run by nurses) and regional hospitals, (predominantly run by specialists and doctors). However, in the absence of efficient and adequate network of PHC clinics and CHC's, district hospitals often have to render these services. In addition, due to geographic distances between district hospitals and regional hospitals, it often has to offer specialist services such as Orthopaedics, Gynaecology. as well. This increases the burden on district hospitals.

The profile of patients admitted to district hospitals have not been clearly described and this study seeks to describe and to compare trends over a two year period and factors influencing these trends, to allow for informed decisions to be made for future planning.

1.2 STATEMENT OF THE PROBLEM

Over the last few years, the District Health Information System (DHIS) reported that the Usable Bed Utilisation Rate (UBUR) for FH Odendaal Hospital is declining. unlike other district hospitals in the same district (Limpopo Department of Health and Social Development, 2008; Limpopo Department of Health and Social Development, 2009). The reasons for these trends were neither clear nor documented and are alarming, given the increasing burden of diseases in South Africa, especially HIV and AIDS and related conditions.

It is assumed that interventions introduced within the last two years, especially in the Limpopo Province, might have had an impact on trends. These interventions include the appointment of chief medical officers and specialists. Services by specialists have been rendered on an outreach basis from regional hospitals, resulting in an improvement of the available medical expertise within institutions. Although these interventions alone might not have a significant impact on the timely discharge of patients, it had an effect on the Average Length of Stay (ALOS), which in turn has an indirect influence on the UBUR. It is also recognized that other underlying factors (such as the outreach services by doctors and clinical support staff to clinics on a weekly basis), might have a role to play in improved patient management and care. It was assumed that this might lead to a limitation in admissions to FH Odendaal Hospital, (FHO Hospital), as diseases/conditions had managed properly at an early stage, resulting in fewer complications.

1.3 RESEARCH QUESTION

What are the trends of adult admissions and profile of admitted patients in F H Odendaal Hospital, in Limpopo Province?

1.4 STUDY OBJECTIVES

1.4.1 Broad Objective

To determine the trends of adult admissions and profile of admitted patients in F H Odendaal Hospital, in Limpopo Province.

1.4.2 Specific Objectives

1. To describe the trend of adult admissions to F H Odendaal Hospital for the study period.
2. To describe the profile of patients admitted in the adult wards during the study period.

1.5 SUBSEQUENT CHAPTERS

The background to the research has been discussed and objectives defined in this first chapter. The following chapters are:

Chapter Two: Literature Review
The purpose of the literature review is to explain and discuss concepts related to the research and to search for solutions to the research problem.

Chapter Three: Research Methodology
The chapter describes the research methodology, methods and techniques used in this study.

Chapter Four: Presentation of Results

This chapter deals with an analysis of the findings and the study relating to its aims and objectives.

Chapter Five: Discussion

The findings from the review of the literature are integrated with the results obtained from the analysis in order to address the aims and objectives of the study.

Chapter Six: Conclusions and Recommendations

This constitutes the final chapter of the report and draws conclusions from the research related to the aims of the study, makes recommendations and suggests areas for future research in the field of trends of adult admissions in District Hospitals in the Department of Health and Social Development in the Limpopo Province.

1.6 SUMMARY OF THE CHAPTER

The introductory chapter covered the background to the study, the motivation for the research, and the objectives of the study and statements of the problems. Lastly, it provided a summary of the subsequent chapters that constitutes this research report.

CHAPTER 2
LITERATURE REVIEW

In this chapter, relevant reports based on district hospitals and admissions into these hospitals and various factors that might influence the admissions are discussed. In addition to published literature, information from various unpublished sources is also reviewed.

2.1 DISTRICT HOSPITALS

According to the World Health Organization, a district hospital is distinguished by the following criteria, as listed in Table 2.1 (World Health Organization, 1987).

Table 2.1 Criteria of district Hospitals (WHO, 1987)

It forms an essential component of the Health District.
It provides certain level one hospital services that cannot usually be delivered at a PHC clinic or CHC.
It has the following clinical departments, emergency, care, medicine, surgery, obstetrics, paediatrics, psychology and outpatient services.
It provides 24-hours service and has more than 30 beds.
It provides in-service training and support to PHC services and facilities in the district.
It ensures the maintenance of good clinical standards in the district.
It provides comprehensive (protective, preventative, curative and rehabilitative) care and is an integral part of the district health programme.
It is staffed by generalist doctors who receive support from secondary and tertiary hospitals.
It should render primary level services to the local surrounding population, such as immunization, growth monitoring and Sexually Transmitted Infections, treatment through a separate PHC centre or Out Patient Department, OPD, within the grounds of the hospital.
It has the capacity to interact within the community and with other sectors.

As an integral part of the district health system, the hospital management team forms part of the overall district management with the aim to play a key role in health reform at district level. The hospital management team continually needs to improve the delivery of primary health care services in a safe and healthy way, and find ways in which hospital based resources can optimally be harnessed to strengthen the district health system (DHS). The following clinical disciplines are covered in a district hospital, namely, Family medicine, Medicine, Obstetrics, Psychiatric, Eye care, Rehabilitation, Surgery, Paediatrics and Geriatrics.

2.2 SOCIO-DEMOGRAPHIC PROFILE OF PATIENTS ADMITTED IN A DISTRICT HOSPITAL

The majority of patients in rural districts (such as Waterberg District) of South Africa are from low socio-economic strata. Only a small minority of them have access to medical aid. For example, 67.6% of population in Waterberg District have no personal income (Municipal Demarcation Board, 2006). These patients constitute the bulk of the catchments population in the district hospitals situated in these districts.

There are usually few health facilities in rural districts. As a result of that the majority of patients access the nearest health facilities for their health care needs. McMillan (2010) found that up to 83.7% of inpatients treated at district Hospital in Canada were local.

Generally, more elderly patients get admitted in the adult medical wards. In South Africa, Ndjeka and Ogunbanjo (2003) found geriatric patients (aged between 60 to 69) had the highest number of admissions (18.6%) among a cohort 743 patients (aged between 12 to 93 years), which was similar to the findings of studies done in Israel and Canada. In a study done in Israel, Stein and Zeidman (2000) found that the majority of patients (43.1%) were older than 75 years and 23.6% of them were between 65 and 74 years of age. A similar pattern was also found in a district

Hospital in Canada, where more than 25% patients were 75 years or older (McMillan, 2010). These studies confirmed that the vulnerable patients, in this case the elderly, are mostly admitted for hospital care even in the more developed countries, such as Canada and Israel.

2.3 TRENDS OF HOSPITAL ADMISSIONS

Due to financial constraints and the advent of managed health care and medical insurance, there is a general decline in hospital admission rates in countries such as the USA (Shonick, Hopkins and Gauvreau, 1976; Roberts, 2003), New Zealand (Lawrence, 2007), Canada (McMillan, 2010). Davis and colleagues, reported a decline in the admission rate (10%) as well as a decline in the length of stay (7% for the non-elderly and 15% for the elderly) in the United States of America, (USA) (Davis, et al., 1985), which was similar to the findings of another study conducted between 1987 and 1998 in the USA (Hemesath and Pope, 1998). A study done in New Zealand, also found a consistent reduction in bed utilisation as a result of an increase in day care patients as well as a more than 50% decline in the average length of stay" (Laurence, 2007). McMillan, (2010) also reported a decrease in the number of inpatient cases (5%) in a rural hospital in Canada.

A different trend emerged in South Africa. Floyd, Reid, Wilkinson, et al., (1999) reported an 81% increase in hospital admissions between 1991 and 1998, tuberculosis being the main contributory diagnosis for this trend. They further reported that the non-tuberculosis clinical AIDS cases also increased 43 fold between 1997 and 1991. Reid, Dedicoat, Lalloo, et al., (2005) suggested that this increasing tend in hospital admissions were due to increase burden of HIV/ AIDS and infectious diseases such as tuberculosis, lower respiratory tract infections and diarrhoeal illnesses. Although, this might show that increasing utilisation of public hospitals, this might have a negative impact on *patients with other conditions.*

Trends of hospital admission depend on its type (public or private), level (generalist

or specialist), and location (rural or urban) (British Audit Commission, 2003). The burden of diseases in the catchments population might also have some influence on the trend. (Whynes, Falk-Whynes and Pringle, 1999).

Often the public hospitals particularly those in rural areas face major challenges associated with inappropriate admissions. Appropriate placement of patients and reduction of inappropriate admissions have a major impact on hospital performance. In Ireland, PA Consulting Group (2007) found 13% of admissions and 39% of hospital days, were inappropriate according to the Irish Appropriateness Evaluation Protocol (A protocol developed to assess bed utilisation). In England, Whynes, et al (1999) also found a significant proportion of district hospital admissions were technically inappropriate. They raised their concerns about the increasing trend of these admissions and suggested that appropriate measures should be taken to manage them.

The most important factor influencing appropriate admissions of patients is the health care systems rather than patients themselves (PA Consulting Group, 2007). These include various factors such as operating hours, availability of appropriate health professionals (no doctors at the clinics), availability of drugs and investigations (PA Consulting Group, 2007).

2.4 FACTORS INFLUENCING HOSPITAL BED UTILISATIONS

Hospital bed utilisation is determined by various factors such as geographical location of nearby health facilities, burden of diseases, admission protocol, availability of drugs and services and clinical decision making.

