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THE PROFILE OF DEATHS IN CHARLES HURWITZ TB HOSPITAL: JANUARY TO DECEMBER 2007

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A research report submitted to the Faculty of Health Sciences, University of the Witwatersrand, Johannesburg in partial fulfilment of the requirements for the degree of
Master of Public Health (Hospital Management)
Johannesburg, August 2014

DECLARATION

I, Dorothy Maruapula Diale, 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 the Witwatersrand, Johannesburg. It has not been submitted before for any degree or examination at this or any other University.

_____

Signed on this 18th of August 2014

DEDICATION

I dedicate this research report to: my late father, who was always proud to see my academic achievements, my mother, Ms Nellie Mampempe Stone, my three daughters and grandchildren, Oratile and Rapelang Diale. Nothing is impossible when God is your light.

ABSTRACT

Background

Tuberculosis (TB) remains a major cause of disease and death worldwide. In 2008, South Africa ranked third in the world in terms of the total numbers of new TB cases. Little is known about the profile of TB deaths at individual hospital level. Hence, the aim of the study was to describe the profile of TB deaths in Charles Hurwitz TB Hospital for the period January to December 2007.

Methods

A descriptive study was done, based on retrospective record review of all patients who died between January and December 2007 at Charles Hurwitz TB Hospital, irrespective of the date of admission. The data was analysed using Microsoft Excel.

Findings

The mean age at death was 41 years (standard deviation =10.9 years). Less than half of deceased individuals were employed (43.4%), more than one third had a history of smoking (42%) and the majority had a history of alcohol consumption (60.5%). Almost three quarters of the patients (75.3%) were being treated for the first time. The majority (85.1%) of deceased patients tested for HIV were HIV positive, but only 23.3% of those referred for treatment were actually on ART, indicating missed opportunities in treatment and care at the hospital.

Conclusion

There is need for ongoing vigilance and training to ensure that TB hospitals and individual health care providers comply with the national quality of care and TB management standards, and that missed opportunities are eliminated to reduce avoidable TB deaths.

ACKNOWLEDGEMENTS

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To my only four months supervisor, Professor Laetitia Rispel, your contributions and support are recognised and counted in the highest office. You are amazing. Your efforts are noted and you will reap in abundance your blessings. Mrs. Busi Ngoyi, you are a real angel, you did everything in your power to ensure that I complete the research report. Dr Gill Nelson, research coordinator, thank you for taking it upon yourself to ensure that my registration was smooth and for dealing with unnecessary blockages. I wish to acknowledge the assistance of Mrs. Dikgapha Khumalo with the formatting of the document.

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LIST OF ACRONYMS &ABBREVIATIONS

AIDS	Acquired immune-deficiency Syndrome
AFB	Acid-fast bacilli
ART	Antiretroviral Therapy
BCG	Bacille Calmette Guerin
CCMT	Counselling, Care, Management and Therapy
CFS	Cerebrospinal Fluid
CXR	Chest X-ray
DOT	Directly Observed Therapy
DR-TB	Drug-Resistant Tuberculosis
EPTB	Extra-pulmonary Tuberculosis
FBC	Full Blood Count
GXP	GeneXpert
HAST	HIV, Sexually Transmitted infections and Tuberculosis
HCT	HIV Counselling and Testing
HIV	Human Immuno-deficiency Virus
ICD-10	International Classification of Disease 10th Revision; ICD-10. Code list
INH	Isoniazid
IPT	Isoniazid Preventive Therapy
MDG	Millennium Development Goals
MDR-TB	Multi-Drug Resistant Tuberculosis
NHLS	National Health Laboratory Service
NTMG	National Tuberculosis Management Guidelines
OR	All Other treatment
PMTCT	Prevention of Mother to Child Transmission
PTB	Pulmonary TB
PZA	Pyrazinamide
RC	Relapse after Cure
RAC	Retreatment after completion
RD	Treatment after defaulted after two or more months
RF	Treatment after failure
RI	Treatment interruption

RHZE	Rifampicin, Isoniazid, Pyrazinamide and Ethambutol
RIF	Rifampicin
S	Streptomycin
TAT	Turn –around- time
TB	Tuberculosis
VCT	Voluntary Counselling and Testing
WHO	World Health Organisation
XDR-TB	Extensively Drug Resistant TB
PZA	Pyrazinamide

ICD10 CODES

ICD 10 Code	Organ Affected
A15/A16.2	All AFB positive
A15.2	All PTB
A16.3	TB of the lymph nodes
A16.5/A16.8	TB Pleura and other respiratory organs
A16.7	Primary TB
A17	TB meningitis
A18.6/A18.8	TB other organs
A19/A19.9	TB Miliary

CHAPTER 1: INTRODUCTION

1.1 Background

Tuberculosis (TB) remains a major cause of disease and death worldwide. In 2008, there were an estimated 8.9 to 9.9 million incident (or new) cases of TB, 9.6 to 13.3 million prevalent (or existing) cases of TB, 1.1 to 1.7 million deaths from TB among HIV-negative people and an additional 0.45 to 0.62 million TB deaths among HIV-positive people (WHO, 2009). Globally, progress has been made and prevalence and mortality rates are falling in all World Health Organization (WHO) regions. WHO has indicated that the gaps in the Africa Region in reaching the targets in the *Global Plan* are huge (WHO, 2009). WHO has also noted that the global target of halving the 1990 mortality rate appears impossible in many African countries (WHO, 2009). Africa is the only region to show increases in TB prevalence, from an estimated 162 per 100 000 population in 1990 to 480 per 100 000 population in 2008 (WHO, 2011).

In Sub-Saharan Africa, the TB and HIV epidemics are closely intertwined. A study found that the TB case-fatality rates (proportion of patients dying while on anti-tuberculosis treatment) were between 16 to 35% in HIV positive individuals not receiving antiretroviral treatment, compared to 9% in HIV negative patients (Ya Diul, Mher, & Harris, 2001). In 2012, the estimated percentage of TB cases living with HIV remained worldwide at 13% (WHO, 2013: p6).

The factors contributing to the increased TB burden in Africa include: poverty and rapid urbanisation; the impact of the HIV-pandemic; poor health infrastructure; including inadequate laboratory facilities and diagnostic equipment; poor programme management with inadequate case detection, diagnosis and cure; and sub-optimal involvement of communities and other stakeholders in TB control (WHO, 2009).

South Africa is one of the 22 high-burden countries which combined account for around 80% of the total global burden of all TB cases (WHO, 2009). In 2008, South Africa ranked third in the world in terms of the total numbers of new TB cases (WHO, 2009). This is because of the

complex interrelationship with the HIV epidemic, which accounts for a significant disease burden in the country (Day, Gray, & Budgell, 2011; SANAC, 2011). In 2010, the incidence of all types of TB in South Africa was 981 per 100 000, whilst TB prevalence for the same period was 795 per 100 000 (Day, et al., 2011). Tuberculosis case notification rates have risen sharply, with an increase in the number of TB cases from 148 164 in 2004 to 401 048 in 2010 (SANAC, 2011: p24). People living with HIV and infected with TB are 21 to 34 times more likely to develop TB disease compared to people with TB infection who are not HIV-infected (Aurum Institute for Health Research, 2013).

In communities where HIV prevalence exceeds 30% in pregnant women, annual tuberculosis notification rates as high as 1 468 per 100 000 population were reported in 2004 and continued to increase thereafter (Abdool Karim, Churchyard, Abdool Karim, & Lawn, 2009). Many TB cases are associated with HIV and over 50% of new TB cases are in patients with HIV co-infection. Even in communities where HIV prevalence has reached a plateau, TB rates continue to rise because of increasing levels of immunodeficiency (Abdool Karim, et al., 2009). Before the emergence of the HIV epidemic, the Western Cape Province had the highest rates of tuberculosis (Abdool Karim, et al., 2009). Currently, the number of tuberculosis cases and notification rates are highest in KwaZulu-Natal province (1066 per 100 000 population in 2006), reflecting a combination of the highest HIV prevalence (39.1% in pregnant women in 2006) and the worst tuberculosis programme performance indicators (National Department of Health, 2008). Historically, TB notification rates increased with advancing age, with men having a higher TB burden than women. Today, TB rates peak in women in their twenties and men in their thirties, which reflect the age distribution of HIV infection (Abdool Karim, et al., 2009). In 2006, Gauteng Province ranked fourth in terms of the TB burden in South Africa (Department of Health, 2007).

