

**KNOWLEDGE, AWARENESS AND PRACTICES REGARDING
TUBERCULOSIS AMONG GOLD MINERS IN TANZANIA**

by

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DECLARATION

I declare that **KNOWLEDGE, AWARENESS AND PRACTICES REGARDING TUBERCULOSIS AMONG GOLD MINERS IN TANZANIA** is my own work and that all the sources that I have used or quoted have been indicated and acknowledged by means of complete references.

SIGNATURE
(MR G MTAITA)

DATE

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My gratitude and praise to God, my Father and Creator, without Whose grace neither I nor this study would have been conceived.

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KNOWLEDGE, AWARENESS AND PRACTICES REGARDING TUBERCULOSIS AMONG GOLD MINERS IN TANZANIA

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ABSTRACT

The overall aim of this study was to investigate the knowledge, awareness and practices regarding TB at a selected gold mine in Tanzania in order to enhance the paucity of knowledge in this area of public health.

The mining population is considered to be at high risk of tuberculosis infection and illness. However, there is little data available on the knowledge, awareness and practices in the mining population in Tanzania.

A quantitative, descriptive study, using the Health Belief Model as the conceptual framework, was conducted among 100 workers in order to give a detailed description of the knowledge and awareness of tuberculosis. The study confirms the role of the media, particularly radio broadcasting, health workers, teachers, and the community in promoting information and education on TB.

Fever as a symptom was a problem. The study area is a malaria endemic area where fever is the commonest presentation hence every fever is regarded as malaria. This complicated picking up and identifying other causes of fever. Despite feeling compassion for and wanting to help TB sufferers, most avoided them, which emphasised people's general fear of TB. This indicated the general isolation and stigmatisation of TB sufferers. The findings highlighted the need for on-going education about TB and its treatment, especially early diagnosis and adherence to treatment

Key concepts

Tuberculosis awareness, gold miners; Health Belief Model; knowledge and practices regarding TB

DEDICATION

This study is dedicated to

My parents whose values of hard work and humility will always be an inspiration.

My wife, Leocadia and my children, Reuben and Ruth, for their love, support and inspiration, and without whom this would not have been possible.

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Above all to GOD who gifted me with the wisdom and knowledge to give much, expect little and love exceedingly.

ABBREVIATIONS

AFB	Acid-fast bacilli
AIDS	Acquired immunodeficiency syndrome
BCG	Bacille Calmette–Guerin
DOT	Directly observed treatment
DOTS	Internationally recommended control strategy for TB
EIU	Economist Intelligence Unit
ELISA	Enzyme-linked immunosorbent assay
GDP	Gross Domestic product
HBCs	High burden countries
HBM	Health Belief Model
HIV	Human Immunodeficiency virus
ILO	International Labor Organization
INH	Isoniazid
KAP	Knowledge, attitudes, and perceptions
MDGs	United Nations Millennium Development Goals
MDR-TB	Multidrug-resistant TB
NTP	National Tuberculosis Programme
PTB	Pulmonary tuberculosis
RMP	Rifampicin
RSA	Republic of South Africa
SPSS	Statistical Package for the Social Science
TB	Tuberculosis
UN	United Nations
USA	United States of America
UTI	Union Tuberculosis Institute
WHA	World's Health Assembly
WHO	World Health Organization
UNISA	University of South Africa

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List of annexures

Annexure A: Permission from the Research and Ethics Committee of UNISA

Annexure B: Permission from the mining company

Annexure C: Research information and consent

Annexure D: Data collection instrument

CHAPTER 1

Orientation to the study

“Nowhere in these ancient communities of the Eurasian land mass, where it is so common and feared, is there a record of its beginning. Throughout history, it had always been there, a familiar evil, yet forever changing, formless, unknowable. Where other epidemics might last weeks or months, where even the bubonic plague would be marked forever afterwards by the year it reigned, the epidemics of tuberculosis would last whole centuries and even multiples of centuries. Tuberculosis rose slowly, silently, seeping into the homes of millions, like an ageless miasma. And once arrived, it never went away again. Year after year, century after century, it tightened its relentless hold, worsening whenever war or famine reduced people’s resistance, infecting virtually everybody, inexplicably sparing some while destroying others, bringing the young down onto their sickbeds, where the flesh slowly fell from their bones and they were consumed in the years-long fever, their minds brilliantly alert until, in apocalyptic numbers, they died, like the fallen leaves of the dreadful premature autumn”. (From “The forgotten plague: how the war against tuberculosis was won – and lost” (Ryan 1992).

1.1 INTRODUCTION

According to the World Health Organization (WHO) (WHO 2008a), diseases caused by organisms such as bacteria, viruses, fungi and other parasites are major causes of death, disability, and social and economic disruption for millions of people in the world today. Breman, Alilio and Mills (2004:1) state that, despite the existence of safe and effective interventions globally, millions of people still lack access to needed preventive and treatment and care. Diseases such as Human immunodeficiency virus (HIV) and Acquired immunodeficiency syndrome (AIDS) and tuberculosis (TB) strike young adults in their most productive years when they are about to contribute to their families’ and country’s economic progress and stability. The loss in productive workforce missed educational opportunities and high health-care costs caused by infectious diseases directly impact families, communities and countries and erodes economic growth and discourages foreign investment (UNAIDS, WHO 2006; WHO 2002a). According to the Institute for One World Health (2009), these diseases disrupt communities and undermine nations’ economic growth.

Infections are prevalent in developing countries where co-infection is common. The adverse impact of infectious diseases is most severe among the poorest people, who have the fewest material, physical and financial resources to draw from and limited or no access to integrated health care, prevention tools and medications.

Infectious diseases raise awareness of peoples' global vulnerability, the need for strong health care systems and the potentially broad and borderless impact of disease (WHO 2002a). It is estimated by the WHO (2002a) that between 14 and 17 million people die each year due to infectious diseases – nearly all live in developing countries (Breman et al 2004:3; UNAIDS, WHO 2007; WHO 2002a). Children are particularly vulnerable to infectious diseases. Pneumonia, diarrhea and malaria are leading causes of death among children under age five; cerebral malaria can cause permanent mental impairment (Jameson, Breman, Measham, Claeson & Evans 2006; Rudan, El-Arifeen, Black & Campbell 2007:56). Infectious diseases are also destructive to the health of adults, causing disability, a diminished quality of life, decreased productivity and death.