Davis, Anderson, Renn, et al. (1985) found that the most important factor for bed utilisation is the decision of physicians to treat patients on an outpatient or inpatient basis. The authors found that improved utilisation review procedures (both prior

and subsequent to a hospital stay) resulted in better utilisation of hospital beds. Whynes, et al. (1999) found that increasing number of inappropriate referrals have a significant influence on increasing admission. On the other hand, delays in diagnosis, treatment and discharges for even a day or two might have a significant impact on clinical management of patients. This might also increase the opportunity costs for hospitals as well for the patients (British Audit Commission, 2003). In this Hospital however, all patients are seen by senior medical doctors who take decisions based on clinical conditions of the patients. The decisions include (a) admission, (b) referral to regional hospitals and (c) discharge. Patients that are admitted are done so for typical 1st level care such as for medical observations and treatment, minor surgical procedures, uncomplicated orthopaedic cases, maternity cases up to caesarean section and emergency care such as resuscitation, stabilization.

Bed utilisation in a health facility is influenced by burden of disease for the specific area. In the UK, allocation of hospital beds and their utilisations are found to be dependent on the characteristics of the catchments population. For example, elderly and deprived population and those with poor economic status were found to have more need in comparison to others (British Audit Commission, 2003).

Patients often attend district hospitals as a first level of health care which is a predominantly doctor led service and also because it is situated in the most densely populated spots, even in rural settings, such as towns or big villages. Patients come to district hospitals for services as the hospital is in many cases closer to the place of residence than clinics. Many patients also indicate that they would like to be seen by a doctor. Other reasons given by patients are non-availability of medication in clinics, better medication in hospitals and better services in hospitals (Limpopo Department of Health and Social Development, 2009). This sentiment was confirmed by Patel, (1971), who found that the numbers of self referred patients have increased from 46.4% to 60.9%. He further stated that, *"Self-referral is an increasing problem".* Whynes, et al., (1999) stated that a

possible contributory factor has been suggested to be the rising patient expectations. The effect of self care and the role of intermediate care are also found to play an important role in the hospital admission rate (Ham, York, Sutch, et al., 2003).

Hemeseth et al., (1998) suggested the following factors also had significant influences on bed utilisation rates (a) more demand for services (2) increasing length of stay, and (3), decrease in number of beds

2.5 SUMMARY OF THE CHAPTER

District Hospitals are regarded as primary health care institutions and is the first level of hospital care in the South African Health System. These hospitals are often burdened with inappropriate admissions. Previous studies suggest that the patients are often not the reason for inappropriate placement, but rather the system itself. Other studies indicate that financial constraints contributed towards a decline in admissions. Other factors that contribute towards a decline in bed utilisation are the increase in day-patients, self care, burden of diseases, demographic characteristics, different societal needs and the proper implementation of the District Health System.

CHAPTER 3
METHODOLOGY

The methodology for this study was selected on the basis of its aims and objectives. In this chapter the following were discussed: setting, scope, study design and research tools.

3.1 STUDY SETTING AND STUDY SCOPE

The setting of this study was the FH Odendaal Hospital in Modimolle, which is a district hospital situated in a rural area of the Limpopo Province.



Figure 3.1 Map of Limpopo Province

The FH Odendaal Hospital has one ward each for male (34 beds) and female (37 beds) patients. These wards are used for both medical and surgical conditions and all adult patients were admitted to either of these wards.



Figure 3.2 Map of Waterberg District

3.2 STUDY DESIGN

A cross-sectional study design was used for this study. The study was based on the review of existing hospital records and no primary data collection was done for

this study. In addition, no intervention was done as a part of this study.

3.3 STUDY PERIOD

Hospital records for two years were reviewed for this study. The study period extended from April 2007 to March 2009 in order to coincide with the financial years of public sector.

3.4 STUDY POPULATION AND SAMPLE

The study population consisted of all adult patients admitted to the male and female wards during the study period. Patients were regarded as adult if they were 18 years and older as patients under 18 years were regarded as minors. Approximately 100 (male) and 87 (female) patients were admitted on average per month in this Hospital. During the study period, 4481 patients (2400 males and 2081 females) were admitted to these two wards.

From the records of all adult patients during the study period a stratified random sample of 400 each for female and males were used for analysis.

3.5 MEASUREMENT AND DATA SOURCE

3.5.1 Study Instruments

MS Excel based data collection tools were used for data capturing (Annexure B). .

3.5.2 Variables

The variables for this study are listed in Table 3.1.

Table 3.1 List of study variables

OBJECTIVES	VARIABLES	
1	Trend of admissions	• No of patients admitted in male and female wards for the study period. • ALOS • UBUR
	Mode of admissions	• Accident and Emergency, relates to patients going through casualty, before being admitted. • Follow-up, relates to patients having to be re-admitted to access progress after initial procedures or treatment. • Referral, relates to referred, from PHC clinic, CHC or General Practitioner. • Self referral relates to a patient coming to the institution on own accord.
2	Socio-demographic profile	• Age • Gender • Hospital classification • Residence (town- or village name).
	Patient profile	• Final diagnosis and ICD-10 code
		• Discharge to home, transferred out, refusal of hospital treatment, abscondment or death.

Usable bed utilisation rate (UBUR) is calculated on monthly basis from the daily ratio of number of patients admitted to number of usable beds

$$\text{UBUR} = \sum\left[\frac{\text{No of patients admitted}}{\text{No of usable beds}}\right] / \text{ No of days in the month}$$

Average length of stay is calculated on monthly basis from the sum total of length of stay for each patient divided by the number of patients.

$$\text{ALOS} = \sum[\text{Length of stays}] / \text{ No of patients}$$

$$UBUR \propto 1/ ALOS$$

$$UBUR \propto \text{Number of admissions}$$

Hospital classification system for patients used in the study is based on the UPFS. This provides a guideline for patients' potential to pay for services or to be exempted from paying (Table 3.2)

Table 3.2 Hospital classification system

Type	Description
H0	They do not pay anything and include unemployed, pregnant women, children under 6 and pensioners.
H1	These individuals have an income less than R36 000 per annum or a household income of less than R50 000 per annum.
H2	They are individuals with an income of less than R72 000 per annum or a household income of less than R100 000 per annum.
Private	Private patients include those that pay in full for services, medical aids, and patients from other government departments such as South African Police Services, South African National Defence Force, Correctional Services, etc. It also includes payments from embassies and the Road Accident Fund.

3.5.3 Data Collection

The Hospital uses MEDICOM patient administration system (an electronic record keeping system) for routine data collection. Data was mostly extracted from this system. When information is missing, other data sources (such as Ward registers, Casualty/ OPD registrars, midnight census registers and Patient's file) were used to extract missing information. Patients' information was not captured to maintain confidentiality. All information entered for each individual patient was linked to a study number allocated to each patient.

3.5.4 Data Analysis

Data was collected and captured with MS Excel based tools. It was then analysed with EPI-Info software version 3.4.1

Descriptive statistics were used to analyse the data. Numerical variables were presented as mean and spread for normally distributed data or median and inter-quartile range (IQR) for others. Categorical data was presented as proportions.

Analytical statistics used for the study includes comparison between male and female patients (T-test or Mann Whitney's U test based on the distribution of the data) and chi-square test (for categorical data). Correlation (Pearson's or Spearman's correlation based on the distribution of the data) was done to determine the association between two continuous variables

3.6 PILOT STUDY

A pilot study was conducted in the Paediatric ward of this Hospital to test the data capturing tools for accuracy, availability of variables and reliability of data. Some adaptation of the data collection tools were done based on the findings of the pilot study.

3.7 ETHICAL CONSIDERATIONS

This study was approved by the Human Research Ethics Committee (Medical) of the University of the Witwatersrand. It was also authorised by the Head of the Department of the Limpopo Provincial Department of Health and Social Development (Annexure A). Patient's confidentiality was respected at all times and no patient details were captured.

CHAPTER 4
RESULTS

The results obtained from the analysis of data were described in this chapter.

I. STUDY POPULATION

The study population includes total admissions in adult male and female wards during the two years study period, (n = 4481). The first section describes the total study population. Subsequent section of this chapter focuses on the study sample (n=800).

4.1 ADMISSION TRENDS

The monthly admissions during this period are described in Table 4.1. Of the 4481 patients admitted over the period, 2400 were male and 2081 were female. Average total monthly admissions (male and female) were 187 (SD 37).

Table 4.1 Admission trends for adults between April 2007 and March 2009

	TOTAL	MALE	FEMALE			TOTAL	MALE	FEMALE
Apr 07	**100**	59	41		**Apr 08**	**198**	96	102
May 07	**122**	97	25		**May 08**	**202**	106	96
Jun 07	**99**	56	43		**Jun 08**	**216**	124	92
Jul 07	**159**	118	41		**Jul 08**	**221**	114	107
Aug 07	**177**	117	60		**Aug 08**	**235**	114	121
Sep 07	**154**	102	52		**Sep 08**	**220**	106	114
Oct 07	**204**	101	103		**Oct 08**	**211**	108	103
Nov 07	**197**	96	101		**Nov 08**	**215**	103	112
Dec 07	**157**	86	71		**Dec 08**	**198**	109	89
Jan 08	**205**	105	100		**Jan 09**	**191**	87	104
Feb 08	**200**	98	102		**Feb 09**	**204**	108	96
Mar 08	**203**	86	117		**Mar 09**	**193**	104	89
TOTAL	**1977**	**1121**	**856**		**TOTAL**	**2504**	**1279**	**1225**

There average male admissions per month were 95 (SD 18) and 107 (SD 13) for the two years respectively. The average female admissions during this period were 74 (SD 30) and 102 (SD 10) for the respectively (Table 4.2). There were significant differences between male and female admissions during this period (Student t test $p < 0.05$).