TB mortality is defined as "the estimated number of deaths due to TB in a given time period, and is expressed as deaths per 100 000 population per year. TB mortality is one of the direct indicators of the burden of the disease as it indicates the number of people dying each year. Furthermore, mortality responds rapidly to improvements in control, as timely and effective treatment reduces the likelihood of dying from the disease (thus reducing disease-specific mortality)" (WHO, 2011: p94). In 2007, the estimated TB mortality rate in South Africa was 230 per 100 000 (WHO, 2011). TB is a leading killer of people living with HIV (WHO, 2013). Moreover, it has also shown to increase the risk of HIV progression and death,

particularly if HIV is untreated (McGaw, Lall, Meyer, & Eloff, 2008). TB deaths continue to occur despite the availability of effective antimicrobial agents. Multi-drug resistance, HIV infection, and delayed therapy contribute to TB mortality (Sacks & Pendle, 2009).

Although there is extensive information available on TB indicators, both globally and in South Africa, little is known about the profile of deaths at individual hospital level. Hence the focus of this study was on the profile of deaths at the Charles Hurwitz Hospital.

1.1.1 Profile of Johannesburg Metropolitan District

The boundaries of the Johannesburg Metropolitan health district (hereafter referred to as Johannesburg Metro) are co-terminous with those of the greater Johannesburg Metropolitan Municipality. Johannesburg Metro is one of five health districts[1] within the Gauteng Province. The district has a population of 3.2 million and a population growth rate of 6.7%. The majority (83%) of the population are uninsured and are therefore dependent on the public health sector (Statistics South Africa, 2011).

Johannesburg Metro is made up of seven health regions (A to G). There are 113 clinics, nine Community Health Centres, eight public hospitals, 20 private hospitals, numerous non-governmental organisations and one MDR-TB unit. Charles Hurwitz TB Hospital is located within the Johannesburg Metro (see Figure 1).

[1] At the time of the study, there were six health districts



Figure 1: Map of Gauteng with approximate location of Charles Hurwitz Hospital

Source: www.google.co.za

Note: Red star shows approximate hospital location

As is the case in the rest of the country, the district has to implement the national Tuberculosis Control Programme (TBCP). The purpose of the TBCP programme is to improve case detection, case holding and treatment outcomes while prioritising infection control and TB/ HIV collaboration activities (Department of Health, 2007).

In 2011, the incidence rate in the Johannesburg Metro district for all TB cases was 571 per 100 000 population and 452 per 100 000 population for Pulmonary TB (PTB) cases. However, even within the district there are wide variations in incidence rates across the health regions. For the period from April 2011 to March 2012, a total of 20 682 TB cases were registered on the electronic TB register within the JHB Metro (COJ, 2012).

1.1.2 Profile of Charles Hurwitz Hospital

Charles Hurwitz TB Hospital was born out of the amalgamation of three TB centres. It is a specialised hospital rendering TB and other communicable disease treatment services to the community of Johannesburg. Charles Hurwitz TB Hospital is situated within the Johannesburg Metro in Region F. In April 2006, the management of the hospital was taken over by the Gauteng Department of Health from a non-government organisation (NGO) as part of the provincialisation project mandated by the National Health Act No 61 of 2003. The hospital is situated in the southern part of the City of Johannesburg on the outer boundaries of Soweto. It is 1.5m away from Chris Hani Baragwanath Hospital, one of the central, university teaching hospitals in Gauteng Province.

Charles Hurwitz TB Hospital is used as a referral institution for the primary health care (PHC) clinics and other hospitals in the Johannesburg Metro district for: acutely ill patients already diagnosed with TB; complicated TB patients; and those with drug resistant TB, while awaiting the result of culture specimen to confirm the drug resistance.

Charles Hurwitz is a 350-bed hospital with 12 adult wards and one children's ward. The hospital is providing free services to all patients. Based on the hospital statistics, the racial profile of patients admitted to the hospital in 2007 was 72.8% black Africans; 20% coloureds and 7.2% Asians. (Charles Hurwitz Statistics, 2007).

The hospital was providing anti-retroviral (ARV) treatment to patients with a CD count of 350 and above and treatment initiation was only when the patient was out of the critical period. Patients were admitted for more than three months in the hospital and only discharged when they had converted to smear negative.

At the time of the study in 2007, the researcher was the chief executive officer of the hospital. An analysis of routine information (monthly statistics and reports) suggested that the mortality figures were increasing in Charles Hurwitz TB Hospital.

Locally, context specific information is important for the individual hospital manager to enable programme planning and possible interventions to prevent or reduce hospital deaths. In light of the importance of local, context specific information, this study was conducted

from January-December 2007 at the Charles Hurwitz Hospital in order to determine the profile of TB deaths.

The remainder of this chapter sets the scene for the study that was conducted by outlining the problem statement, and presenting a brief review of existing literature on the profile of TB deaths. The chapter concludes with the rationale for the study.

1.2 Problem Statement

The prevention of TB mortality is a global priority (WHO, 2009), and is one of the key priorities in the strategic plan of the Department of Health in South Africa (Department of Health, 2007). Although extensive information is available on TB indicators (incidence, prevalence and mortality) at national and provincial levels, the profile of death at Charles Hurwitz was unknown. It was important from a management perspective to analyse the profile of deaths at the hospital, specifically: demographic profile of individuals who died, socio-economic information and information about treatment and care. Such information is important for programme planning, to improve quality of care, and to determine strategies for prevention or reduction of deaths.

1.3 Literature review

1.3.1 Definition of terms

A *new patient* is defined as a patient who has never had treatment for TB or who has taken anti-tuberculosis drugs for less than four weeks (Department of Health, 2009: p28).

A r*etreatment* is defined as a patient who has taken TB treatment for four weeks or more in the past and either relapsed, defaulted or had treatment failure (Department of Health, 2009: p28).

Treatment after relapse is defined as a sputum smear or culture-positive pulmonary TB client who received treatment and was declared cured or treatment completed at the end of the

treatment period and has now developed sputum smear or culture positive pulmonary TB again within two years (Department of Health, 2009: p28).

Treatment after failure is defined as pulmonary TB client who is still sputum smear or culture positive at the end of the treatment period (Department of Health, 2009: p28).

Treatment after default is defined as a patient who completed at least one month of treatment and returns after having interrupted treatment for two months or more, and is still smear or culture positive or has signs of active TB on clinical and radiological assessment (Department of Health, 2009: p28).

Transfer in is defined as the client already registered for treatment in one district that has been transferred to another district to continue treatment is recorded as a "transfer in" at the receiving facility (Department of Health, 2009: p28).

Moved in is defined as the client registered for treatment in one facility and moved to another facility within the same district (Department of Health, 2009: p28).

TB mortality is defined as "the estimated number of deaths due to TB in a given time period, and is expressed as deaths per 100 000 population per year" (WHO, 2011: p94).

1.3.2 Overview of initiatives to combat TB

There have been a number of international, regional and national directives aimed at reducing the burden of TB. In 1993, WHO declared TB as a 'global public health emergency' (WHO, 2009). The decade between 1995 and 2005, saw the directly observed treatment, short course [DOTS] strategy, which included DOTS supporters. Goal 6 of the Millennium Development Goals (MDGs) focuses on combatting HIV/AIDS, malaria and other diseases (United Nations, 2011). The Stop TB Strategy succeeded the DOTS strategy, and is summarised in the table below (WHO, 2013).

Table 1: Overview of 'The Stop TB Strategy'

Vision	Goal	Objectives	Components
A TB-free world	Reduce the global burden of TB by 2015 in line with MDGs and the Stop TB Partnership targets	• Achieve universal access to high-quality care for all people with TB • Reduce the human suffering and socio-economic burden of TB • Protect vulnerable populations from TB, TB/HIV and drug-resistant TB • Support development of new tools and enable their timely and effective use • Protect and promote human rights in TB prevention, care and control	• Pursue high-quality DOTS expansion and enhancement • Address TB/HIV, MDR-TB, and the needs of poor and vulnerable populations Contribute to health system strengthening based on primary health care • Engage all care providers • Empower people with TB, and communities through partnership • Enable and promote research

Source: WHO, 2013: page 2

Forty six Ministers of Health unanimously declared TB an emergency in Africa. A resolution was taken to ensure urgent extraordinary action in preventing the scourge of TB that ravages the continent (Department of Health, 2007: p6).

In South Africa, tuberculosis has been a priority for the new democratic government since 1994. Following the WHO-AFRO Regional Committee meeting in 2005, the Minister of Health declared TB to be a national crisis and a TB crisis management plan was developed with the aim of intensifying the efforts to improve the TBCP (Department of Health, 2007). However, between 1996 and 2005, both the cure rates and successful treatment completion rates declined to 50% and 60% respectively, below the target set by WHO (Department of Health, 2009). The number of new tuberculosis cases doubled during the period from 2001 to 2006, fuelled largely by the rampant HIV epidemic (Chopra et al., 2009). Gauteng Province was the province with the fourth largest TB caseload of 46 093 at the time (Department of Health, 2009). In 2010, the Minister of Health included TB prevention, management and control as one of the key priorities in the Negotiated Service Delivery Agreement signed with the President of South Africa (Department of Health, 2010).