Korenromp, Williams, De Vlas, Gouws, Gilks and Ghys (2005) mention that people infected with one infectious disease become more susceptible to other diseases. Examples include: HIV/AIDS co-infection with TB or malaria and co-infection with multiple neglected diseases. Illness and death from infectious diseases are particularly tragic because they are largely preventable and treatable with available interventions.

The progress in the infectious diseases needs a global team effort and Kapp (2008:13) states that progress has been made by:

- Efforts to achieve the sixth Millennium Development Goal, which focuses on stopping and reversing the spread of infectious diseases by 2015 (United Nations (UN) 2007).
- Regional progress against infectious diseases, such as:
 - A 91% reduction in deaths resulting from measles in Africa between 2000 and 2006 (Kapp 2008:13).

- The attainment of successful treatment of TB among 85 percent of patients in the Western Pacific and Southeast Asia during 2005 (WHO 2007b).
- The near eradication of polio and guinea worm disease, and lower prevalence of several other tropical diseases over the past few decades (WHO 2006d).
- A renewed interest in the research and development of new diagnostics, vaccines and drug treatments (WHO 2006e).

Increased funding could help eradicate, eliminate and control diseases, preventing millions of deaths and improving the lives of many millions more (Hotez, Raff, Fenwick, Richards & Molyneux 2007:512).

Many of the infectious diseases found in the world today are preventable; however these preventable illnesses continue to claim millions of lives. Over four billion acute cases of diarrheal diseases occur every year, primarily in children in developing countries, according to the WHO (2002a) and two million children die annually from diarrhoea. Lower respiratory infections such as pneumonia are another scourge of children. Almost 4 million people died of lower respiratory infections in 2002, many of them children under five. Malaria, banished in most of the developed world, remains a leading killer in many poor corners of the world, especially sub-Saharan Africa, where 90% of the world's cases occur. Malaria infects at least 500 million people worldwide every year. Measles, too, still thrives. This childhood infection, which can be prevented with a cheap and effective vaccine, still kills an estimated 700,000 people annually, lives that could be spared with a simple immunization. The list goes on (Institute for One World Health 2009).

For the purpose of this study, the focus is on TB, a disease that claims more than two million people every year of which 90% of them in developing countries (Institute for One World Health 2009). About one-third of the world's population is infected with TB and almost 40 million people worldwide are infected with HIV/AIDS making them highly susceptible to contract TB. Due to new anti-viral drugs, HIV/AIDS has become a manageable disease instead of a death sentence. But in the world's

hardest hit places where poverty and hunger thrives, most TB and AIDS patients do not have access to life-saving drugs (WHO 2001a).

1.1.1 Background to TB

TB is an airborne bacterial infection and a major cause of illness and death worldwide, especially in Asia and Africa. Globally, 9.2 million new cases and 1.7 million deaths from TB occurred in 2006, of which 0.7 million cases and 0.2 million deaths were in HIV-positive people (WHO 2008a:393). According to Baxi (2003) and Hattingh, Dreyer and Roos (2008:276), TB is the biggest killer of young people and adults in the world today.

The global TB incidence rate per 100 000 of the population is falling slowly (−0.6% between 2005 and 2006), having peaked around 2003 (WHO 2008a:393). In 2006, the TB incidence per capita was stable in the European region and in slow decline in all other WHO regions (from 0.5% between 2005 and 2006 in the South-East Asia region to 3.2% between 2005 and 2006 in the region of the Americas) (WHO 2008a:393).

An estimated one-third of the world's population (1.9 billion people) is infected with TB. Every year, 8 million people become infected with TB, 80% of who are in the so-called 22 “high burden” countries. TB is the leading infectious cause of death among adults (15-59 years of age) in developing countries. TB kills more than two million people each year, which constitutes about 26% of the avoidable adult deaths in the developing world (Narain & Lo 2004:278).

The WHO (2008a:393) reports that there were an estimated 9.2 million new cases of TB in 2006 (139 per 100 000 population), including 4.1million new smear-positive cases (44% of the total) and 0.7 million HIV-positive cases (8% of the total). According to the WHO (2008a:393), this is an increase from 9.1 million cases in 2005, due to population growth. India, China, Indonesia, South Africa and Nigeria rank first to fifth respectively in terms of absolute numbers of cases. The African region has the highest incidence rate per capita (363 per 100 000 population).

1.1.2 TB in Africa

TB case rates have risen progressively throughout Africa and have increased by up to four fold even in African countries with well run TB programmes in which the incident rates had previously been in decline (Churchyard & Corbett 2001:155). Africa is the only region in the world to be experiencing an increase in TB cases - in the rest of the world; infection rates are either stable or falling. According to Ameh (2007), in 2005, the WHO Regional Committee for Africa, comprising health ministers from 46 member states, declared TB an emergency in the African continent. This decision was made based on the fact that the number of TB cases in African countries per year has quadrupled since 1990, and continues to rise. Now 540,000 people die of the disease in Africa every year (Lawn, Bekker, Middelkoop, Myer & Wood 2006:1040). These authors also state that the African continent, with 11% of the world's population, now accounts for 27% of the global burden of TB and 30% of TB-related deaths. An estimated 2.4 million new TB cases and 540 000 TB-related deaths occur in Africa annually (Lawn et al 2006:1041).

According to Ameh (2007), some African countries such as Tanzania and Malawi pioneered TB control strategies that were later adopted around the globe. But they were not successful - Malawi saw the number of TB cases a year rise by four times over the past 15 years. Poverty, poor health systems and the HIV/AIDS virus have been blamed by the WHO for this.

Funding is a particularly critical issue. Eight of the nine worst affected African countries reported that, for 2003, they had short-falls in the funding their TB control programmes needed. However the WHO emphasises that money alone will not end the crisis - health systems must be improved, and the rate at which health professionals are lost in the region must be reduced (American Lung Association 2009; Treatment Action Group 2008).

Figure 1.1 indicates the number of cases in the ten African countries most afflicted with TB in 2006 (WHO 2007b:25).