Table 4.2 Adult admissions during study period

	TOTAL Mean ± SD	**MALE** Mean ± SD	**FEMALE** Mean ± SD
2007-2008	170 ± 38	95 ± 18	74 ± 30
2008-2009	209 ± 13	107 ± 13	102 ± 10
TOTAL	187 ± 37	100 ± 16	87 ± 28

SD = standard deviation

There were significant increases in total (male and female) admissions during the 24 month study period. (Pearson's correlation $r = 0.67$, $\rho < 0.01$) (Figure 4.1)

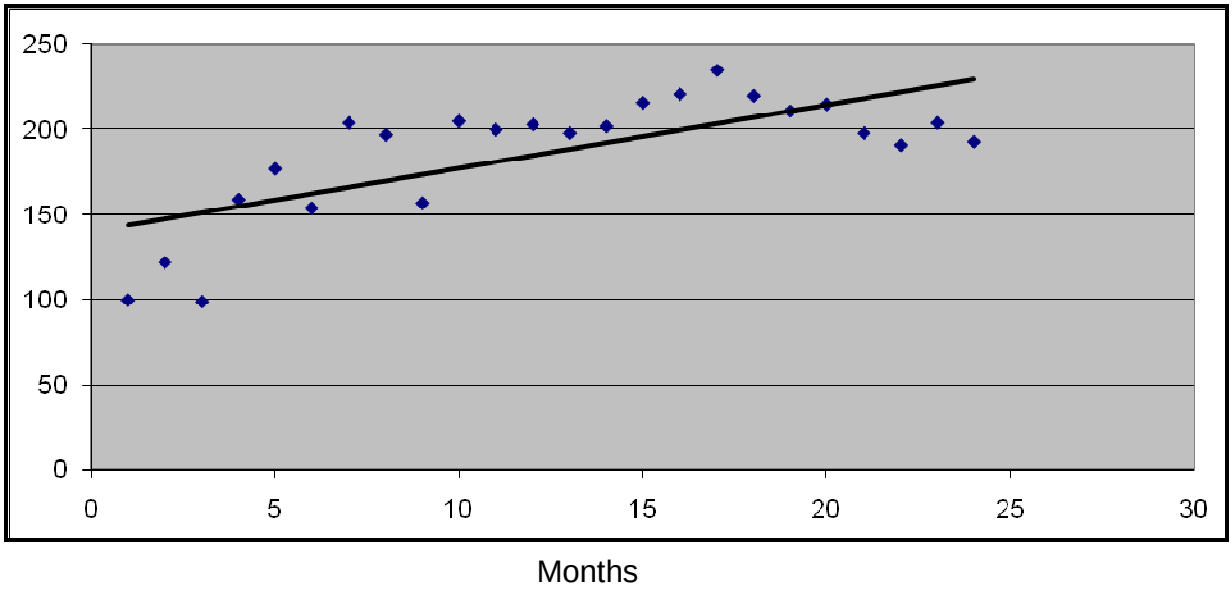
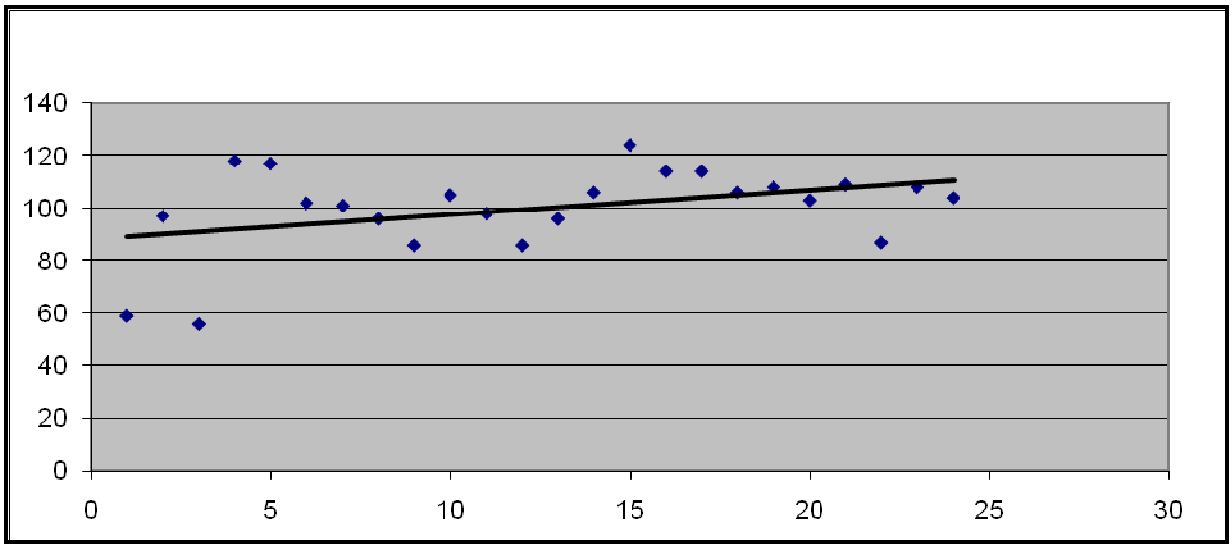


Figure 4.1 Overall admissions

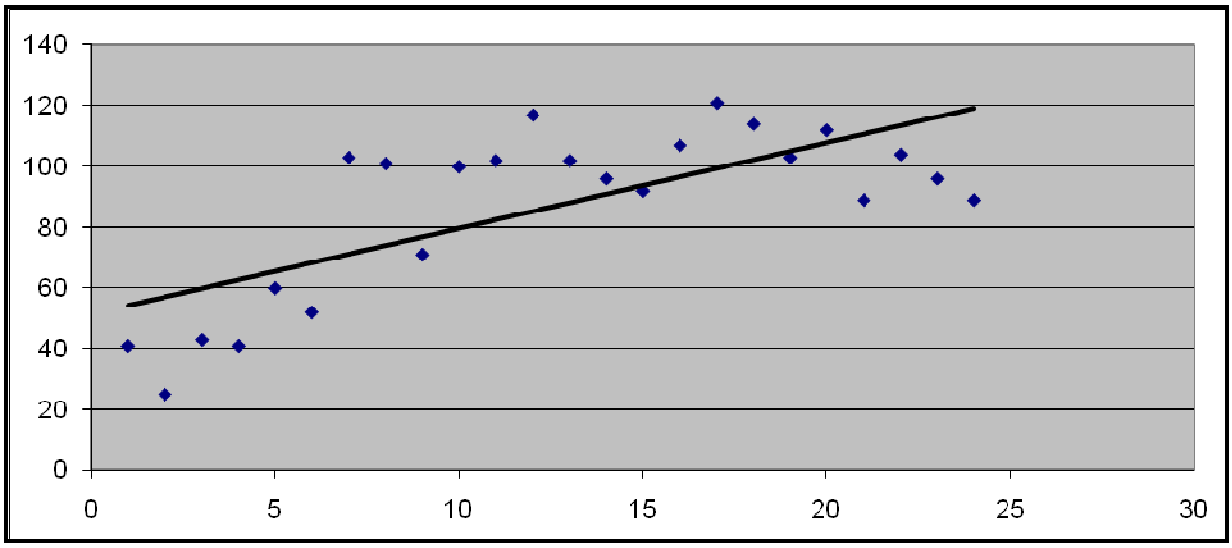
Although there was a linear trend of increasing male admissions, it is not statistically significant. (Pearson's correlation r = 0.39, p =0.06) (Figure 4.2).



Months

Figure 4.2 Male admissions

This increase was predominantly due to a significant increase in female admissions (Pearson's correlation r = 0.71, ρ < 0.01) (Figure 4.3).



Months

Figure 4.3 Female Admissions

The average male admissions were more in the winter months (June to August) (107 ± 25) in comparison to the summer months (December to February) (98 ± 10). However, for the females, there were fewer admissions in the winter months (77.3 ± 34) than in the summer months (93.6 ± 12.3). However, Student t-test showed that these differences were not statistically significant (male p=0.47; female p =0.29).

The Usable Bed Utilisation Rate (UBUR) and the Average Length of Stay (ALOS) are reflected in Table 4.3.

Table 4.3 Usable Bed Utilisation Rate and Average Length of Stay for adults between April 2007 and March 2009

	UBUR	ALOS		UBUR	ALOS
Apr 07	72.0%	6.6	**Apr 08**	42.9%	3.5
May 07	55.9%	3.8	**May 08**	46.6%	4.0
Jun 07	41.2%	4.2	**Jun 08**	60.7%	4.8
Jul 07	59.9%	5.1	**Jul 08**	56.2%	4.2
Aug 07	67.4%	4.4	**Aug 08**	62.5%	5.0
Sep 07	63.6%	4.2	**Sep 08**	52.4%	3.8
Oct 07	65.5%	4.1	**Oct 08**	50.7%	4.1
Nov 07	62.9%	4.1	**Nov 08**	40.2%	3.6
Dec 07	65.5%	5.1	**Dec 08**	43.9%	3.6
Jan 08	62.3%	3.9	**Jan 09**	46.9%	3.6
Feb 08	53.3%	4.1	**Feb 09**	45.7%	3.6
Mar 08	55.1%	3.8	**Mar 09**	61.1%	3.8
AVERAGE	**60.4%**	**4.5**	**AVERAGE**	**50.8%**	**4.0**

There were significant decrease in UBUR, (r = -0.48, p = 0.01) and ALOS, (r = -0.51, ρ = 0.01) during this period (Figure 4.4), although there was a significant increase in actual number of admissions during this period.