South Africa's national strategic plan on HIV, STIs and TB for the period 2012 until 2016 contains the following sub-objectives: "Ensure everyone in South Africa tests voluntarily for HIV and is screened for TB annually, and subsequently enrols in relevant wellness and treatment, care and support programmes" and "Prevent new TB infection and disease through IPT, infection control, early identification and treatment of TB and an improved TB cure rate" (SANAC, 2011: p39).

1.3.3 Overview of TB mortality

In 2012, there were an estimated 8.6 million new cases of TB and 1.3 million deaths, with 320 000 of these deaths among HIV-positive people (WHO, 2013). In the same year, approximately one quarter of the world's TB cases occurred in the Africa region, which also had the highest rates of deaths relative to population (WHO, 2013: p6). TB remains a disease that preys upon social disadvantage (Gandhi et al., 2006).

The overwhelming majority of TB deaths take place in low- and middle-income countries (WHO, 2013). High mortality rates among TB patients, particularly early in treatment, have been reported in numerous settings (Harries, Hargreaves, Gausi, Kwanjana, & Salaniponi, 2001). High mortality rates have been associated, with diagnostic delays, which occur most frequently in the case of smear-negative pulmonary TB and extra-pulmonary TB (EPTB) (Storla, Yimer, & Gunnar, 2008; Whitehorn, Ayles, & Godfrey-Faussett, 2010). Other risk factors for TB deaths include co-morbidities, HIV infection and multi-drug-resistant TB. The figure below shows the estimated TB mortality rates globally (WHO, 2013).

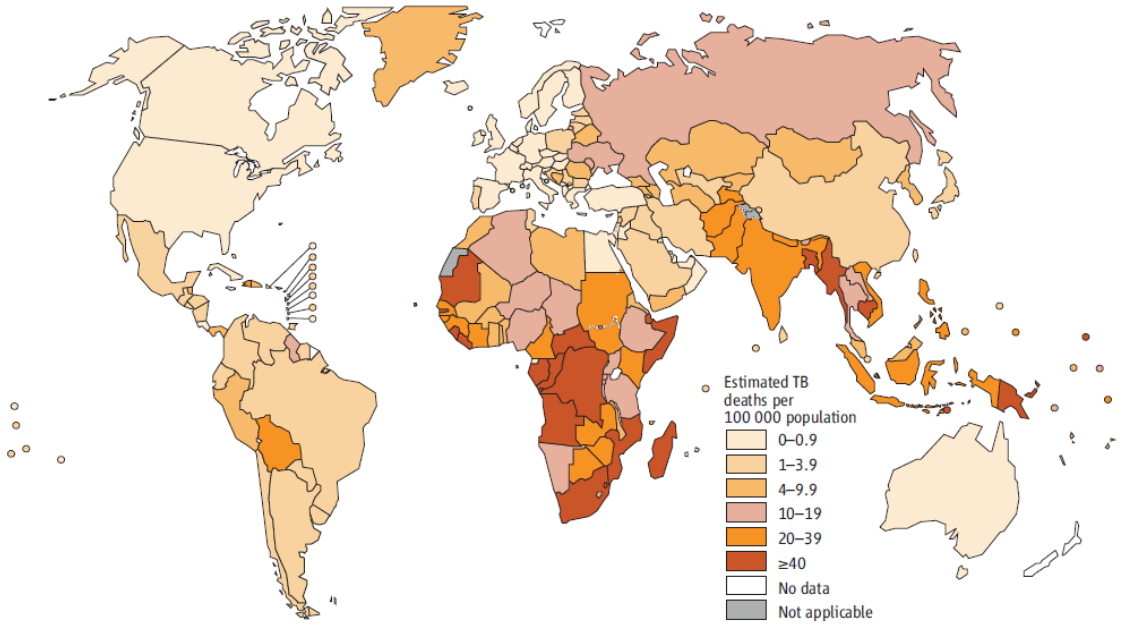

Figure 2: Estimated TB mortality rates among HIV-negative people, 2012

Source: WHO, 2013: page 20

Figure 2 illustrates the burden of TB deaths in sub-Saharan Africa. Although the graph excludes TB deaths among HIV positive individuals, TB remains a leading cause of death among HIV-positive individuals (WHO, 2013). Hence, the risk factors or predictors for TB deaths are different in settings with low HIV prevalence. In Taiwan, for example, with a low HIV prevalence, a study conducted in a university hospital found that malignancy, liver cirrhosis, renal failure, and miliary and pneumonic radiographic patterns were the main predictors of TB deaths (Lin et al., 2014). A study done at a hospital in Iran, found that anaemia, positive sputum smear, smoking, drug hepatitis, drug use, and history of previous TB were major risk factors for death among TB patients (Alavi-Naini, Moghtaderi, Metanat, Mohammadi, & Zabetian, 2013). In Brazil, a 2008 study found that TB was the leading cause of AIDS-related deaths despite free access to anti-retroviral treatment (Saraceni et al., 2008).

In sub-Saharan Africa, the higher mortality in patients with smear negative pulmonary TB and extra-pulmonary tuberculosis (EPTB) has been attributed to misdiagnosis of HIV-related diseases (Cain, Thanomsak, Channawong, & et al, 2009). The Democratic Republic of Congo (DRC) is a high TB burden country, with an incidence rate of 372 per 100 000 population. A study found higher mortality rates among HIV-positive patients. The study also found increased risk of death among patients with smear-negative PTB and EPTB in the first

months of treatment for HIV-negative patients, and lower risk of death among EPTB cases who survived the first two months of treatment (Henegar, Behets, Van den, Driessche, & et al, 2012).

A study that examined the predictors of mortality among TB-HIV co-infected patients treated for tuberculosis in Northwest Ethiopia found that mortality was high and strongly associated with the absence of ART during TB treatment. In addition cotrimoxazole prophylaxis was an important factor in the reduction of mortality during TB treatment (Sileshi, Deyessa, Girma, Melese, & Suarez, 2013).

1.3.4 TB death profile in South Africa

In South Africa the proportion of extra-pulmonary TB deaths has risen from 5.2% to 7.4% of all TB deaths for the years 2001 to 2002. This could be partially due to HIV-related TB deaths (Nicolls, King, D., Bala, & del Rio, 2005). A report from Stats SA, South Africa's official statistics agency, has recorded that the number of deaths between 1997 and 2002 in the age groups of 20 to 45 more than doubled, from over 100 000 to more than 200 000 (Statistics South Africa, 2006). Most of the deaths were likely to be linked to AIDS, but misclassified as deaths due to diseases such as TB and pneumonia. The age and disease pattern provided a strong evidence of the growing impact of AIDS. Two aspects of the report were particularly noteworthy, the death-certificate figures of sexually active women was rising significantly compared to male death certificate figures-which is a ratio that indicates the country's AIDS-related mortality rate (Statistics South Africa, 2006).

Figure 2 shows trends in TB death rates for new smear positive pulmonary TB cases for South Africa from 1994 until 2005 (Department of Health, 2007). As can be seen, the peak was reached in 1999, but TB death rates have remained unacceptable high as the national target for mortality rate is less than 2% (Department of Health, 2007).

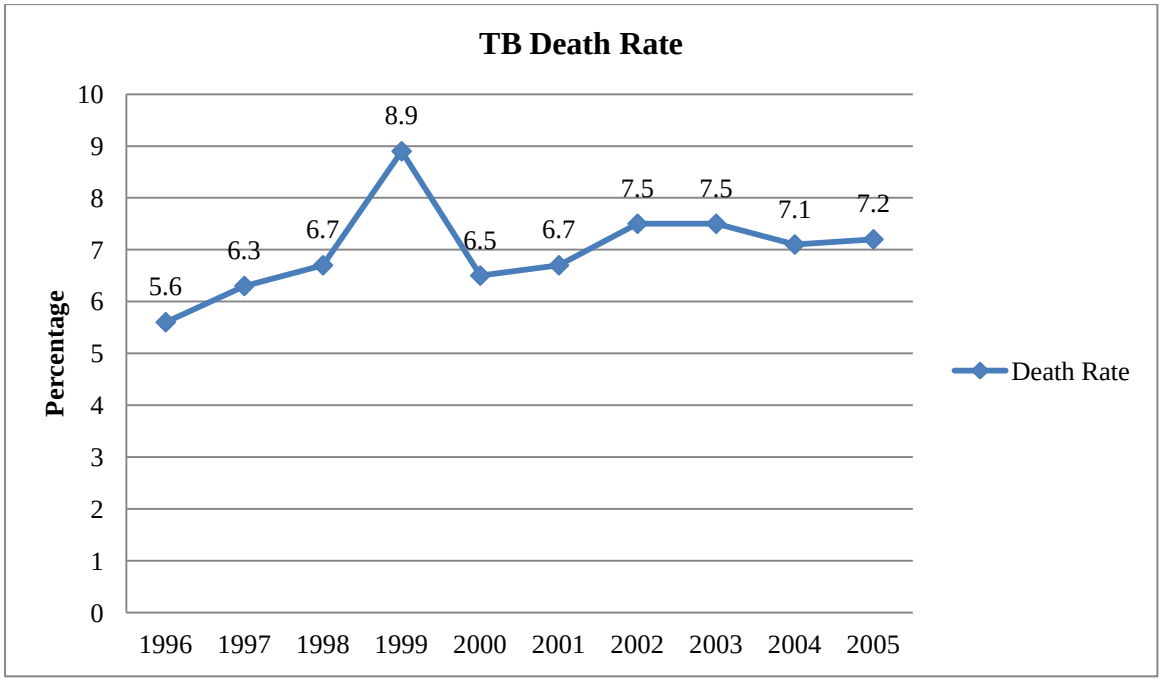

Figure 3: Trends in TB death rates for new smear positive PTB cases, 1996-2005
Source: Department of Health, 2007: page 12

1.3.5 TB death profile in the Johannesburg Metro

TB continues to be a persistent problem in the Johannesburg Metro and is associated with high mortality rates, especially among HIV infected people. In 2006, the Johannesburg Metro was one of the worst performing districts in the country (Department of Health, 2007). In the first quarter of 2006, the cure rate was 73.7%, the default rate was 7.8% and the death rate was 6.9% (Department of Health, 2007: p19).