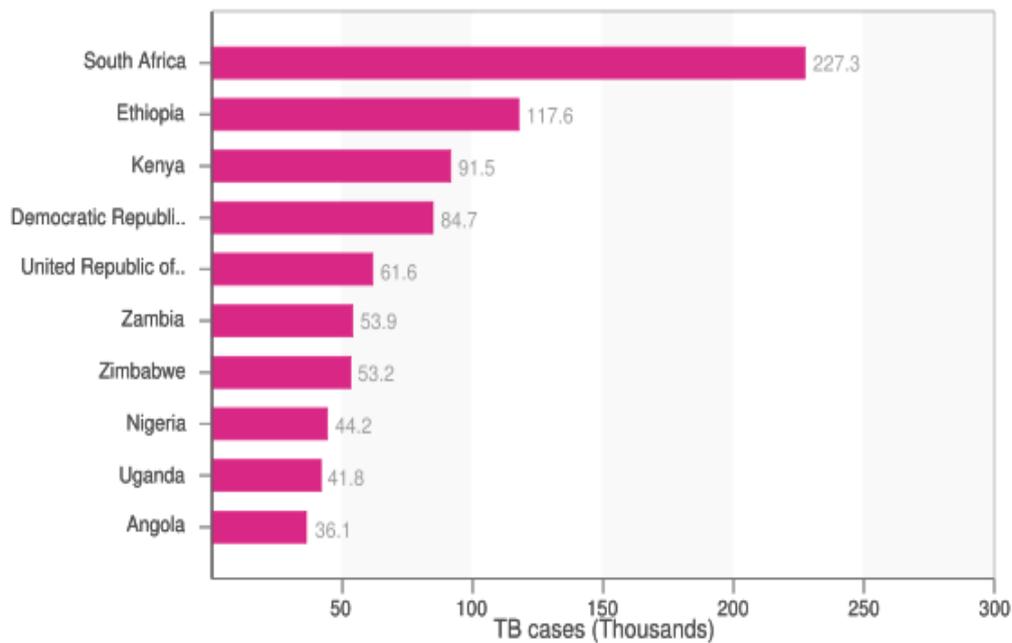


Figure 1.1 Top ten African countries severely affected by TB

Source: WHO (2007b:25)

According to figure 1.1, South Africa has more than double the incidence of TB compared to Kenya and the Democratic Republic of the Congo (DRC) and Angola the lowest incidence of TB.

1.1.3 TB in Tanzania

TB continues to be of grave concern in Tanzania and other countries in the Sub-Saharan region of Africa with an annual incidence of 308 per 100 000 of the population suffering from TB, Tanzania ranked fourteenth (14th) on the list of African countries. The incidence of TB had increased dramatically since 1984 corresponding to the spread of HIV infection. Over 61,600 new TB cases were notified in 2003 compared to only 11,000 in 1984. In 2003, TB was a major cause of morbidity and mortality in Tanzania (Tanzania Ministry of Health and Social Welfare [MHSW] (2003:39). Moreover, TB is associated with human immunodeficiency (HIV) and the increase in TB cases severely impacts on the existing health system (MHSW 2005:1). The majority of cases of TB appear in adults aged 15 to 45 years, the same age group affected by HIV/AIDS. The high HIV infection rates have directly increased TB infection (MHSW 2005:1).

In Tanzania, there is an estimated 51% HIV prevalence among TB patients (Mfinanga, Mutayoba, Kahwa, Kimaro, Mtandu, Ngadaya, Egwaga & Kitua 2008:158). The current TB prevalence in Tanzania is 496 per 100 000 population. The estimated annual TB incidence is 342 per 100,000 of the population, of who 147 per 100,000 are smear-positive cases. Urban regions with higher population densities and HIV burden contribute largely to the incidence.

In 2004, the Dar es Salaam region contributed about 24% of all TB cases (Mfinanga et al 2008:158). AIDS was responsible for 49.8% of the overall mortality rate and perinatal conditions such as severe bleeding, infections, unsafe abortions, hypertension, and obstructed labour contribute to 32.0%. Many of those affected are in the productive age group, which affects negatively growth of the national economy due to absenteeism and reduced productivity (MHSW 2005:39).

1.1.3 TB in mines

Mining is a hazardous occupation, and the safety of mineworkers is an important aspect of the industry, which contributes largely to the Gross Domestic Product of most African countries. Surface mining is less hazardous than underground mining and metal mining is less hazardous than coal mining due to less ventilation and dust control (Chr. Michelsen Institute; Jennings 2001:20-23). Hazards stem from the nature of the underground mines are associated with hazards such as rock and roof falls, exposure to severe heat, flooding, and inadequate ventilation. The New Zealand Department of Labour (2008:5) states that miners may also suffer severe injuries due to accidents from the use of explosives in mines where blasting occurs. Furthermore, accidents related to the haulage system in the mining industry constitute the second greatest hazard common to all types of mines.

Over time, a number of debilitating hazards, related to the quality and nature of the environment in the mines, affect miners. Adverse environmental conditions aggravate TB and, in addition, complicate the treatment of the disease. Dust produced during mining operations is generally injurious to health and causes the lung disease known as “black lung”, or pneumoconiosis. Although the increase in TB occurs in all main commodity mines such as gold, coal, platinum, and diamonds, TB case rates among gold miners are approximately three times higher than those among coal and platinum

miners (Guild, Ehrlich, Johnston & Ross 2001:156). Gold miners are susceptible to TB, because of occupational exposure to silica dust, which is a strong risk factor for contracting TB, that in turn interacts multiplicatively with the risk from having HIV infection (Corbett, Charalambous, Fielding, Clayton, Hayes, De Cock & Churchyard 2003:1157; Tiwari, Sharma & Saiyed 2007:61-62).

Among gold miners, the increase in TB case notification has occurred parallel with the increases prevalence of HIV infection which greatly increases the susceptibility of a person to TB (Morris 2008). In addition, Guild et al (2001:156) report that the proportion of HIV associated TB among miners now exceeds 50% of all TB cases in this group. In addition, HIV infection, silica dust inhalation and in particular silicosis is a potent risks factor for TB. This combination of risk factors places gold miners at a very high risk for TB. Guild et al (2001:157) remark that the gravity of the threat to TB control posed by the HIV epidemic cannot be over-emphasised and it can be expected that TB incidence rates among gold miners will continue to increase during the next decade unless effective control measures can be identifies and implemented.

Zandonella (2009:1) is of the opinion that lack of awareness or limited knowledge about TB might lead to harbouring misplaced beliefs and misconceptions about various aspects of the disease, which might prevent the timely reporting to the health institutions or lead to poor compliance with treatment.