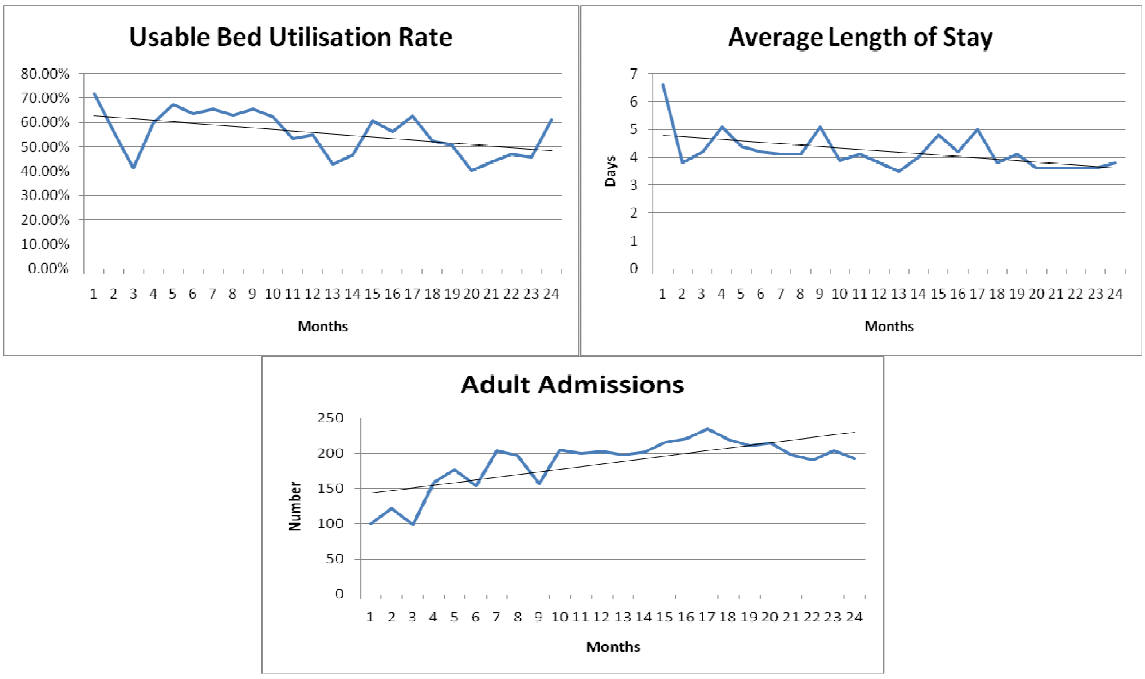


Figure 4.4 Total admissions, UBUR and ALOS

II. STUDY SAMPLE

A stratified random sample of 800, (400 males and 400 females), were taken from the total study population (Table 4.4). The study population and sample were similar in terms of demographic characteristics (such as age and ethnicity). The following section analyses and describe results of the study sample.

Table 4.4 Admissions according to the sample

	TOTAL	MALE	FEMALE
2007/08	**226**	121	105
2008/09	**574**	279	295
Total	**800**	**400**	**400**

4.2 MODE OF ADMISSIONS

The majority of admissions, (468, 58.5%), were emergencies (Table 4.5). These patients were admitted through the Accident and Emergency Unit of the Hospital. The lowest proportion (18, 2.3%), were referred from PHC clinics. No information was recorded for 207 (25.8%) patients.

Table 4.5 Mode of admission for the period

	TOTAL n (%)	MALE n (%)	FEMALE n (%)
Accident & Emergency	**468 (58.5%)**	237 (59.3%)	231 (57.8%)
OPD			
Referral	**18 (2.3%)**	11 (2.6%)	7 (1.7%)
Self referral	**43 (5.4%)**	20 (5%)	23 (5.7%)
Follow-up	**64 (8%)**	19 (4.8%)	45 (11.3%)
Unknown	**207 (25.8%)**	113 (28.3%)	94 (23.5%)
TOTAL	**800 (100%)**	**400 (100%)**	**400 (100%)**

4.3 SOCIO-DEMOGRAPHIC PROFILE

4.3.1 Age

The age distribution described in Table 4.6 reveals no significant difference between the males and females. The median age changed slightly for males (39.5 years to 41 years) and females (35 years to 36 years) during this period. This indicates that the age distribution for adult admissions remained stable.

However, female patients were found to be significantly younger than male patients (Mann Whitney's test, $\rho<0.001$)

Table 4.6 Age distribution of patients

Age (years)	MALE MEDIAN (IQR)	FEMALE MEDIAN (IQR)
2007/08	39.5 (30 -52)	35 (27-47)
2008/09	41 (31-53)	36 (28-51)
Total	39 (31-52)	36.5 (28- 49)

4.3.2 Hospital classification

The distribution of patients according to hospital classification is described in Table 4.7. The majority of them were free H0 patients and there were very few private patients.

Table 4.7 Classification of patients according to UPFS

	TOTAL n (%)	MALE n (%)	FEMALE n (%)
H0 (Free)	138 (17.3%)	61 (15.2%)	77 (19.2%)
H1	653 (81.6%)	332 (83%)	321 (80.3%)
H2	2 (0.2%)	2 (0.5%)	0 (0%)
Private	7 (0.9%)	5 (1.3%)	2 (0.5%)
TOTAL	**800 (100%)**	**400 (100%)**	**400 (100%)**

4.3.3 Ethnicity

The majority of the patients were black (739, 2.4%). There were 370 (92.4%) black males and 369 (92.2%) females. The second highest group were whites (54, 6.7%). The Coloured and the Indian community formed the outright minority (Table 4.8).

Table 4.8 Ethnicity of patients admitted during study period

	TOTAL n (%)	MALE n (%)	FEMALE n (%)
Black	739 (92.4%)	370 (92.4%)	369 (92.2%)
White	54 (6.7%)	28 (7%)	26 (6.5%)
Indian	2 (0.3%)	1 (0.3%)	1 (0.3%)
Coulored	5 (0.6%)	1 (0.3%)	4 (1%)
TOTAL	800 (100%)	400 (100%)	400 (100%)

4.3.4 Residence

The vast majority of patients resided within the Modimolle municipal area. Most of them were from Modimolle town (where the Hospital is situated) and Vaalwater (approximately 60 km away) (Table 4.9).

- A total of 730 patients, resided within a radius of approximately 100 km from the Hospital. Residences of 535 adult patients (male 281 and female 254) fall within a distance of approximately 50 km from FH Odendaal Hospital. Most of them (462, 240 males and 222 females) were from Modimolle town and the surrounding areas. The second highest number of patients came from Vaalwater (157 patients, 74 males and 83 females).
- The remaining 70 patients (31 males and 39 females), came from towns and areas, which are more away than 100 km from this Hospital. This includes towns that are more than 300 km away. It also includes other provinces such as Free State, Gauteng, Mpumalanga and North-West that contributed a total of 39 (18 males and 21 females) patients. Distances for these places were not calculated as in most instances only the names of the provinces

were mentioned. A similar situation applies to the fact that one female patient came from Zimbabwe.

Table 4.9 Area of residence of patients admitted during the study period

PROVINCE	TOTAL	MALE	FEMALE	DISTANCE (± Km)
LIMPOPO				
0 – 50 km				
Alma	**25**	15	10	50
Bela Bela	**9**	4	5	30
Modimolle	**462**	240	222	0
Mookgophong	**17**	9	8	45
Settlers	**22**	13	9	37
SUB-TOTAL	**535**	281	254	
51 – 100 km				
Kromdraai	**1**	0	1	80
Marble Hall	**12**	3	9	100
Mokopane	**9**	4	5	95
Radium	**1**	1	0	60
Rankins Pass	**1**	0	1	75
Tuinplaas	**14**	6	8	68
Vaalwater	**157**	74	83	60
SUB-TOTAL	**195**	88	107	
>100 km				
Lebowakgomo	**2**	1	1	150
Rust De Winter	**1**	0	1	114
Lephalale	**4**	1	3	180
Polokwane	**5**	2	3	155
Thabazimbi	**2**	1	1	160
Dendron	**1**	0	1	236
Jane Furse	**1**	1	0	205
Tzaneen	**3**	1	2	250
Bochum	**2**	1	1	276
Giyani	**4**	1	3	336
Phalaborwa	**1**	0	1	370
Thohoyandou	**4**	4	0	355
SUB-TOTAL	**30**	13	17	
Limpopo (sub-total)	**660**	**382**	**378**	
OTHER PROVINCES				
Free State Province	**2**	2	0	
Gauteng Province	**10**	9	1	
Mpumalanga Province	**23**	6	17	
North-West Province	**4**	1	3	
Other provinces (sub-total)	**39**	**18**	**21**	
OTHER COUNTRIES				
Zimbabwe	**1**	0	1	
Other countries (sub-total)	**1**	**0**	**1**	
GRAND TOTAL	**800**	**400**	**400**	

4.4 CLINICAL PROFILE OF PATIENTS

4.4.1 Final diagnosis and ICD-10 code

The top 10 conditions for males, as showed in Table 4.10, related to approximately a third of the patients.