The District Health Barometer, an authoritative publication of the South African Health Systems Trust, analysed the district's 2009 burden of disease (BoD) profile (Massyn et al., 2013). The authors noted that "Johannesburg's 2009 quality of death certification was poor, with 38.3% of the certificates submitted not being useful for public health analysis. This is well above the South African mean of 30.2% and a long way from the internationally recognisable standard of 10%" (Massyn, et al., 2013), page 270. Figure 3 below shows the years of life lost (YLL) for the Johannesburg Metro. As can be seen from the figure, the highest proportion of YLLs was due to TB (13.3%), with non-communicable diseases making

up a total of 37.4%. HIV and TB together accounted for 23.7% of YLL (Massyn, et al., 2013).

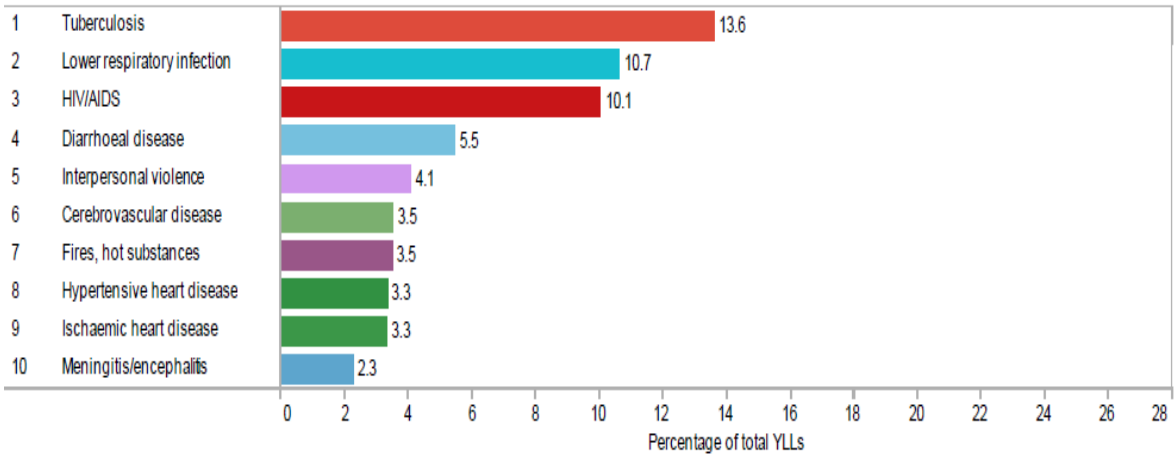

Figure 4: Leading causes of Years of Life Lost (YLLs): Johannesburg Metro District
Source: Massyn, Day, Barron, Haynes, English, & Padarath, 2013: page 270

1.3.6 TB Profile in Charles Hurwitz TB Hospital

In 2007, a management scan of the hospital records showed a high proportion of deaths when viewed against admissions (Table 2). There were no admissions during June 2008 because of the health worker strike in the province.

Table 2: Overview of key TB indicators at Charles Hurwitz Hospital, 2007

Month	Indicators			
	Admissions	**Discharges**	**Deaths**	**Deaths as percentage of admissions**
January	109	88	25	22.9%
February	159	63	29	18.2%
March	165	66	33	20%
April	129	83	26	20.1%
May	139	88	32	23%
June	0	81	26	No admissions
July	165	60	18	10.9%
August	167	61	26	15.5%
September	165	73	30	18.1%
October	208	117	39	18.75%
November	202	144	38	18.8%
December	98	98	28	28.57%

As can be seen from Table 2, deaths as a proportion of monthly admissions were very high. In January, the proportion of death was 22.9%. July 2007 is the only month where the proportion of death was the lowest (10.9%). The proportion of death was at the highest in December 2007 with 28.6%. Hence it was a critical management imperative to understand the profile of deaths at Charles Hurwitz Hospital.

1.4 Study Justification and Motivation

During the study period, TB was managed as a disease on its own, and hospital treatment protocols did not necessarily take into cognisance co-infections with HIV or other diseases. Of particular concern was the increase in admissions and high mortality figures. There were several reasons for undertaking a study on the profile of deaths at Charles Hurwitz Hospital. Firstly, information on the profile of TB deaths could assist hospital management in developing appropriate strategies to prevent or reduce TB mortality.

Secondly, Gauteng Province as a whole was not performing well with a death rate of 9.6% (McGaw, et al., 2008). Importantly, the 2007 country report on progress with the MDGs listed the Johannesburg Metropolitan district as one of the fourth worst performing districts in the country (Republic of South Africa, 2007).

It was envisaged that defining the profile of TB deaths would assist with valuable information to assess past outcomes of service delivery based on the TBCP guidelines and the norms and standards set by the Department of Health. Information gathered could also assist the referring facilities to be proactive and treat and refer appropriately in order to prevent unnecessary complications.

It was also envisaged that the study would assist policy makers with locally context information to inform policies that could contribute towards the achievement of the MDGs.

The next chapter describes the study methodology.

CHAPTER 2: METHODOLOGY

This chapter describes the study aim and objectives, as well as the methodology to answer the questions posed in this research.

2.1 Aim of the Study

The aim of the study was to describe the profile of TB deaths in Charles Hurwitz TB Hospital for the period January to December 2007.

2.2 Objectives

The specific objectives of the study were to:

a. Describe the demographics of patients who died while admitted in Charles Hurwitz hospital
b. Describe the socio-economic status of the patients who died
c. Describe clinical profile and or risk factors of these patients
d. Determine the TB disease classification using ICD 10 codes
e. Assess whether the patient was co-infected with HIV when admitted
f. Assess the treatment regimen that the patient was on
g. Identify whether the patient was on ART or cotrimoxazole treatment while on TB treatment
h. Describe the condition of the patient when admitted to hospital (e.g. level of consciousness or the critical state).

2.3 Study setting

The study setting was the Charles Hurwitz TB Hospital, the characteristics of which are described in Chapter 1.

2.4 Ethical Issues

Ethical clearance for the study was obtained from University of the Witwatersrand's Human Research Ethics Committee (Medical) with reference number M091160 (Appendix 1). The Gauteng Department of Health and Social Development, through the Provincial Research

Committee, also gave approval for the study. Standard ethical procedures were adhered to for the review of patient records, and confidentiality was maintained of all information collected.

2.5 Study Population

The study population was all patients who died at the Charles Hurwitz hospital.

2.6 Study period

The study period was from 1 January until 31 December 2007.

2.7 Study sample

All hospital records of patients that died at Charles Hurwitz during the study period (January-December 2007) were used for the study. This means that all records of patients who were admitted before the study period (January-December 2007) and who died within the study period and those admitted during the study period and died within the period of January-December 2007 were included in the study.

2.8 Study Design

This was a descriptive study based on a retrospective record review of patients who died between January-December 2007 at Charles Hurwitz TB Hospital.

2.9 Framework of analysis

The framework of analysis of the study was the national strategic plan (Department of Health, 2007). Selected key targets contained in the plan and applicable to hospitals are contained in the table below.

Table 3: Targets used to frame data collection in the study

Indicator	Target
Bacteriological coverage	100%
Proportion of TB patients offered counselling and tested for HIV	100%
Proportion of HIV positive TB patients started on cotrimoxazole	100%
Proportion of HIV positive TB patients qualifying for ART and started on ART	100%

Source: Department of Health, 2007: page 20

2.10 Data collection

The study was conducted during 2009. All records of patients admitted in the hospital and who died during the study period January-December 2007 were reviewed. The first step consisted of sorting the records according to the patient category: new patient, re-treatment after failure, relapse after cure, re-treatment after default or all other re-treatment cases not included in the above mentioned categories. Colour codes were used to distinguish among the records of the deceased: purple was used for new admissions, grey for re-treatment and black for HIV/AIDS infection.