This study wished to gather information on the knowledge, awareness and practices of TB at the gold mine at which the study was conducted. This would contribute to closing the gap in knowledge on this important area of public health concern.

1.2 BACKGROUND TO THE STUDY

The study was conducted in Tanzania, a coastal country in East Africa. Tanzania covers 364 943 square miles (945 203 square kilometres), is comparable in size to Nigeria, and is slightly more than twice the size of the state of California in the United States of America (USA) (Encyclopaedia of the Nations 2007).

Tanzania is mountainous in the northeast, where Mount Kilimanjaro, Africa's highest peak, is situated. To the north and west are Lake Victoria (Africa's largest lake) and Lake Tanganyika (Africa's deepest lake, known for its unique species of fish). Central Tanzania

comprises a large plateau, with plains and arable land. The eastern shore is hot and humid, with the island of Zanzibar lying just offshore (World Travel Guide 2009) (see figure 1.1).



Figure 1.2 Map of Tanzania (Source: Africa Safari Travel 2008)

1.2.2 Mining in Tanzania

Officially, Tanzania is enjoying a gold mining 'boom'. Since the first large-scale gold mines began production in late 1998, gold mining has been the fastest growing sector of the economy and the largest source of foreign investment. Minerals now account for almost half the country's exports (Economist Intelligence Unit [EIU] 2004:33).

Tanzania's gold production grew from two tons (2 000 kilograms) in 1998 to 50 tons (50 000 kilograms) in 2004 to become Africa's third largest producer of gold after the Republic of South Africa (RSA) and Ghana (Economist Intelligence Unit 2004:33). In January 2008, gold hit a record high world price of US \$876.00 per ounce. Tanzania operates six major gold mines with two foreign mining companies dominating the sector, one company operates three mines and is developing a fourth (at Buzwagi), and another international company operates the other mine, the country's largest gold deposit (Economist Intelligence Unit 2004:33).. Tanzania is estimated to possess around 45 million ounces (1 275 728 kilograms) of gold. At the current gold price, this means an income of up to US\$39billion – over three times the country's annual Gross Domestic Product (GDP) of US\$11bn (Euroamerican Data Corporation 2006).

The gold mine where this study was conducted is an underground gold mine situated approximately 125 kilometres (km) southwest of the city of Mwanza (see figure 1.3). The site is named after the Bulyanhulu River, which runs through the area, and covers about 54 km². The site has around 3 000 workers including contractors. Near to the mine, there are four villages that interact with people working in the mine, namely Kakola, Bugarama, Ilogi and Buyange, with an estimated population of 25 000 (Tanzania National Bureau of Statistics 2003.1).

The nearby Geita mine employs nearly 200 expatriates (around 6% of its 3 200 workers) while the mine, where this study was done, employs 178 expatriates which account for around 9% of its 1 971 workers (Euroamerican Data Corporation 2006). Expatriates usually occupy the management and supervisory positions.

Since 2001 Tanzania has been the focus of Africa's gold exploration and development, with the gold mining industry growing by 27% in 2004 compared to 17% in 1999 (Chr. Michelsen Institute (CMI) 2006). Currently, there are more than twenty mining companies involved in mining various types of minerals in Tanzania, with most companies focusing on gold, diamonds and tanzanite.

Most of the gold mines are found to the east and south of Lake Victoria and there are some deposits in the south and southwest of the country. Iron, nickel, lead, zinc and copper are found in the Kagera, Kigoma, Mbeya, Ruvuma and Mtwara regions while diamonds, rubies, sapphires and emeralds are found in the east, west, and the areas bordering Kenya in the north, and the Mbeya and Rukwa regions bordering Mozambique in the south.

According to Kulindwa Mashindano, Shechambo and Sosovele (2003:8), the mining sector contributes 2.3% of the GDP, which is projected to grow to 10% in 2025. A Canadian gold mining company is now operating the gold mine under study in north-western Tanzania, the first major mine in operation in years (Kulindwa et al 2003:13).

Camperhout (2002:4) points out that mining plays a major role in poverty alleviation in the country through development projects, including health and education services, water and electricity supply, and the provision of employment opportunities.

At the same time, however, mining also has side effects on the workers and communities surrounding mines. The International Labour Organization (ILO) (2001:5) estimates that there are 120 million accidents related to occupational injuries and 200 000 occupational fatalities a year worldwide in the mining industry. Takala (2002:25) indicates that the average risk of accidents is 42 per 1 000 workers with the risk of fatality at 8.30/100 000. In addition to occupational injuries, TB and other diseases are on the rise in the mining communities and the surrounding villages.

Workers in developing countries suffer several maladies due to bacterial, viral and parasitic infections, malnutrition, poor hygiene and poor sanitation. Such conditions further reduce working capacity and aggravate the effects of occupational hazards (Loewenson 2001:865).

1.3 RESEARCH PROBLEM

While TB and other health issues cause grave concern as the most widespread future threat and large budget allocations and external grants/loans are concentrated on TB

eradication, there is a corresponding increase in opening up more areas for mining, which is directly related to the growth of TB in Tanzania.

Besides TB, mineworkers' health is at high risk of accidents, air and water pollution due to chemicals and radiation, as well as heavy work and prolonged working hours which will aggravate the disease. In some of the least developed countries up to 80% of the workforce is employed in agriculture, mining and other types of primary production (Loewenson 2001:865). For example, heavy physical work often combined with heat stress, occupational accidents, pesticide poisoning, and organic and biological hazards are the main causes of occupational morbidity and mortality in Tanzania. These conditions compound the increase of TB cases.

1.4 PURPOSE OF THE STUDY

The purpose of this study was to investigate mine workers' knowledge, awareness and practices regarding TB at a selected gold mine in Tanzania in order to enhance the paucity of knowledge in this area of public health.

1.4.1 Research questions

In order to achieve the purpose, the researcher wished to answer the following questions:

- What are the knowledge, awareness and practices regarding TB among mineworkers in a selected gold mine in Tanzania?
- What programmes are available to promote the mineworkers' knowledge, awareness and practice regarding TB at the selected gold mine?
- What are the mineworkers' perceptions of the recent programmes?
- What guidelines can be developed to enhance the mineworkers' knowledge, awareness and practices regarding TB at the selected gold mine in Tanzania?