Table 4.10 Top 10 diagnoses for males during the study period

ICD 10 CODE	DIAGNOSIS	NUMBER OF CASES n (%)	RANK
J18.9	Pneumonia, unspecified	20 (5%)	1
A09	Diarrhoea and gastroenteritis of presumed infectious origin	20 (5%)	2
B33.3	Retrovirus infections not elsewhere classified	17 (4.2%)	3
A15.9	Respiratory TB, unspecified	15 (3.7%)	4
E14.9	Unspecified Diabetes Mellitus without complications	14 (3.5%)	5
I15.9	Secondary Hypertension, unspecified	9 (2.2%)	6
G40.9	Epilepsy, unspecified	8 (2%)	7
H26.9	Cataract, unspecified	7 (1.7%)	8
I50.0	Congestive heart failure	7 (1.7%)	9
Z91.5	Personal history of self harm	7 (1.7%)	10
	TOTAL FOR SAMPLE	124 (31%)	

The top 10 conditions for females, related to more than third of the subjects (142, 35.5%) (Table 4.11).

Table 4.11 Top 10 diagnoses for females during the study period

ICD 10 CODE	DIAGNOSIS	NUMBER OF CASES n (%)	RANK
B33.3	Retrovirus infections not elsewhere classified	32 (8%)	1
J18.9	Pneumonia, unspecified	21 (5.2%)	2
O06.9	Complete or unspecified abortion without complication	16 (4%)	3
A09	Diarrhoea and gastroenteritis of presumed infectious origin	15 (3.7%)	4
E14.9	Unspecified Diabetes Mellitus without complications	14 (3.5%)	5
I15.9	Secondary Hypertension, unspecified	10 (2.5%)	6
D64.9	Anaemia, unspecified	9 (2.2%)	7
N73.9	Female pelvic inflammatory disease, unspecified	9 (2.2%)	8
H26.9	Cataract, unspecified	8 (2%)	9
Z91.5	Personal history of self harm	8 (2%)	10
	TOTAL FOR SAMPLE	142 (35.5%)	

Table 4.12, provides an overview of the rankings of the top 10 diseases/conditions for both male and females.

Table 4.12 Male and female patients listed according to ranking

ICD 10 CODE	DIAGNOSIS	MALE RANKING	FEMALE RANKING
J18.9	Pneumonia, unspecified	1	2
A09	Diarrhoea and gastroenteritis of presumed infectious origin	2	4
O06.9	Complete or unspecified abortion without complication		3
A15.9	Respiratory TB, unspecified	4	
B33.3	Retrovirus infections not elsewhere classified	3	1
E14.9	Unspecified Diabetes Mellitus without complications	5	5
G40.9	Epilepsy, unspecified	7	
D64.9	Anaemia, unspecified		7
H26.9/H26	Cataract, unspecified/Other cataract	8	9
N73.9	Female pelvic inflammatory disease, unspecified		8
I50.0	Congestive heart failure	9	
Z91.5	Personal history of self harm	10	10
I15.9	Secondary Hypertension, unspecified	6	6

In Table 4.13, an overview is provided about the number and distribution of diagnoses made on adult male and female patients, who were admitted during the study period. The distribution was done based on the main disease groupings according to the ICD 10 coding system. Where more than one disease/condition was diagnosed, only primary diagnoses were considered. Only groups that did occurred are shown, hence the omission of some disease groups

Laser therapy treatment is a procedure that is performed on females and is not provided for under any of the disease groupings.

Table 4.13 Number of patients for each Disease code

DISEASE CODE	DISEASE GROUP	MALE n (co-disease)	FEMALE n (co-disease)
A00 – B99	Certain infectious and parasitic diseases.	82	76
C00 – D48	Neoplasms	2	2
D50 – D89	Diseases of the blood and blood forming organs and certain disorders involving the immune mechanisms.	5	20
E00 – E90	Endocrine, nutritional and metabolic diseases.	20	18
F00 – F99	Mental and behavioural disorders.	17	6
G00 – G99	Diseases of the nervous system.	25	14
H00 – H59	Diseases of the eyes and adnexa.	12	15
I00 – I99	Diseases of the circulatory system.	40	27
J00 – J99	Diseases of the respiratory system.	47	41
K00 – K93	Diseases of the digestive system.	17	16
L00 – L99	Diseases of the skin and subcutaneous tissue.	6	6
M00 – M99	Diseases of the musculoskeletal system.	13	10
N00 – N99	Diseases of the genitourinary system.	16	27
O00 – O99	Pregnancy, childbirth and the puerperium.		53
R00 – R99	Symptoms, signs and abnormal clinical and laboratory findings not elsewhere classified.	18	8
S00 – T98	Injury, poisoning and certain other consequences of external causes.	59	30
V01 – Y98	External causes of morbidity and mortality.	7	8
Z00 – Z13	Factors influencing health status and contact with health services.	14	21
	Laser therapy treatment		2

4.4.2 Final outcome (mode of discharge)

The mode of discharge for these patients is described in Table 4.14. The majority of them(689, 86.1%) were discharged to return to their homes. The number of patients that died during this period was 87 (10.9%) of which 46 (11.5%) were males and 41 (10.2%) were female. A total of 21 (2.6%) refused hospital treatment. Only one (0.1%) male patient was transferred to a secondary care hospital and two (0.3%) males absconded.

Table 4.14 Mode of discharges of patients during the study period

	TOTAL n (%)	MALE n (%)	FEMALE n (%)
Home	**689 (86.1%)**	336 (84%)	353 (88.3%)
Death	**87 (10.9%)**	46 (11.5%)	41 (10.2%)
Transfer up	**1 (0.1%)**	1 (0.3%)	0 (0%)
Absconded	**2 (0.3%)**	2 (0.5%)	0 (0%)
RHT	**21 (2.6%)**	15 (3.7%)	6 (1.5%)
TOTAL	**800 (100%)**	**400 (100%)**	**400 (100%)**

A higher proportion of females (88.3%) to males (84%) were discharged home. However, there was no significant difference in deaths between males (46, 11.5%) and females (41, 10.2%) (Chi-square test, p =0.1).

Table 4:15 indicates that a higher proportion of patients (both males and females) were discharged home in the second year than what was the case in the first year and less deaths occurred for both genders in the second year, comparing to the first year.

Table 4.15 Comparison of patients (discharged and deceased)

	2007/08		2008/09	
	MALE n (%)	FEMALE n (%)	MALE n (%)	FEMALE n (%)
Home	98 (81%)	87 (83%)	238 (85%)	266 (90%)
Deaths	15 (12%)	17 (16%)	31 (11%)	24 (8%)

4.5 COMPARISON OF CATCHMENTS POPULATION

Based on the data in Table 4.9 462 (240 males and 222 females) were admitted during the study period, who resided within or around Modimolle. The remaining 338, (160 males and 178 females), resided outside Modimolle..

Table 4.16 shows that of all the patients that were admitted during the study period and for whom the mode of admission were recorded, 339 came from Modimolle and 254 from outside Modimolle. Of those that came from Modimolle, 264 (78%)

went through the Accident and Emergency Unit before being admitted in comparison to 204 (80%) from other areas. Referrals for Modimolle patients amounted to 11 (3%), self referrals 30 (9%) and follow-ups 34 (10%), in comparison to patients from other areas Referral (7, 3)%), self referrals (12, 5%) and follow-ups (31, 12%). No significant differences were found between the two groups in terms of their disease profile (Chi-square test, p =0.79).

Table 4.16 Comparison between patients from Modimolle and other areas in terms of mode of admission

Mode of Admission	TOTAL		MALE		FEMALE	
	Modimolle n (%)	**Other areas** n (%)	**Modimolle** n (%)	**Other areas** n (%)	**Modimolle** n (%)	**Other areas** n (%)
Accident & Emergency	264 (78%)	204 (80%)	142 (82%)	95 (37%)	122 (73%)	109 (78%)
Referral	11 (3%)	7 (3%)	5 (3%)	6 (2%)	6 (4%)	1 (1%)
Self Referral	30 (9%)	12 (5%)	14 (2%)	6 (2%)	16 (10%)	6 (4%)
Follow-up	34 (10%)	31 (12%)	12 (7%)	7 (3%)	22 (13%)	24 (17%)
TOTAL	339 (100%)	254(100%)	173 (100%)	114(100%)	166 (100%)	140(100%)

Table 4.17 shows that of all the patients that were admitted during the study period, 404 (88%) Modimolle patients were discharged home in comparison to 285 (78%) from outside Modimolle. Of the patients that came from Modimolle, 48 (10%) died in comparison to 39 (16.5%) outside Modimolle patients. No significant differences were found between the two groups in terms of their disease profile (Chi-square test, p =0.24).