A summary of the information extracted from each patient's record is shown in the table below and the standard data collection sheet is attached as Appendix 2.

Table 4: Information collected from each patient record

- Demographic information e.g. age and sex
- Employment status, including work in the mining industry
- Family history e.g. family member diagnosed with TB
- History of smoking or alcohol consumption
- Condition of the patient on admission (e.g. malnutrition, mental state or level of consciousness).
- First episode of disease or re-treatment
- Presence of other diseases e.g. diabetes, hypertension and epilepsy.
- HIV Counselling, testing and treatment

2.11 Data processing and analysis

All data was kept in a safe storage area. The information collected was captured into an Excel spreadsheet, and analysed using Microsoft Excel. Findings are presented through descriptive statistics using proportions, averages, percentages, tables, graphs and a narrative description.

2.12 Study Limitations

The study was limited to a review of the records of patients that died during January-December 2007 while admitted in Charles Hurwitz TB Hospital. Information collected was only from what has been recorded in the records; there was no possibility of interviews or questionnaires to gather more information or to get clarity. Some history collected on admission by the hospital staff was sometimes from the sick patient without a next-of-kin to verify the information. Hence, the limitations are those of record reviews, namely incomplete records, missing information and an inability to get clarity or additional information. The results of the study are discussed in the next chapter.

CHAPTER 3- RESULTS

3.1 Introduction

A total of **291 records** of deceased TB patients were sampled at Charles Hurwitz TB Hospital for the study period from 1 January 2007 until 31 December 2007.

3.2 Demographic and social profile of deceased TB patients

The majority 97.9% (n=285) of deceased patients were black Africans, 1.7% (n=5) were coloured and 0.3% (n=1) was white. Just over one third 34.8% (n=101) of all the deceased patients was in the age group of 35-44 years and only 2.8% (n=8) were aged 65 years and above at the time of death (range from 8 years to 80 years) (see Figure 5). The mean age at death was 41 years (standard deviation = 10.9 years) and the median age was 39.5 years

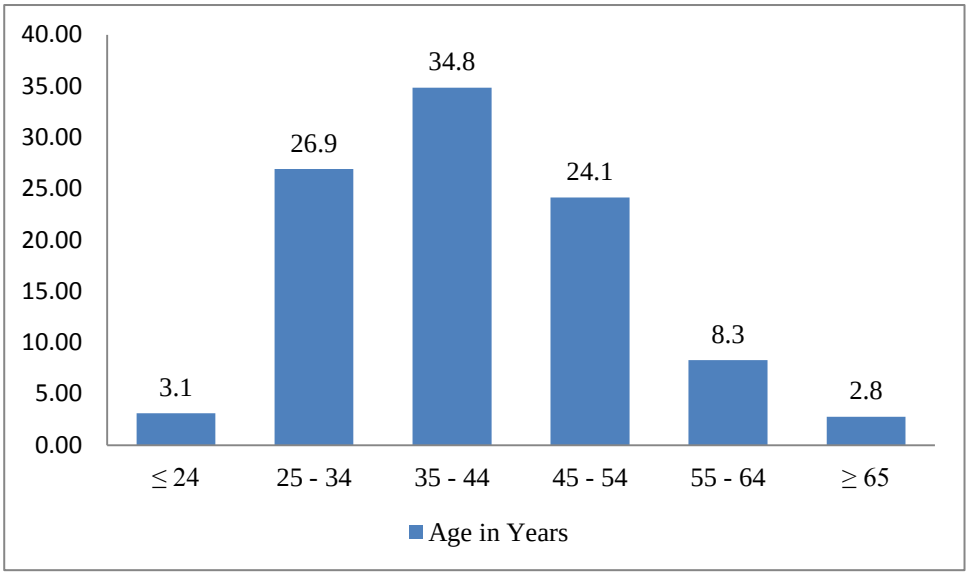

Figure 5: Age distribution of deceased TB patients, 2007

The majority of the patients 56.4% (n=163) were males and the remaining 43.6% (n=127) were females. Table 5 shows the age and sex distribution of the deceased TB patients at Charles Hurwitz Hospital for the study period.

Table 5: Age and sex distribution of deceased TB patients, 2007

Age (years)	**Females**	**Males**
≤ 24	8 (88.9%)	1 (11.1%)
25 - 34	44 (56.4%)	34 (43.6%)
35 - 44	41 (40.6%)	60 (59.4%)
45 - 54	25 (35.7%)	45 (64.3%)
55 - 64	7 (29.2%)	17 (70.8%)
≥ 65	2 (25.0%)	6 (75.0%)
Total	**127 (43.8%)**	**163 (56.2%)**

Table 6: Socio-demographic information on deceased TB patients, 2007

Variable	**Yes**	**No**	**Missing information**
Employment (%)	109 (43.4%)	142 (56.6%)	n=40 (13.7%)
	Female-29 (26.6%) Male-80 (73.4%)	Female-82 (56.3%) Male-60 (43.7%)	
Family TB contact (%)	28 (13.0%)	187 (86.9%)	n=76 (26.1%)
History of smoking	108 (42.0%)	149 (58.0%)	n=34 (11.7%)
	Female-34 (31.5%) Males-74 (68.5%)	Female-97 (65.1%) Male-52 (34.9%	
Alcohol intake	152 (60.8%)	98 (39.2%)	n=41 (14.1%)
	Females-60 (34.5%) Males-92 (60.5%)	Females-52(53.1%) Males-46 (46.9%)	

Table 6 indicates that only 28 or 13% of the deceased had a family history of TB contact.

The record review found that 108 of the study sample (42%) had a history of smoking, and the majority of these were males 74 (68.5%). The review also found that the majority of patients 152 (60.8%) reported alcohol consumption, with the majority being males 92 (60.5%). Fewer than half 109 (43.4%) were employed, and the majority of these 80 (73.4%) were males. The review found that 65/80 employed men (81.3%) had a history of being employed in the mining industry-61(93.8%) of the 65 males confirmed to have worked in the mines for more than five years.

3.3 Clinical profile of deceased TB patients

The record review found that eleven (3.8%) patients were admitted in a critical condition, they were diagnosed with advanced retroviral disease, presenting with confusion and disorientation. One patient was diagnosed with gross malnutrition and with a history of gastroenteritis.

The majority of the patients (75.3%) were being treated for the first time. Table 7 shows the categories of deceased patients.

Table 7: Category of deceased TB patients

Patient category	**No of patients**	**%**
New patients	216	75.3
Relapsed after cure	22	7.7
Retreated after treatment completion (no cure)	15	5.2
Treatment interrupted	15	5.2
Retreatment failure	7	2.4
All other retreatment cases	6	2.1
Retreated after default	6	2.1
Total	**287**	**100.0**

3.3.1 Information on notification of TB

The information on the TB notification for seven patients was missing. For those with complete information (n=284), the majority of TB cases (99.6%) were notified and in only one instance was the disease not notified.

3.3.2 Classification of disease using ICD10 code

The majority of the patients (66.6%) had a disease classification ICD10 code of A15/A16.2 or positive for TB acid fast bacilli (Table 8).

Table 8: Deceased TB patients according to ICD 10 codes

ICD 10 Code	Organ Affected	No of patients	%
A15/A16.2	All AFB positive	193	66.6
A15.2	All PTB	2	0.7
A16.3	TB of the lymph nodes	3	1
A16.5/A16.8	TB Pleura and other respiratory organs	15	5.2
A16.7	Primary TB	1	0.3
A17	TB meningitis	25	8.6
A18.6/A18.8	TB other organs	19	6.6
A19/A19.9	TB Miliary	32	11
TOTAL		**290**	**100**

3.3.3 Other medical conditions or treatment

The review found that 54/291 (18.6%) suffered from co-morbidities. Two thirds 36/54 (66.7%) of these patients with co-morbidities were on chronic medication for those conditions: eight (22%) were treated for hypertension; four (11%) were treated for hypotension; six (16.6%) were treated for diabetes; five (13.8%) were treated for epilepsy; four (11%) treated for anaemia; four (11%) were treated with chemotherapy, four (11%) were treated for mental health conditions. One female patient was pregnant at the time of death.

3.3.4 Sputum results

The sputum results for 36 patients (12.4%) were not available. In those cases where the information was available, the majority of the deceased patients (62%) had a positive sputum result and the remaining (38%) had a negative sputum result.

3.3.5 Diagnoses other than smear microscopy

The use of other diagnostic tests other than smear microscopy is shown in the table below.