1.4.3 Research objectives

The objectives of this study were to

- Investigate the mineworkers' knowledge, awareness and practices regarding TB at the selected gold mine.
- Determine what programmes are available to promote the mineworkers' knowledge, awareness and practice regarding TB at the selected gold mine.
- Investigate the mineworkers' perceptions of the recent programmes at the selected gold mine.
- Make recommendations to enhance mineworkers' knowledge, awareness and practices regarding TB at the selected gold mine.

1.5 SIGNIFICANCE OF THE STUDY

The mining sector employs a substantial percentage of young males at the most productive period in their life and is one of the most attractive professions in terms of remuneration. Many men travel far and wide to seek employment with mining companies, such as in Kakola, a local mining town.

This study should indicate the extent of mineworkers' knowledge, awareness and practices regarding TB at the selected gold mine. In addition, it should determine what programmes are available for mineworkers to prevent the spread of TB and what their perceptions of these programmes are. Knowing the mineworkers' perceptions of the programmes will provide an insight into which programmes contribute to the prevention of TB in order to determine the success of programmes. By focusing on the programmes currently available for promoting the mineworkers' knowledge, awareness and practices regarding TB at the gold mine under study, the findings should encourage management to improve any shortcomings found or to update the programmes, if necessary.

Based on the mineworkers' recommendations, the guidelines developed should enhance knowledge, awareness and practices regarding TB at the selected gold mine. The findings and guidelines should assist management to improve conditions and educational strategies to prevent TB amongst mineworkers. Finally, the findings should provide an impetus to the national TB control programme efforts to control TB among mineworkers in general and lead to further investigation and research.

1.6 THEORETICAL FRAMEWORK

The Health Belief Model (HBM) was used as a conceptual framework for this study. The HBM aims to explain the determinants of engaging in actions that can have health implications (Petrovici & Ritson 2006:222). There are two main assumptions underpinning the HBM:

- The subjective valuation of a particular goal
- The individual's estimate of the likelihood that a given action will activate that goal (Janz & Becker 1984:42).

The goals can be identified in terms of the prevention of the disease or improvements to an individual's health status or well being. According to the HBM, health behaviour is dependent upon perceiving threat of a disease. This is the outcome of perceived susceptibility to getting a disease and the severity of consequences suffering the particular disease (Becker 1974b:326; Glanz, Lewis & Rimer, 1997; Harrison, Mullen & Green, 1992:108).

Omega (in Stanhope & Lancaster 2001:252) states that the HBM is beneficial in assessing health protection or disease prevention behaviours. It is also useful in organizing information about clients' views on the state of health and what factors may influence them to change their behaviour. The HBM when used appropriately provides organized assessment data about clients' abilities and motivation to change their health status. Programmes can be developed or improved to suit the needs of clients/patients.

This study utilised the HBM to facilitate and acquire insight into mineworkers' knowledge, awareness, perception and practice with regard to TB (Dennill, King & Swanepoel 1999:157). Based on the HBM, questionnaires were developed to address the mineworkers' knowledge and perceptions (perceived susceptibility, perceived severity, perceived benefits and barriers to adopting preventive behaviours) of TB. In applying the HBM, it is important to provide information about TB and the consequences which arise if TB is untreated or if the treatment is interrupted. Mine workers should be aware of the spread, the signs and symptoms and the severity of the disease as well as about the potential benefits of effective programmes in the workplace. Different forms of health

education strategies assist and remind workers to take action in the prevention of disease. Local surveys on knowledge and attitudes towards health educational programmes in the workplace are beneficial in the planning, implementation and evaluation of TB control programmes.

1.7 DEMARCATION OF THE STUDY FIELD

The study was conducted at a selected gold mine in Tanzania. This is an underground gold mine situated approximately 125 km southwest of Mwanza. The site is near the Bulyanhulu River, which runs through it, and covers an area of about 54 km² (see figure 1.3). Approximately 3 000 workers, including contractors, work at the mine on a daily basis. Near to the mine, there are four villages that interact with people working in the mine, namely Kakola, Bugarama, Ilogi and Buyange, with an estimated population of 25 000 (Tanzania National Bureau of Statistics 2003.1).



Figure 1.3 Map of Tanzania: mines

Source: Barrick Gold Corporation (2009).

1.8 RESEARCH DESIGN AND METHODOLOGY

The researcher adopted a quantitative approach, using a descriptive, cross sectional design in order to give a detailed description of the respondents' knowledge and awareness of TB (see chapter 4).

Research methodology is the “application of all steps, strategies and procedures for gathering and analysing data in a research investigation in a logical and systematic way” (Burns & Grove 2001:26). The selection of a research methodology or strategy is the core of a research design and must include the research design, definition and selection of the population of interest, variables (characteristics of the individuals in this population), their status and relationships to one another, the instruments for data collection and the procedure for data analysis of the information collected (WHO 2001b:11).

1.8.1 Research design

A research design is “a blueprint for conducting the study that maximizes control over factors that could interfere with the validity of the findings” (Burns & Grove 2005:211). The design guides researchers to plan and implement a study so as to achieve the set goals and is “the structures within which the study is implemented (Burns & Grove 2005:211).

Polit and Beck (2006:179) state that the purpose of a research design is to provide a plan for answering the research questions and “is a blueprint for action”. It is the overall plan that spells out the strategies that the researcher uses to develop objective and interpretive information. It is the “general plan for addressing research questions including specifications for enhancing the study's integrity” (Polit & Beck 2006:509). Green and Thorogood (2006:34) state that a research design is “...the what, how and why of data production” to answer research questions. In this study, a quantitative, descriptive and cross sectional design was used.

Quantitative research is a formal, objective and systematic process for generating information about the world. In quantitative research, evidence is gathered according to a specified plan, using formal instruments to collect the needed information (Somekh &

Lewin 2005:215). A quantitative, explorative descriptive research design was therefore chosen for this study in order to systematically collect evidence of the knowledge and awareness of TB among gold miners.

Descriptive studies provide accuracy in that they describe what exists, the frequency with which it exists, assign new meaning to a phenomenon and put information into categories. Furthermore, descriptive studies have as their main objective the portrayal of that which is being studied; be it persons, situations or groups (Burns & Grove 2001:30).

Cross-sectional studies entail the collection of data on a cross-section of the population, which may comprise the whole population or a proportion (sample) of it (WHO 2001b:17).