Table 4.17 Comparison between patients from Modimolle and other areas in terms of final outcome

Final outcome	TOTAL		MALE		FEMALE	
	Modimolle n (%)	Other areas n (%)	Modimolle n (%)	Other areas n (%)	Modimolle n (%)	Other areas n (%)
Discharge	404 (88%)	285(78%)	207 (86%)	129 (81%)	197 (89%)	156(88%)
Death	48 (10%)	39 (16.5%)	25 (10%)	21 (13%)	23 (10%)	18 (10%)
RHT	10 (2%)	11 (5%)	8 (3%)	7 (4.5%)	2 (1%)	4 (2%)
Transfer	0 (0%)	1 (0.5%)	0 (0%)	1 (0.5%)	0 (0%)	0 (0%)
Abscond	0 (0%)	2 (1%)	0 (0%)	2 (1%)	0 (0%)	0 (0%)
TOTAL	462 (100%)	238(100%)	240(100%)	160(100%)	222 (100%)	178(100%)

Thirty one patients from Modimolle were admitted for HIV in comparison to 18 from outside Modimolle (Table 4.18). Patients admitted from elsewhere outnumbered those from Modimolle for three conditions namely, Diarrhoea and Gastroenteritis (18) Cataract and Abortions (9). No significant differences were found between the two groups in terms of their disease profile.

Table 4.18 Comparison between patients from Modimolle and other areas in terms of their disease profile

Top 10 diagnoses	TOTAL		MALE		FEMALE	
	Modimolle n (%)	Other areas n (%)	Modimolle n (%)	Other areas n (%)	Other areas n (%)	Modimolle n (%)
Diarrhoea and gastroenteritis	17 (11%)	18 (17%)	11 (14%)	9 (19%)	6 (8%)	9 (14%)
Respiratory TB	8 (5%)	7 (7%)	8 (11%)	7 (15%)		
Retrovirus Infection	31 (20%)	18 (17%)	14 (8%)	3 (6%)	17 (22%)	15 (24%)
Anaemia	6 (4%)	3 (3%)			6 (8%)	3 (5%)
Diabetes	18 (12%)	10 (10%)	7 (9%)	7 (15%)	11 (14%)	3 (5%)
Epilepsy	5 (3%)	3 (3%)	5 (7%)	3 (6%)		
Cataract	3 (2%)	12 (11%)	2 (3%)	5 (10%)	1 (1%)	7 (11%)
Hypertension	11 (7%)	8 (8%)	6 (8%)	3 (6%)	5 (6%)	5 (8%)
Congestive heart failure	5 (3%)	2 (2%)	5 (7%)	2 (4%)		
Pneumonia	26 (17%)	15 (14%)	12 (16%)	8 (17%)	14 (18%)	7 (11%)
Pelvic inflammation	6 (4%)	3 (3%)			6 (8%)	3 (5%)
Abortion	7 (5%)	9 (3%)			7 (9%)	9 (14%)
Self harm	12 (8%)	3 (3%)	6 (8%)	1 (2%)	6 (8%)	2 (3%)
TOTAL	155 (100%)	111(100%)	76(19%)	48(100%)	79(100%)	63 (100%)

4.6 SUMMARY OF THE CHAPTER

The results of the study are described and supported by tables and graphs. Results are described as the admission trends, mode of admission and socio demographic profiles, which includes age, hospital classification, residence, and ethnicity of the admitted patients. The last section describes the patient profile as it looks at the diagnoses and related ICD 10 coding, the top 10 diseases/conditions as well as a comparison of the disease rankings between male and female patients and the distribution of diagnoses based on the disease groupings of the ICD 10 coding system. The final section concludes this chapter as it describes the mode of discharge of patients.

CHAPTER 5
DISCUSSION

In this chapter, the results obtained from the analysis of the data were discussed and compared with those from other published studies.

5.1 INTRODUCTION

This study was done in order to determine the trends of adult admissions and the profile of admitted patients in a district hospital in the Limpopo Province. No studies have been conducted at the level of a district hospital in the Limpopo Province to look at the trends of adult admissions and the profile of such patients on admission, the outcome of such patients and the impact it has on services or what services have on the patients. In addition, not many studies addressed this topic at national or international levels and most of the published literatures are based on studies done at tertiary level hospitals in developed countries. Published studies done in African continent are few except some unpublished official documents and reports from Departments of Health. Therefore, the findings of this study could not be effectively compared with other studies.

The findings documented in this report are data obtained from routine data collecting tools namely, admission records as well as wards, OPD and casualty registers. The data for the entire study population (admissions in male and female medical wards) were extracted and a sample of 400 each for males and females were randomly selected for detailed analysis. There was no difference between the study population and the sample in terms of demographic characteristics (such as age and ethnicity). More records were sampled for the 2008/09 year than for the 2007/08 as the number of admissions was greater in the second year than in the first year (Table 4.1 and Table 4.4).

5.2 CASELOAD

A total of 4481 adult patients were admitted for the period April 2007 to March 2009. These patients included all patients that were admitted to the institution and had to spend at least one or more nights in the institution, whether they came to the institution as an emergency, referral, self referral or for follow-up.

Of the 4481 patients admitted over the period, 2400 were male and 2081 were female, at a ratio of 1:1.15. There was an increase in the admission rates from 2007/08 to 2008/09. In addition, the variation in monthly admissions in both male and female wards narrowed. Wider fluctuations in hospital admissions influence human resource planning in the hospitals. This implies that hospital management could probably allocate resource more effectively in the second year. It would be interesting to know, if these patterns continue in future years.

In the Modimolle Sub-district, there was an increase in the number of patients accessing PHC services at clinics, more patients were seen during outreach services by doctors in clinics. In addition there were also increase in the OPD headcount of the institution during the 2008 and 2009 calendar years, (Limpopo Department of Health and Social Development 2009; Limpopo Department of Health and Social Development 2010). Because more patients have accessed services at PHC clinics and the FHO Hospital, it is assumed that either the quality of care has improved, especially during early management at clinic level or else, that the burden of disease have increased therefore “forcing” more patients to seek health care.

During the study period, the UBUR decreased from 60.4% to 50.8% ($r= -0.51$, $p = 0.01$). In 200/09 financial year, more senior and experienced medical officers (chief medical officers) were appointed. Therefore, it could be assumed that this was due to improved decision making which resulted in improvement in the quality of clinical care. This can be confirmed by the decrease in ALOS from 2008/2009 to

2009/2010. A schematic diagram (Figure 5.1) described the possible events in the FHO Hospital. However, a detailed prospective study is necessary to confirm the model described below.

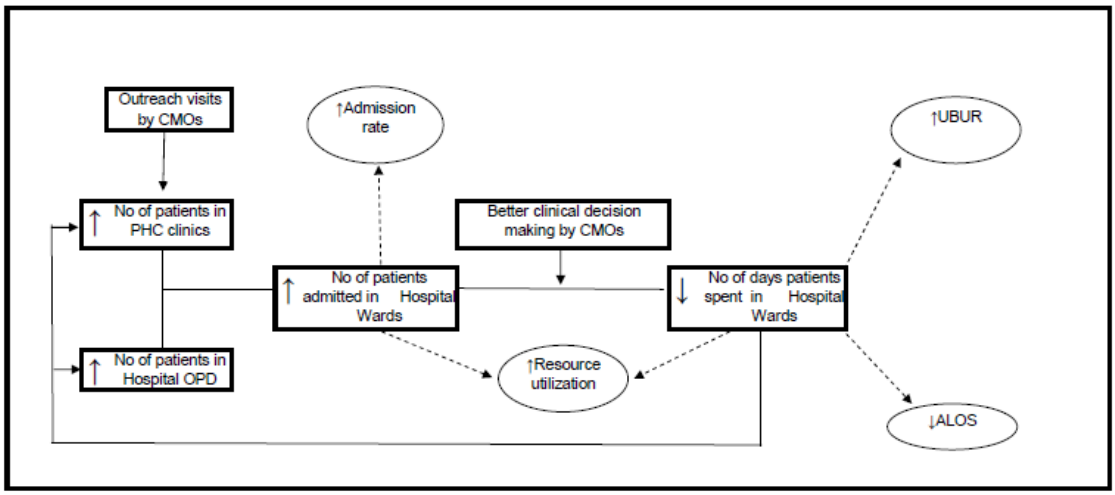


Figure 5.1 Schematic diagram

5.3 MODE OF ADMISSION

The majority of patients in General hospitals usually are usually admitted through the Accident and Emergency Units. These units are often described as 'front door' (Thomson Healthcare, 2008) or 'gatekeepers' (Wai, Chor, Lee, et al., 2008) to hospitals. Thomson Healthcare (2008) reported that Emergency Department in hospitals in the USA were more problematic and more critical to the success of the entire facility. They found that this Unit had a unique culture within the larger framework of the Hospital. Nearly half (45%) of the hospital admissions were done through this Unit. In a study done at the John Radcliffe Hospital in Oxford, Anderson, Meara, Brodhurst, et al., (1986) found that 69% of admissions were for emergencies and only 31% for elective procedures during a three week period. Patients admitted as emergencies, accounted for 77% of bed days. In Invermere and District Hospital, inpatients admitted through the emergency department,

amounts to 80.8% for 2008/09, and the majority of them were unscheduled (75%) (McMillan, 2010). In this study, the majority of patients 468 (58.5%), males 237 (59.3%) and females 231 (57.8%), that were admitted during the study period, passed through Accident and Emergency Unit. Such patients were either brought to the institution by ambulance or by relatives/friends, any time of the day.