Table 9: Use of other diagnostic tests

Diagnosis	No of patients	%
X-ray	124/291	42.6
Cerebro-spinal fluid	23/291	7.9
Biopsy	8/291	2.7

3.3.6 Referred patients

Information on referral was missing for eight patients. For those where information was available, almost half of the patients (127/283, 44.8%) were referred from other hospitals and clinics, while the remaining (156/283, 55.2%) were direct admissions to Charles Hurwitz TB Hospital.

3.3.7 Type of Regimen and dosages

Regimen 1 is administered for new cases and consists of Rifampicin, Isoniazid, Pyrazinamide and Ethambutol (RHZE). Regimen 1 is administered for any new patient for a continuous period of six months. Regiment 2 is administered for re-treatment cases. It consists of Regimen 1 drugs plus a daily streptomycin injection. The period of treatment is for eight months depending on the smear conversion rate. Daily streptomycin injection is given for a period of two months. The majority of the deceased TB patients (68.7%) were administered regimen 1 (for new cases) and the remaining (31.3%) were administered regimen 2

Table 10: Number of RHZE dosages (in months)

RHZE Dosages (months)*	No of patients	%
0	3	1.0
2	20	7.0
3	223	76.6
4	45	15.4
Total	**291**	**100**

3.3.9 Patients on cotrimoxazole

The majority of the patients (94.8%) were on cotrimoxazole prophylaxis treatment.

3.4 TB-HIV co-infection

3.4.1 HIV counselling

The record review found that 202/291 (69.4%) of deceased individuals received HIV counselling. The remaining 89 patients (30.6%) either did not receive HIV counselling or it was not indicated in the patient record.

3.4.2 HIV testing and treatment

Although the records showed that only 69.4% of patients received HIV counselling, the majority 281 (96.6%) were tested for HIV. Of these, 239 (85.1%) were HIV positive, 3.9% negative, and 11% were awaiting HIV test results. The majority (95%) with HIV positive results were referred for anti-retroviral treatment (ART), but only 23.3% were actually on ART. This is graphically illustrated in the figure below.

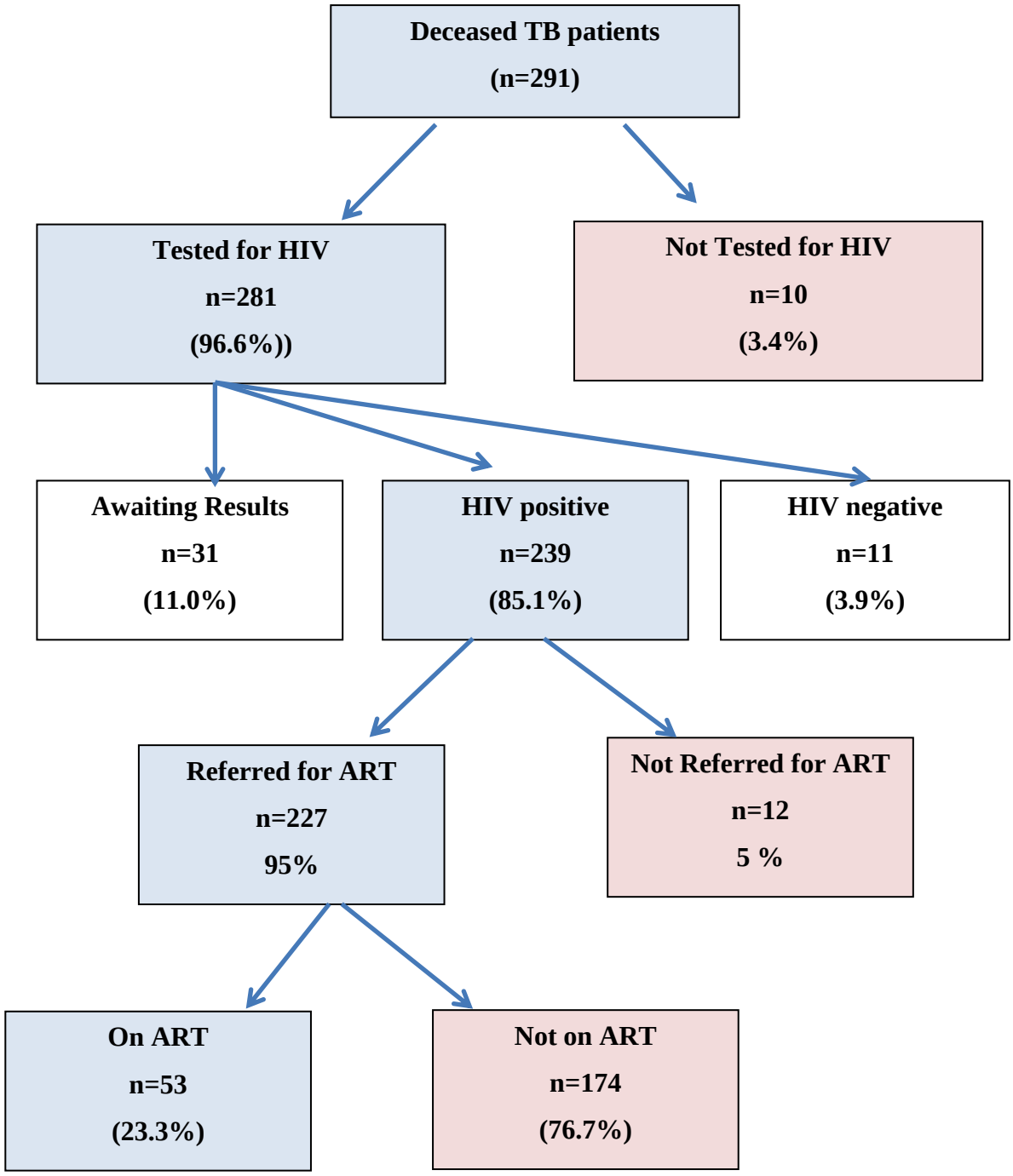

Figure 6: HIV testing and treatment–deceased TB patients

3.4.3 CD 4 counts of patients

The CD4 count was only available for 138 out of 239 HIV positive patients (57.7%) and missing for the remainder of patients (42.3%). The mean CD4 count for the 138 patients was 82.5 (SD=89.1), and the CD4 counts ranged from a low of 2 to a high of 441. The median CD4 count for the 138 patients was 45.9.

Table 11 shows the distribution of the CD4 count for the deceased patients where information was available. As can be seen from the table, the majority of the patients (75/138, 54.3%) had a very low CD4 count of ≤ 50 CD4 cells/ µL, (48/138, 34.8%) had a low CD4 count of 51 – 200, (13/138, 9.4%) had a moderate CD4 count of 201 – 350, and only (2/138, 1.4%) had a CD4 count higher than 350.

Table 11: Distribution of CD4 count

CD4 cells/ µL	**No of patients**	**%**
0 - 50	75	54.3
51 - 200	48	34.8
201 - 350	13	9.4
> 350	2	1.4
Total	**138***	**100**

*CD4 counts for 101 patients were missing

3.5 Conclusion

The mean age at death of all patients was 41 years and a median age of 39.5 years. Less than half of deceased individuals were employed (43.4%), more than one third had a history of smoking (42%) and the majority had a history of alcohol consumption (60.5%).

The record review found that 11 patients (3.7%) were admitted in a critical condition. Almost three quarters of the patients (75.3%) were being treated for the first time. Almost one fifth of patients (18.6%) suffered from co-morbidities, the majority of whom were on chronic disease medication.

The review found that the majority of the patients (94.8%) were on cotrimoxazole prophylaxis treatment. Although the records showed that only 69.4% of patients received HIV counselling, the majority (96.6%) were tested for HIV. A staggering 85.1% of patients had HIV-TB co-infection. The majority (95%) of patients with HIV positive results were referred for anti-retroviral treatment (ART), but only 23.3% were actually on ART. A large number of records had missing information on CD4 tests, but in those cases where information on the CD4 count was available, the vast majority of patients had a very low CD4 count, with only two patients exceeding the threshold of 350 for treatment at the time of the study.

The next two chapters will discuss the study findings in light of the existing literature, explore the implications of the findings, make recommendations and highlight issues requiring further investigation.

CHAPTER 4- DISCUSSION

4.1 Introduction

In this chapter, the findings of the study are discussed in relation to the study objectives and in light of the available literature. The chapter will also discuss the "*missed opportunities*", defined as a failure to implement the key elements of the TBCP (specifically TB management and care interventions) to prevent potential TB deaths at the hospital.

4.2 Socio-demographic information

This was one of the first studies that examined the profile of deaths at the Charles Hurwitz TB hospital. The study found that the majority of TB patients at Charles Hurwitz Hospital died in the prime of their lives, with a mean age at death of 41 years and a median age of 39.5 years. It confirms existing evidence that TB primarily affects adults in the economically active section of the population (WHO, 2013: p1). The findings contrast with a similar hospital-based study done in Taiwan where the mean age at death was 74 years (Lin, et al., 2014). However, as indicated earlier, Taiwan is a low HIV prevalence setting, hence the much higher mean age at death.