1.8.2 Research methodology

The research methodology entails the process of the research, including assumptions and values, strategy for the study starting from the identification of the research problem to the final plans for data collection. Research methodology serves as a rationale for research as well as criteria used for interpreting data (Burns & Grove 2001:223)

1.8.3 Population and sample

The population in a study includes all the elements, which could be objects or people, which meet the criteria in a given situation (Burns & Grove 2001:47). In addition, Polit and Beck (2006:259) describe a population as the entire aggregation of cases that meet specified criteria. The population is the entire set of individuals having some common characteristics. The accessible population comprises the individuals who conform to the eligibility criteria and are available for a particular study (Burns & Grove 2005:342).

In this study, the population consisted of various levels or categories of workers at a selected gold mine in Tanzania.

A *sample* is a subset of a population selected to participate in a study (Polit & Beck 2006:260). A convenient sample consists of the most readily available or most convenient group from the sample (Cohen, Manion & Morrison 2000:102). This method was chosen because it provided easy access to the respondents.

Sampling is the process of selecting a portion of the population to represent the entire population. Sampling refers to decision making on whether probability (random) or non-probability (non-random) sampling will be done (Polit & Beck 2004:291). The selected elements are then referred to as the sample (Polit & Beck 2004:291). According to Bryman (2004:87), the sample has to be representative of the population if one wants to be able to make generalizations about the findings from the sample to the population and similar populations.

Sample size refers to the number of elements that are included in the sample (Brink, Van der Walt & Van Rensburg 2006:135). De Vos, Strydom, Fouche and Delport (2002) suggest that “a study with an over-large sample may be deemed overly sensitive”. A large sample is therefore no guarantee of accuracy (Brink et al 2006:136). The sample size for this study consisted of one hundred workers available during the study period, which was January to May 2008 (see chapter 4).

1.8.4 Data collection

Burns and Grove (2001:49) define data collection as “the precise systematic gathering of information relevant to specific research objectives or questions”. In this study, data was collected using a structured questionnaire.

The questionnaire consisted of four sections:

Section 1: Respondents’ demographical profile

Section 2: Respondents’ knowledge, awareness and practices regarding TB

Section 3: Respondents’ understanding of TB programmes

Section 4: Respondents’ perceptions of current programmes and suggestions for enhancing TB prevention and programmes.

1.8.5 Data analysis

Data analysis is conducted to reduce, organise and give meaning to the data. Data analysis usually begins when data collection begins. The analysis techniques implemented are determined primarily by the research objectives, questions or hypothesis (Burns & Grove 1999:43). In addition, Polit and Beck (2006:352) state that statistical procedures enable researchers to organise, interpret and communicate numeric information.

In this study, a statistician analysed the data using the Statistical Package for Social Sciences (SPSS) version 14.0. The analysis included descriptive statistics, cross-tabulation and logistic regression. The results were presented in frequencies, percentages, graphs and tables.

1.8.6 Validity and reliability

Validity of a measurement instrument measures accuracy (De Vos et al 2002:166). According to De Vos et al (2002:167), validity refers to “the degree to which the instrument measures what it is supposed to be measuring”. The researcher focused on content validity, which refers to the accuracy with which an instrument measures the factors under study. Therefore, content validity was concerned with how accurately the questions elicited the information sought. The research instrument was tested for content validity by giving questionnaires to clinic staff experienced with diagnosing, management and following up of TB cases.

Reliability relates to the precision and accuracy of the instrument and refers to the consistency of the measurement result. If used on a similar group of respondents in a similar context, an instrument should yield similar results (Cohen et al 2000:117). Accurate and careful phrasing of each question to avoid ambiguity and leading respondents to particular answers ensured the reliability of the questionnaire.

1.9 DEFINITIONS OF KEY CONCEPTS

For the purposes of this study, the following key concepts are used as defined below.

- **Knowledge**

Collins English Dictionary (1991:860) defines knowledge as “the facts, feelings, or experiences known by a person or group of people; the state of knowing; awareness, consciousness, or familiarity gained by experience; specific information about a subject”.

In this study, knowledge referred to the facts the respondents had regarding the condition of TB and its treatment, and their understanding of the disease in the mining industry.

- **Awareness**

Being aware refers to “having knowledge; being cognizant of; informed of current developments” and awareness is the noun (*Collins English Dictionary* 1991:106). In addition, Kavanagh (2002:74) defines *awareness* as “having knowledge or a perception of a situation or fact; an act of becoming conscious of the challenging world a person lives in; developing feelings and thoughts about, and knowing the skills which will help a person in adapting and coping with challenges occurring in it”.

In this study, awareness refers to mine workers’ understanding of and knowledge about TB in a selected mine in Tanzania.

- **Tuberculosis (TB)**

The WHO (1994:19) defines TB as a “communicable disease of the lungs that can also affect any part of the body. It is caused by the *Mycobacterium tuberculosis* and transmission occurs by the airborne spread of infectious droplets.”

According to Ringold, Lynn and Glass (2008:464), TB is infection with *Mycobacterium tuberculosis*, a specific type of bacterium. TB infection typically occurs after repeated or prolonged exposure to the coughing of an actively infected person. Individuals with HIV infection are at particularly high risk for contracting TB due to a lowered resistance to

disease-causing organisms. TB infection can involve any organ in the body, but the lungs are the most common sites of damage.

In this study, TB is a chronic modifiable infectious bacterial disease caused by the *Mycobacterium tuberculosis*, which infects the lungs of mine workers in Tanzania.

1.10 ETHICAL CONSIDERATIONS

Ethics deals with matters of right and wrong. *Collins English Dictionary* (1991:533) defines ethics as “a social, religious, or civil code of behaviour considered correct, esp. that of a particular group, profession, or individual”. Research ethics involves protecting the rights of respondents and institutions in which research is done, and maintaining scientific integrity (Babbie & Mouton 2003:531; Burns & Grove 2005:181).

Conducting research ethically begins with identification of the topic and continues through to the end when the findings are published. A researcher’s conduct therefore requires not only expertise and diligence, but also honest and integrity (Burns & Grove 2001:34; De Vos et al 2002:24).

The researcher obtained permission to conduct the study and upheld the principles of voluntary participation, informed consent, minimisation of harm, confidentiality and anonymity.

- **Permission**

The researcher obtained permission from the Ethics Committee of the University of South Africa and from the mine where that study was conducted (see annexure A and B).