Only a small proportion of patients was either referred to the hospital by a clinic or self referred (coming to the institution on their own), or came for an arranged follow-up. The group of patients (Total 64(8%), Male 19 (4.8%) and Females 45 (11.3%)) who came for follow-up and then re-admitted constituted a small proportion of admissions. This probably reflects better in-patient care reducing the need for repeat admission.

The number of admission who were referred from clinics and then admitted through Hospital OPD were few (Total, 18 (2.3%), Males 11 (2.6%) and Females 7 (1.7%)). This is probably an indication of poor referral system. Although there are signs of increased patient visits to PHC services, the vast majority of patients were still admitted through the Accident and Emergency Unit. This might reflect more sick patients in the community who were seen at the Clinics and referred as Emergency to the Hospital Accident and Emergency Unit for admissions.

A number of admitted patients were self referrals (Total 43 (5.7%), Male 20 (5%) and Female 23 (5.7%)). It is possible that these patients who referred themselves either postponed healthcare to the point that the disease/condition for which they were seeking care for had reached the point that they could no longer ignore, and as such were “forced” to seek medical attention. The possibility that other means of health care, such as Traditional Healers, were sought and probably did not yield the desired results which led them to seek more formal health care.

5.4 SOCIO-DEMOGRAPHIC PROFILE

5.4.1 Age

The study indicated that their average age was 39 years, which was similar to the findings (average age 40) of a study done in Western Cape (Marszalek et al., 2006). Admitted female patients were found to be significantly younger than male patients which are consistent with the demographic profile of the catchments population (Municipal Demarcation Board, 2006). In this study, 64% of patients were in the age group of less than 45 years. This coincides with the midyear population estimates of 2009, for the Waterberg District, which reflected that 81.7% of the total population of 594 991, were younger than 45 years (Limpopo Department of Health and Social Development, 2009). In a study done in Limpopo, Ndjeka, et al., (2003) found a smaller number of hospital admissions above 60 years, which is similar to the findings of this study. However, a different trend was observed by Stein et al., (2005) in Israel. They found that 43.1% of admitted patients were older than 75 years. It is assumed that this is due to relatively older population in Israel.

Interestingly, a significant number of patients who were admitted through the Accident and Emergency Unit were younger than 40 years (29.3% males and 13% females).

5.4.2 Hospital classification

The vast majority of them (653, 81.6%), were classified as H1, (Individuals with an annual income of less than R36 000 or an annual household income of less than R50 000). This means that the majority of patients that access this hospital's services has an income and have the potential to pay for the services received. This is somewhat contrary to popular believe about unemployment and not able to pay for services.

Other groups (H2 classified patients, and private patients constituted the smallest proportion of admitted patients (Total 9, Male 7, Female 2). This is probably low poor socio-economic condition of the catchments population (Limpopo Department of Health and Social Development, 2009).and most patients in this category either have a medical aid or access services in private hospitals. Private patients are mostly made up of patients for whom services are paid for by the Road Accident Fund, Workman's Compensation Fund or Government Departments such as Police Services, Defence Force and Correctional Service. This confirm the fact that this hospital like other Government hospitals, are serving mostly the poorer individuals with little to no financial support and that affluent individuals or those who do belong to a Medical Aid, presumably access health services in the private sector. However, presence of a significant number of H1 patients suggests that these patients could have potential to pay for some hospital fees.

5.4.3 Ethnicity

The majority of the patients were Black (92%), which was similar to the ethnicity of the catchments population (Municipal Demarcation Board, 2006). The remaining 8% are Whites, Coulored, and Indians. This, confirms that Blacks represent the biggest proportion of individuals with no medical aid and seek heath care in public health facilities particularly in rural areas.

5.4.4 Residence

The majority (83.4%) of the admitted patients resided within the Modimolle Municipal area, which is the catchments area for the Hospital. More than half (462, 57.7%), resided within or around Modimolle town.

A small number (8.7%) of patients resided further than 100 km away, which include other provinces. One of the reasons for this group of patients seeking health care in this Hospital is possibly due to geographical location of this Hospital next to the

N1 highway, which is easily accessible. Patients also indicate through the Patient Satisfaction Surveys that are conducted twice a year in this Hospital, that they come to this institution because the services here are preferred to that of their own institutions.

5.5 CLINICAL PROFILE OF PATIENTS

5.5.1 Final Diagnosis and ICD-10 code

The top 10 diseases/conditions, for which males and females were admitted during the study period, are described in Table 4.10 for males and Table 4.11 for females.

The top 5 diseases/conditions for males and females confirmed the disease profile that has been evident in this institution for a number of years. Four of the top five diseases for both genders are the same (Pneumonia, Diarrhoea and Gastroenteritis, Retrovirus infections and Diabetes Mellitus).

- For males the first four diagnoses are infections that can directly be related to HIV and AIDS: Pneumonia (20, 5%), Diarrhoea and Gastroenteritis (20, 5%), Retrovirus infections (17, 4.2%) and Tuberculosis (15, 3.7%).
- For females, three of the top four diagnoses are also related to HIV and AIDS: Retrovirus infections (32, 8%), had Pneumonia (21, 5.2%) and had Diarrhoea and Gastroenteritis (15, 3.7%).
- Diabetes mellitus were for both genders in the fifth spot with males (14, 3.5%) and females (14, 3.5%).
- For female, 16 (4%) patients were admitted was for complete abortions.

South Africa Department of Health (2007) reported that the five leading causes of death in South Africa between 1997 and 2006 were Tuberculosis, Influenza and Pneumonia, Cerebro-vascular diseases, other forms of heart disease and Diabetes Mellitus.

Ndjeka, et al., (2003), reported that in their study at St. Ritas Hospital in the Limpopo province, the six most common diseases at discharge were Hypertension (19%), Pulmonary Tuberculosis (10%), Gastroenteritis (8%), Pneumonia (6%) Diabetes (5%) and Asthma (4%). Of these six diseases/conditions, five were also amongst the top six conditions found in the present study, with only Asthma not appearing amongst the top 10.

Marszalek, et al., (2006) reported that the five most common diseases/conditions for which patients were admitted to G F Jooste Hospital in the Western Cape were: (1) Injury, poisoning and certain other consequences of external causes, (2) Diseases of the circulatory system, (3) Certain infectious and parasitic diseases, (4) External causes of morbidity and mortality and (5) Endocrine, nutritional and metabolic diseases. Three of these conditions were similar to the two studies conducted in Limpopo namely: Congestive heart failure, Diarrhoea and Gastroenteritis and Retrovirus infections and Diabetes Mellitus.

Table 4.12 describes the differences and similarities in ranking of the top 10 diseases/conditions between males and females. Seven of the top 10 diagnoses (Retrovirus infection, Pneumonia, Diarrhoea and Gastroenteritis, Cataract, Diabetes Mellitus, Hypertension and Self harm). The female specific conditions (Abortion, Anaemia and Pelvic inflammation) had an influence on the ranking. Absence of Tuberculosis from female top 10 diseases was an interesting finding.

5.5.2 Final outcome (mode of discharge)

The majority of patients, 689 (86.1%), 336 (84%) males and 353 (88.3%) females, were discharged. The proportion of male patients that were discharged home increased from 81% in the year one to 85% in the year two. For females it also increased from 83% to 90% during the same period.

A total of 87 (10.9%) patients, 46 (11.5%) males and 41 (10.2%) female, died

during this study period. The proportion of deaths decreased for both males (from 12% (15) to 11% (31) and females (from 16% (17) to 8% (24)) from the first to the second year.

A small portion of the admitted patients refused treatment (21, 2.6%) and absconded (2, 0.3%). The majority of these patients were from outside of Modimolle and would probably like to be near their homes. Only 1 (0.1%) of the total sample of patients admitted during the two year period, was transferred to the next level.

The fact that a higher proportion of patients were discharged home in the second year than the first year and that fewer deaths occurred in the second year, could probably be ascribed to the availability of more experienced Medical Officers and the fact that outreach services are conducted on a weekly basis by doctors and Clinical Support Services to all clinics in the catchments area. However, further study is required to confirm that.

5.6 COMPARISON OF CATCHMENTS POPULATION

Table 4.9 shows that 462, (240 males and 222 females), patients that were admitted during the study period, resides within or around Modimolle. The remaining 338, (160 males and 178 females), resides elsewhere in the district, province or even in other provinces. The study found that more patients from Modimolle (264, 33%) were admitted than from the Other areas (204, 25.5%). The study did not find any difference between two groups (Modimolle and Other areas) in terms of mode of admission. In terms of final outcome it was found that fewer patients died from Modimolle areas in comparison to other areas. Regarding final diagnosis, there were also no significant differences between the two groups, which was similar to the findings of the study done by Ndjeka, et al., (2003). They could not find any significant association between diagnoses and patients' village of origin among the patients admitted in the St Ritas Hospital.

CHAPTER 6
CONCLUSION AND RECOMMENDATIONS

In this chapter, the results obtained from this study were assessed in relation to the aims and objectives of the study, so that appropriate conclusions can be drawn. The limitations of the study were articulated. Appropriate recommendations were made within the context of the findings of this study. Finally, suggestions for future research were included.

6.1 CONCLUSIONS RELATED TO THE AIMS OF THE STUDY

This was a cross-sectional study that looked at broad issues pertaining to the subject of trends on adult admissions. More qualitative studies need to be undertaken in order to get to the real issues that contribute towards a decline in bed utilisation rates in District Hospitals.