This study found that there were more male (56.4%), compared to female (43.6%) deaths at the Charles Hurwitz hospital, again confirming global evidence that TB is more common among men than women (WHO, 2013: p1). However, the findings in this Charles Hurwitz hospital study contrast evidence from the WHO Africa region which shows that more deaths occur among women than men in this region, compared to other WHO regions (WHO, 2013: p12). The study findings also contract with those of Stats SA, which showed a higher proportion of female deaths compared to male deaths for the period 1997 to 2002 (Statistics South Africa, 2006). This is because of the epidemiology of the HIV epidemic in this region, where women bear the brunt of the HIV epidemic in sub-Saharan Africa (Joint United Nations AIDS Programme & World Health Organization, 2009).

The study found that the majority of the deceased were unemployed (56.6%), thus supporting the general finding that TB is a disease that affects poor people disproportionally (Coovadia, Jewkes, Barron, Sanders, & McIntyre, 2009; Gandhi, et al., 2006).

Almost one in two of deceased patients (42%) had a history of smoking, and the majority of these were males (68.5%). Similarly, almost two-thirds of patients (60.8%) reported alcohol consumption. A study done at a hospital in Iran also found that smoking and drug use, amongst others, were major risk factors for death among TB patients (Alavi-Naini, et al., 2013). Both smoking and alcohol consumption are significant risk factors for TB infection, and their prevention are a major public health strategic priority (SANAC, 2011; WHO, 2013).

This study conducted in 2007 in Charles Hurwitz hospital found that 81.3% (65/80) of the employed men had a history of employment in the mining industry, 61/65 (93.8%) males confirmed working in the mines for more than five years (first paragraph p22).

The study found that 81.3% of the employed men had a history of employment in the mining industry in excess of five years. This is not surprising as analysts have pointed to the epidemic burden of mining-related occupational diseases, including TB (Murray, Davies, & Rees, 2011; Ndlovu, te Water Naude, & Murray, 2013).

4.3 Clinical profile of deceased TB patients

Although 75.3% of deceased patients were new TB patients who were being treated for the first time, 24.7% of TB patients were because of different *forms of relapse or retreatment* (Table 7). This finding illustrates the challenge (or failure) of the health system to manage TB patients according to the existing standards specified in the national TBCP (Department of Health, 2007).

Notwithstanding the missing records of seven patients, the study found that all but one patient *were notified*; hence it appears that there is relatively good compliance with the disease notification system.

Although the majority of the patients (66.6%) in this study at Charles Hurwitz had a disease classification ICD10 code of A15/A16.2 or positive for TB acid fast bacilli (Table 8), there was almost one third of *extra-pulmonary TB cases*. This figure is much higher than the average of 15% of extra-pulmonary TB cases for South Africa as a whole (Department of Health, 2007: p10). Other studies have found that extra-pulmonary TB, often made worse by diagnostic delays, contribute to high mortality rates (Storla, et al., 2008; Whitehorn, et al.,

2010). A DRC study also found increased risk of death among patients with smear-negative PTB and EPTB in the first months of treatment for HIV-negative patients (Henegar, et al., 2012).

In this study at Charles Hurwitz, almost one in five deceased patients (18.6%) suffered from *co-morbidities*. It is not clear from the records whether all of these individuals were in need of chronic disease medication. Nonetheless, only 66.7% of patients with co-morbidities were on chronic medication, indicating a missed treatment opportunity. These co-morbidities are known risk factors that increase the risk of progressing from latent infection to active TB disease (WHO, 2013: p93). The Iran hospital study also found that drug hepatitis and diabetes mellitus were independent predictors of death among TB patients (Alavi-Naini, et al., 2013).

The sputum results for one in eight patients (12.4%) were not available. More than one third (38%) had a negative sputum result in those cases where the information was available. As is the case with extra-pulmonary TB, studies have found that smear-negative cases of TB are also associated with higher mortality (Henegar, et al., 2012; Storla, et al., 2008; Whitehorn, et al., 2010).

The study found that although three-quarters of patients (75.3%) were classified as new patients, 68.7% were administered regimen 1 (for new cases). It is unclear why there is this discrepancy in treatment, but it may indicate non-compliance with the TBCP.

Cotrimoxazole preventive therapy given in conjunction with TB treatment has also been shown to reduce overall mortality during treatment for HIV-positive patients (WHO, 2013). South Africa's national HIV and AIDS policy guidelines recommend daily cotrimoxazole prophylaxis for all HIV positive adults, regardless of the existence of TB (SANAC, 2011) Encouragingly, the study found that 94.8% of patients were on cotrimoxazole prophylaxis treatment. However, as cotrimoxazole is known to reduce TB mortality (Sileshi, et al., 2013; WHO, 2013), the expected figure of patients on cotrimoxazole prophylaxis is 100%.

4.4 TB-HIV co-infection

The study found that a staggering 85.1% of deceased patients suffered from TB-HIV co-infection. The lethal combination of TB-HIV co-infection, and the consequences for morbidity and mortality have been well described (Abdool Karim, et al., 2009; Chopra, et al., 2009; Coovadia, et al., 2009; Department of Health, 2007; Henegar, et al., 2012; Saraceni, et al., 2008; Sileshi, et al., 2013; WHO, 2011, 2013). In 2012, worldwide there were 13 TB deaths per 100 000 population, but this figure increased to 17.6 when TB deaths among HIV-positive people were included (WHO, 2013: p19).

Although the record review showed that the majority of deceased patients (96.6%) were tested for HIV, only 23.3% of HIV positive individuals referred for treatment (or 22% of those who tested positive) were actually on ART. WHO has indicated that "*ART is a critical intervention for reducing the risk of TB morbidity and mortality among HIV positive individuals living with HIV, as treatment reduces the individual risk of TB disease by 65%, irrespective of CD4 cell count*" (WHO, 2013: p71). A study in Ethiopia also found that mortality was high among TB-HIV co-infected patients, and strongly associated with the absence of ART during TB treatment (Sileshi, et al., 2013). A study in Zimbabwe has also demonstrated the positive impact of ART on the survival of TB-HIV co-infected patients (MacPherson et al., 2011).

The study found that the mean CD4 count for those 138 patients where information was available was 82.5 (SD=89.1), the median CD4 count was 45.9, and the CD4 counts ranged from a low of 2 to a high of 441. The Ethiopia study found that low CD4 counts of less than 75 cells/μl had an increased risk of mortality during TB treatment (Sileshi, et al., 2013). Hence, all of these TB-HIV patients at Charles Hurwitz should have been on ART in light of their very low CD4 counts, and as recommended by the WHO.

4.5 Missed opportunities in the TB treatment and care continuum

The study found that there were several missed opportunities in the TB treatment and care continuum, as has been found in another study that focused on prevention of mother-to-child HIV transmission (Rispel, Peltzer, Phaswana-Mafuya, Metcalf, & Treger, 2009). In this study at Charles Hurwitz Hospital, the missed opportunities started at the admission of the patient

with the failure to obtain socio-demographic information and the failure to provide HIV counselling to all the patients. There were also several missed opportunities related to TB treatment, the management of co-morbidities and the management of TB-HIV co-infection. These missed opportunities are highlighted in the diagram below.