- **Voluntary participation**

The principle of voluntary participation requires that people should not be coerced into participating in research (Trochim 2006:22). Voluntary participation requires informed consent, which means that prospective research participants must be fully

informed about the procedures and risks involved in the research and must give their consent to participate. Accordingly, the researcher informed the respondents of the nature, purpose and significance of the study. The researcher stressed that participation was voluntary and that they could withdraw from the study at any time should they wish to do so.

- **Beneficence**

The principle of beneficence requires that researchers should not put participants in situations where they might be at risk of harm as a result of their participation. Harm can be defined as both physical and psychological (De Vos et al 2002:64). In this study, the risk of harm was minimal because it was non-invasive, and involved observing and interviewing the respondents.

- **Privacy**

The privacy of research participants should be ensured during the research process. Confidentiality and anonymity protect participants' privacy (Trochim 2006:22).

The researcher assured the respondents of confidentiality and anonymity. Anonymity was maintained by not recording the interviewees' names on the interview schedules, and the data collected was kept in the researcher's possession in a safe place to ensure confidentiality. Moreover, the researcher informed the respondents that the information would not be made available to anyone not directly involved in the study. Finally, the researcher emphasised the need to respond truthfully to each question.

1.11 LIMITATIONS

The study was restricted to one gold mine in Tanzania and the respondents interviewed during the study period. The findings can therefore not be generalized to other mines or areas in the country (see chapter 6).

1.12 OUTLINE OF THE STUDY

Chapter 1 introduces the background to the study, the problem, purpose and significance of the study, and the research design and methodology.

Chapter 2 describes the Health Belief Model (HBM), which formed the theoretical framework.

Chapter 3 covers the literature review.

Chapter 4 describes the research design and methodology.

Chapter 5 presents the data analysis and interpretation, and findings.

Chapter 6 concludes the study, briefly discusses its limitations, and makes recommendations for practice and further research.

1.13 CONCLUSION

This chapter briefly described Tanzania and the gold mine where the study was conducted. The researcher discussed the study problem; purpose, objectives and significance of the study, and the research methodology, including the population, sample size, sampling, data collection and data analysis. The researcher described the ethical considerations upheld and defined key terms.

Chapter 2 covers the HBM, which formed the theoretical framework for the study.

CHAPTER 2

Conceptual framework

2.1 INTRODUCTION

This chapter discusses the conceptual framework of this study as it relates to TB. A conceptual framework lays the foundation of a study and enables the researcher to discover what is known or not known about a topic of interest in order to conduct research that adds to the body of knowledge (Polit & Beck 2006:88). The researcher used the Health Belief Model (HBM) as the conceptual framework for this study because it was considered as the most suitable (Becker 1974a:293-313; Rosenstock 1974:328-335).

2.2 THE HEALTH BELIEF MODEL

A model is "...a symbolic depiction of reality and uses diagrams and symbols to represents ideas. The components of a model can guide the researcher in the research task" (Brink et al 2006:23). The HBM is one of the most widely used conceptual frameworks for understanding health behaviors and is believed to lay the foundation of this study which enabled the researcher to discover what is known or not known about the topic of interest in order to conduct research that adds to the body of knowledge (Polit & Beck 2007:88). In order to acquire deeper insight into the knowledge, attitudes, and perceptions among gold miners, the researcher used the HBM as a theoretical framework for the study (Dennill et al 1999:157; Lollis, Johnson & Antoni 1997:551).

The HBM has been thoroughly evaluated, has received much empirical support and is considered to be one of the most influential models in health promotion (Hochbaum 1956:107; Strecher & Rosenstock 1997:227). Since its inception the HBM has been regarded as a useful tool for health care professionals such as, for example, medical doctors, nurses, nutritional practitioners, psychologists, mental health professionals and researchers in the health care field to help clients and manage their illness prevention

or to address health problems. It has been used by nurses in different practice areas (Roden 2004:1).

2.2.1 The origin and development of the HBM

The HBM originated in the early 1950s by a team of social psychologists including Godfrey Hochbaum, Irwin Rosenstock and Stephen Kegels at the United States Public Health Service in an effort to explain people's widespread failure of participation in programmes and screening for diseases designed to promote preventative health behaviors (Edelman & Mandle 1995:228). The HBM as a psychological model attempted to explain and predict health behaviors including the attitudes and beliefs of individuals and groups (Broskey 2008). It was later modified to include individuals' attention and behavior related to diagnosed illness and compliance to medical regimens that were designed to improve the overall health condition include (Rosenstock 1974:328).

Stanhope and Lancaster (2001:252) state that the HBM was inspired by a study of why people did not sought free health screening programmes. It attempted to explain and predict health-related behavior from certain patterns of beliefs about the recommended health behaviors and the health problems that was intended to prevent or control TB (Nies & McEwen 2007:108). Specifically, it was the ineffectiveness of a tuberculosis screening program conducted by the United States Public Health Service in the 1950s (which offered tuberculosis screenings in mobile X-ray units, in various neighborhoods, at no charge to the recipients) which prompted development of the HBM. The lack of participation in the screenings prompted the United States Public Health Service to explore the reasons why the interventions were not being attended (Hochbaum 1958b). It was out of the research conducted by Hochbaum (1958a) that the main components of the HBM were established (Dennill et al 1999:157).

The model soon changed shape when applied to another set of problems concerning immunization and more broadly to (the variety of) people's different responses to public health measures and their uses of health services. In 2006, for example, Gillibrand and Stevenson (2006) used the extended HBM to study people with diabetes. Factors such as the locus of control, self-efficacy, the value of health and social support add value to the HBM. It was found that young people were more likely to adhere to their medial

regime when perceived benefits outweighed costs, they reported high levels of social support, had high levels of internal locus of control, high quality of life score, high levels of empowerment and good perceived metabolic control. Similar studies were conducted by Garcia and Mann (2003:347) and Ogden (2007:441).

In these wider applications, according to Becker (1974a:293), the model substituted a belief in susceptibility to a disease or health problems for the more specific belief that one could have a disease and not know it, which had been featured in Godfrey Hochbaum's original study as the most important belief accounting for seeking screening examinations.