6.1.1 Description of the trend of adult admissions to F. H. Odendaal Hospital for the study period

This study showed an increase in the admissions for both male and females from the 2007/08 to the 2008/09 year. More males were admitted than females. The majority of patients were admitted after accessing the services through the Accident and Emergency Department. The remaining patients admitted, accessed the services because of an arranged follow-up, by referring themselves or having been referred by a clinic.

6.1.2 Description of the profile of patients admitted in the adult wards during the study period.

The study indicated that adults admitted during this study period were mostly within

the economically active group (mean age of 42.5 years). This mean age were lower than other studies conducted in the same province. For this study, males were slightly older on average than females. Most of the patients were black which was similar to the demographics of the catchments population. The majority of the admitted patients were classified as H1 and small minority of patients were classified as H2 or private. These patients should be able to pay user fees according to their income. The biggest proportion (57.7%) of patients was admitted from the main catchments population being Modimolle town. Patients from the rest of the catchments area also contributed significantly to the numbers. The diseases/conditions for which patients were admitted for during the study period, coincides with the burden of diseases for this hospital for some time. The top five disease/conditions for males and females, shared four similarities with pneumonia, diarrhoea and gastroenteritis, retrovirus infections and diabetes Mellitus. More than 80% of all patients that was admitted during the study period were discharged home. About 11% of patients admitted, died while in the hospital.

6.2 LIMITATIONS OF THE STUDY

This study may have the following limitations:

1. This particular subject is not widely researched as researchers mostly focused on a specific group, diagnosis, outcome, etc. in secondary and tertiary care institutions.
2. Quality of data captured on the Electronic Data Base was not verified and therefore might be a major limitation to this study.
3. None of the sources used contained all the variables and not all variables were consistently recorded in any one type of the source documents.

6.3 RECOMMENDATIONS

The recommendations made below were based on the findings from this study as well as from the staff involved with patient care as well as those responsible for the recording of patient information. The analysis of the data also revealed some areas that need to be evaluated and recommendations were made based on the analysis. Recommendations for further research were also highlighted.

6.3.1 Applicability

Information from this study will firstly be utilised within the FH. Odendaal Hospital for the future management of services including the management of beds as well as the allocation of human, financial and material resources. Departmental policy determines that institutions are to be run on a cost center basis and this study should assist in the allocation of resources to each ward/cost center.

Information will also be made available to the Limpopo Provincial Department of Health and Social Development, to assist in the management of services and bed utilisation optimisation, in all district hospitals in the Limpopo province and the allocation of budgets to hospitals. In addition, information will also be made available to the University of the Witwatersrand for use in future research, as a reference base to students and teaching of students.

6.3.2 Further research

This study provided a more detailed insight into the admission trends for a district hospital. However, it has also raised more questions. The researcher is of the opinion that every variable and aspect that were included or researched raised enough questions for each of them to serve as a topic for research on its own. If done, it should provide clearer answers to the Department of Health and Social Development to assist in better management of district hospitals in the Limpopo

province.

Marszalek et al., (2006) are of the opinion that; *"an analysis of hospital admission records has two main purposes. First, it is helpful in the planning and development of hospital services and secondly, an analysis of hospital statistics assist an appreciation of the causes of morbidity in the area as a whole, which in turn can facilitate public health planning and intervention".*

6.4 SUMMARY AND CONCLUSION

This study revealed that this hospital experienced an increase number of adult admissions during the two years study period. During the same period it could reduce the length of stay, thereby improve usable bed utilisation rate. This reflected in more discharges and less death. This was probably due to availability of more experienced medical officers and the fact that outreach services has been conducted on a weekly basis by doctors and Clinical Support Services since 2008/09 financial year.

A significant number of patients had the ability to pay and could be a potential source of revenue for the Hospital. The majority of these patients admitted through the Accident and Emergency Department and more than half of the them resided in Modimolle or immediate surrounding areas. The burden of diseases of the admitted patients was similar to the studies conducted elsewhere in South Africa. Lastly, the study found that more patients were discharged home in the second year in comparison to the first year and also a smaller proportion of patients died in the year two, than in the year one. This definitely might spark a glimmer of hope that this Hospital could improve delivery of services. However, further longitudinal study is required to confirm this trend.

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ANNEXURE

ANNEXURE A
ETHICS CERTIFICATE AND
OTHER LETTERS OF PERMISSION

LIMPOPO
PROVINCIAL GOVERNMENT
REPUBLIC OF SOUTH AFRICA

DEPARTMENT OF HEALTH AND SOCIAL DEVELOPMENT

Enquiries: Ramalivhana NJ/Malomane EL

Ref: 4/2/2

6 April, 2010
Mr Adriaan Lourens
WITS
School of Public Health
Johannesburg
South Africa

Dear Mr Adriaan Lourens

"Adult Admissions in a District "

Permission is hereby granted to Mr Adriaan Lourens to conduct a study as mentioned above in Limpopo Province, South Africa

- The Department of Health and Social Development will expect a copy of the completed research for its own resource centre after completion of the study.
- The researcher is expected to avoid disrupting services in the course of his study
- The research results must be used only for the purpose of the study
- The Researcher/s should be prepared to assist in interpretation and implementation of the recommendations where possible
- The Institution management where the study is being conducted should be made aware of this,
- A copy of the permission letter can be forwarded to Management of the Institutions concerned

HEAD OF DEPARTMENT
HEALTH AND SOCIAL DEVELOPMENT
LIMPOPO PROVINCE

21/04/10 07:41 FAX 0147171257 P H ODENDAAL HOS 001

UNIVERSITY OF THE WITWATERSRAND, JOHANNESBURG
Division of the Deputy Registrar (Research)

HUMAN RESEARCH ETHICS COMMITTEE (MEDICAL)
R14/49 Mr Adriaan E Lourens

CLEARANCE CERTIFICATE	**M10256**
PROJECT	Adult Admissions in a District
INVESTIGATORS	Mr Adriaan E Lourens.
DEPARTMENT	School of Public Health
DATE CONSIDERED	26/02/2010
DECISION OF THE COMMITTEE*	Approved unconditionally

Unless otherwise specified this ethical clearance is valid for 5 years and may be renewed upon application.

DATE 26/02/2010 **CHAIRPERSON** .....
(Professor PE Cleaton-Jones)

*Guidelines for written 'informed consent' attached where applicable
cc: Supervisor : Prof S Naidoo

DECLARATION OF INVESTIGATOR(S)

To be completed in duplicate and **ONE COPY** returned to the Secretary at Room 10004, 10th Floor, Senate House, University.
I/We fully understand the conditions under which I am/we are authorized to carry out the abovementioned research and I/we guarantee to ensure compliance with these conditions. Should any departure to be contemplated from the research procedure as approved I/we undertake to resubmit the protocol to the Committee. **I agree to a completion of a yearly progress report.**

PLEASE QUOTE THE PROTOCOL NUMBER IN ALL ENQUIRIES...

Faculty of Health Sciences
Medical School, 7 York Road, Parktown, 2193
Fax: (011) 717-2119
Tel: (011) 717-2745

Reference: Ms Tania Van Leeve
E-mail: tania.vanleeve@wits.ac.za
03 May 2010
Person No: 331579
PAG

Mr AE Lourens
P.O. Box 937
MODIMOLLE
0510
South Africa

Dear Mr Lourens

Master of Public Health (Hospital Management): Approval of Title

We have pleasure in advising that your proposal entitled "*Adult admissions in district hospital*" has been approved. Please note that any amendments to this title have to be endorsed by the Faculty's higher degrees committee and formally approved.

Yours sincerely

Mrs Sandra Benn
Faculty Registrar
Faculty of Health Sciences

ANNEXURE B

DATA COLLECTION SHEET

TOOL 1: Number of adult admissions for the study period

MONTH 2007	TOTAL ADULT ADMISSION WARD
APRIL	
MAY	
JUNE	
JULY	
AUGUST	
SEPTEMBER	
OCTOBER	
NOVEMBER	
DECEMBER	
TOTAL	

MONTH 2008	TOTAL ADULT ADMISSION WARD
JANUARY	
FEBRUARY	
MARCH	
APRIL	
MAY	
JUNE	
JULY	
AUGUST	
SEPTEMBER	
OCTOBER	
NOVEMBER	
DECEMBER	
TOTAL	

MONTH 2009	TOTAL ADULT ADMISSION WARD
JANUARY	
FEBRUARY	
MARCH	
TOTAL	

TOOL 2: Profile of patients admitted during the study period

RESPONDENT	STUDY NO	MODE OF ADMISSION									DIAGNOSIS		DISCHARGE OUTCOME
		Emergency		Self		Referral					Diagnosis	ICD-10 code	(Home/ Referral/ RHT/ Absconded/ Death)
						Up				Down			
		yes	no	yes	no	Self	PHC	CHC	GP	Regional			
1													
2													
3													
4													
5													
6													
7													
8													
9													
10													

RESPONDENT	STUDY NUMBER	GENDER	ETHNICITY	AGE	EMPLOYMENT	HOSPITAL CLASSIFICATION	RESIDENCE
		(male/ female)	(Black/ Indian/	(in years)	Yes/ No	(H0/ H1/ H2)	(Name of town or

			White/ Coloured/ Others				village)
1							
2							
3							
4							
5							
6							
7							
8							
9							
10							