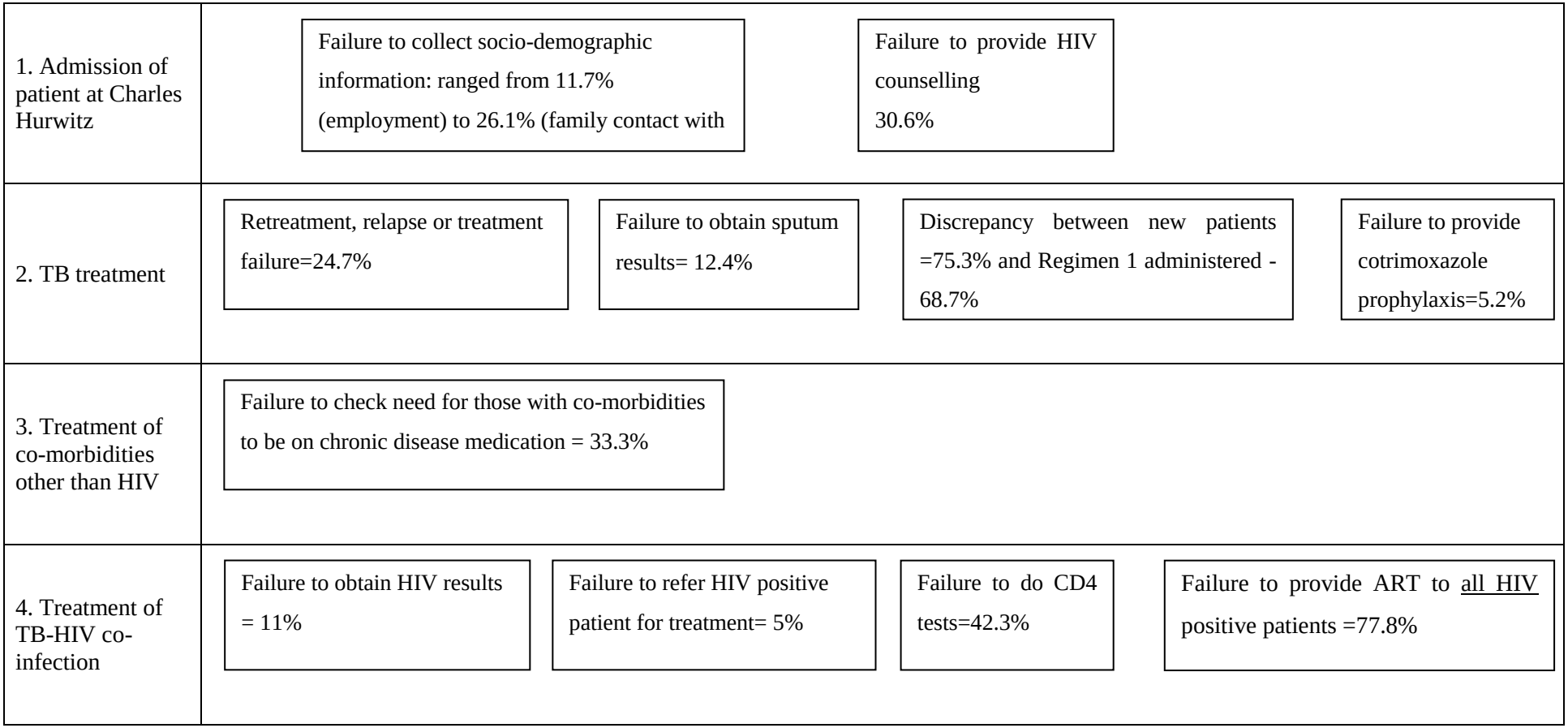

Figure 7: Missed opportunities in the management and care of deceased TB patients

Overall the many missed opportunities indicate sub-optimal compliance with the TBCP at the hospital, both at the clinical and management levels. Further research is needed to determine whether these missed opportunities occurred, or whether it was simply a case of missing information.

4.5 Study strengths and limitations

This was a retrospective record review carried out in at a government TB hospital in Gauteng province, and the findings cannot be generalised to all TB hospitals in South Africa. As with all record reviews, information was missing on a number of items under investigation. It is unclear, for example, whether all the missed opportunities highlighted in the previous sections were indeed the situation, or simply because of missing information. Nonetheless, the quality of recording in patient records is in itself of concern, as these are legal documents. The problem of useable information was also highlighted in the District Health Barometer, hence this is a general issue that needs to be addressed (Massyn, et al., 2013). Lastly, a limitation of the study is that it focused on deaths that occurred during 2007 at the hospital, and there may have been improvements in many of the indicators measured.

There are strengths of this research study. This was one of the first studies to examine the profile of deaths at the Charles Hurwitz TB hospital. It describes the socio-economic profile, TB treatment indicators and management of TB-HIV co-infection, as well as the performance of the hospital against the TBCP. It was relatively cheap to execute as no field-work was needed. The study provides valuable information for clinical management at the hospital, for programme or service planning, which is important in light of the global burden of TB, with the global number of people dying of TB in 2012 at around 1·3 million (WHO, 2013).

4.6 Conclusion

The study found that there were many missed opportunities in TB management and care at the Charles Hurwitz Hospital. The final chapter focuses on the recommendations, based on the findings of the study.

CHAPTER 5- RECOMMENDATIONS

5.1 Introduction

TB is a complex disease that targets people with compromised immune systems e.g. those who are HIV infected. In spite of new modalities for diagnosis and treatment for TB, people are still suffering and TB is still the top infectious disease killer, second only to HIV (WHO, 2013). Using a retrospective record review, this study sought to describe the profile of deaths at Charles Hurwitz TB Hospital. The study generated locally, context specific information on the: demographic profile of deceased patients; the clinical profile of these deceased patients; and the management and care of TB-HIV infection, as it is one of the main predictors of mortality. The key results of the study were presented and discussed in the previous chapters. The study findings underscore the need for better compliance with the national TBCP.

South Africa has well formulated and broadly accepted strategic plans for HIV, STIs and TB, sufficient political will and adequate capacity to deliver on many of the urgently needed health-care interventions that can contribute to the country's response to the twin epidemics of TB and HIV (SANAC, 2011). The recently established Office of Health Standards Compliance provides an opportunity to ensure greater compliance to existing norms and standards. Hence, the recommendations in Chapter 5 derive from the study findings and the existing TB policies, guidelines and strategies in South Africa.

5.2 Recommendations

The main recommendations are summarised in the table below.

Table 12: Summary of recommendations

Hospital level

- All admission clerks should receive training on the importance of obtaining and completing the prescribed social and demographic information from patients
- All health professionals (doctors, nurses, etc.) should receive ongoing training on the national TBCP, especially the importance of combatting TB and preventing deaths, as well as global initiatives (such as the Stop TB campaign)
- A hospital quality assurance programme should be established to ensure compliance with guidelines and standards contained in the TBCP & the NSP on HIV, STIs &TB-the monthly morbidity and mortality meetings should be enforced
- Strengthen linkages with district and community-based services

Policy level

- There should be annual performance monitoring to ensure that all facilities report on compliance with existing TB guidelines and plans

5.2.1 Hospital level recommendations

The study found that the quality of record keeping was sub-optimal, with missing information from a large number of records. All admission clerks at the hospital should receive training on the importance of obtaining and completing the prescribed social and demographic information from patients upon admission. If patients are too ill, an attempt should be made to obtain the information from the next-of-kin. The hospital management team should monitor compliance with the information contained in patient records, and that it is in accordance with the National Health Act (Republic of South Africa, 2005).

All health professionals (doctors and nurses, and other categories) should receive training on the latest guidelines on the management of TB, and TB-HIV co-infection. They should be sensitised on the importance of combatting TB and preventing deaths, and be oriented to the main national and global initiatives. Journal clubs and in-service training sessions should be organised. All health professionals should have access to appropriate guidelines and protocols that enable them to meet the required needs of all TB, as well as HIV positive patients.

The health professionals should be oriented to the notion of missed opportunities in management and care of patients, and they should develop joint solutions on avoiding missed opportunities.

The hospital CEO should establish a hospital quality assurance programme, if this is not already the case, to ensure compliance with guidelines and standards contained in the TBCP & the NSP on HIV, STIs &TB. A quality champion should be appointed. The clinical manager at the hospital should provide oversight of the quality assurance programme, which will also reduce or eliminate missed opportunities. Hospital specific level targets should be developed in line with national guidelines, and these should be monitored at a regular level. The monthly morbidity and mortality meetings should be enforced, as potentially avoidable deaths can be discussed and remedial steps taken at an early level.

The hospital should also strengthen linkages with district and community-based services, particularly campaigns that encourage community members to attend health facilities and to seek care for a persistent or chronic cough. All TB patients must be screened for HIV, and HIV counselling must be compulsory for all patients. Health promotion at both individual and different levels of the health system must be encouraged.

The World Health Organization's Stop TB campaign reaffirms recommendations for supervised treatment, as well as the use of fixed-dose combinations of anti-TB drugs and patient kits as further measures for preventing the acquisition of drug resistance (WHO, 2013). Closer liaison with district services will allow the hospital to influence the training or orientation of community health care workers. The key focus must be on the prevention, early treatment and ensuring the survival of TB patients, and achieving a death rate of less than 2% (SANAC, 2011).

5.2.1 Policy recommendations

There should be annual performance monitoring to ensure that all facilities report on compliance with existing TB guidelines and plans. Feedback is critical, as well as the development of strategies to ensure that remedial action is taken early.

The policy framework is in place to ensure the prevention of TB deaths. The implementation requires strong leadership, political will, social mobilisation, adequate human and financial resources, and sustainable development of health services. (SANAC, 2011). Management of TB must be monitored and it must be a team's effort to ensure that the MDG 2015 and the NDP goals are achieved.

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

HUMAN RESEARCH ETHICS COMMITTEE (MEDICAL)
R14/49 Ms Dorothy M Diale

CLEARANCE CERTIFICATE	**M091160**
PROJECT	The Profile of Deaths in Charles Hurwitz TB Hospital: January to December 2007
INVESTIGATORS	Ms Dorothy M Diale.
DEPARTMENT	School of Public Health
DATE CONSIDERED	2009/11/27
DECISION OF THE COMMITTEE*	Approved unconditionally

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

DATE 008/10/2010 **CHAIRPERSON** .....
(Professor PE Cleaton-Jones)

*Guidelines for written 'informed consent' attached where applicable
cc: Supervisor : Dr F Akpan

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...