In the mid-1970s, a monograph devoted to the wide-ranging applications of the model described its history and experience (Becker 1974b:470). This was soon followed by a review of standardized scales for measuring its several dimensions (Maiman, Becker & Kirscht 1977:215). The model continued to evolve in the 1980s largely at the hands of Marshall Becker (Becker 1974b:329-470) at the John Hopkins University and later at the University of Michigan School. Since then, the HBM has been adapted to explore a variety of long- and short-term health behaviors, most prominently sexual risk behaviors (Strecher & Rosenstock 1997) and the transmission of HIV/AIDS (Beaudoin 2009; Rosenstock, Strecher & Bekker 1994:5).

The HBM related largely to the cognitive factors predisposing a person to a health behavior, concluding with a belief in one's self-efficacy for the behavior. The model leaves much still to be explained by factors enabling and reinforcing one's behavior, and these factors become increasingly important when the model is used to explain and predict more complex lifestyle behaviors that need to be maintained over a lifetime (Campbell 2004:32).

A systematic, quantitative review of studies that had applied the HBM among adults in the late 1980s found it lacking in consistent predictive power for many behaviors, probably because its scope is limited to predisposing factors (Gillam 1991:510; Harrison et al 1992:115; Mullen, Hersey & Iverson 1987:973-975).

Nevertheless, the HBM continues to be the most frequent applied model in published descriptions of programmes and studies in health education and health behavior in the

early 1990s and is still a valuable guide to practitioners in planning the communication component of health education programmes (Collins & Benedict 2006:45; Ho 2002).

Today, the HBM is considered one of the most influential models in health promotion and a very useful tool for nurses to help clients' assess and manage their illness prevention or prevent health problems (Roden 2004:1; Strecher & Rosenstock 1997).

2.2.2 Core assumptions and statements

According to Dennill et al (1999:156), Conner and Norman (1996) and Campbell 2004:2, the HBM is based on the understanding that a person is motivated and therefore will take a health-related action (i.e. use prescribed medication), to promote or prevent diseases if that person:

- Feels that a negative condition such as TB can be avoided.
- Regard the suggested health intervention as valued to maintain specific behaviors.
- Acknowledge that certain barriers must be overcome to institute and maintain specific behaviors.
- Have positive expectations that by taking the recommended action a disease such as TB can be prevented by for example maintaining a healthy lifestyle, immunization and use personal protective equipment.
- Believes that successful action can be taken to prevent and to cure a disease for example early recognition of the signs and symptoms, timely medical intervention and taking of prescribed medication.
- Regard the suggested health intervention as being of value.
- Believes that the effectiveness of the treatment is worth the cost.

2.2.3 Scope and application of the HBM

According to Janz and Becker (1984:36) and Abraham, Norman and Connor (2000:3), the HBM can be applied to a broader range of health behaviors and subject populations. Three broad areas can be identified, namely:

- Preventative health behaviors, which include health promoting (e.g. diet, exercise), immunization and contraceptive practices.
- Sick role behaviors, which refer to compliance with recommended medical regimens, usually following professional diagnosis or illness.
- Clinic use, which refer to visits to a physician for a variety of reasons.

According to Rosenstock (1974:328), the HBM itself has not changed much since its inception despite the later addition of more components and more in-depth descriptions of what is actually being monitored and or measured with those components. Among the additions were variables such as 'cues to action' and 'modifying factors'. Cues to action or triggers instigate preventive health activity, where levels of susceptibility and severity provide the stimulus to act and the perception of barriers offer a preferred mode of action. Modifying factors can be demographic, socio-psychological and structural, and serve to condition an individual's perceptions about perceived benefits of preventive health actions (Rosenstock 1974:329).

According to the HBM (Edelman & Mandle 1995:228; Rosenstock 1974:332), individuals' intentions to participate in a preventive health behavior are determined by five main factors, namely:

- *Perceived susceptibility*, i.e. the person's subjective perceptions of the likelihood of experiencing a specific disease or condition that would adversely affect their health risk. A person believes that his or her health is in jeopardy. For the behavior of seeking a screening test or examination for an asymptomatic disease such as TB, hypertension or early cancer, the person must believe that he or she can have the disease yet not feel symptoms. This constellation of beliefs was later referred to as "belief in susceptibility". People often deny the possibility of disease susceptibility however others feel that there is a danger that they will experience an adverse condition or contract a disease.

- *Perceived severity or perceived seriousness*, i.e. the person's perceptions regarding the effects the disease or condition might have. The person perceives the "potential seriousness" of the condition in terms of pain or discomfort, time lost from work, economic difficulties or other outcomes. Perceived severity could be those opinions pertaining to the seriousness of contracting an illness or suffer the consequences which arise if left unattended.
- *Perceived benefits*, i.e. the person's perceptions of the gains associated with performing the screening behavior. According to Edelman and Mandle (1995:228), on assessing the circumstances, the person believes that benefits stemming from the recommended behavior outweigh the costs and inconveniences and it is indeed possible and within his grasp. The set of beliefs is not equivalent to actual rewards and barriers (reinforcing factors). In the HBM these are "perceived" or "anticipated" benefits and costs (predisposing factors).
- *Perceived barriers*, i.e. the person's perceptions of impediments associated with performing the behavior. The person perceives specific reinforcing factors which may lead to noncompliance. Perceived barriers explain one's beliefs about the tangible and psychological "costs" of the advised action. The potential negative aspects of certain health actions or perceived barriers may act as an obstacle in taking the recommended treatment.

Cues to action; these include a diverse range of triggers, such as perception of symptoms, social influence and health education campaigns. The person receives a "cue to action" or a precipitating force that makes the person feel the need to take action. Cues to action are considered a component in the latest variations of the HBM Hochbaum (1958b) noted that there could possibly be cues such as environmental or bodily events that could potentiate readiness to take action. There have been very few organized and systematic studies regarding the integration of cues to action within the HBM which is evident in the following statement: "Unfortunately, few HBM studies have attempted to assess the contributions of 'cues' to predicting health actions" (Janz & Becker 1984:3). Readiness to take action can be influenced by external factors such as mass media, campaigns, reminders from health care professionals, newspapers or examples set by the illness of family members.

2.3 COMPONENTS OF HEALTH BELIEF MODEL APPLIED TO TB

The HBM is divided into three major components, namely individual perceptions, modifying factors and variables affecting the likelihood of initiating action. Figure 2.1 depicts the variables and relationships in the HBM and figure 2.2 depicts the HBM in relation to TB. The discussion is given under 2.3.1.

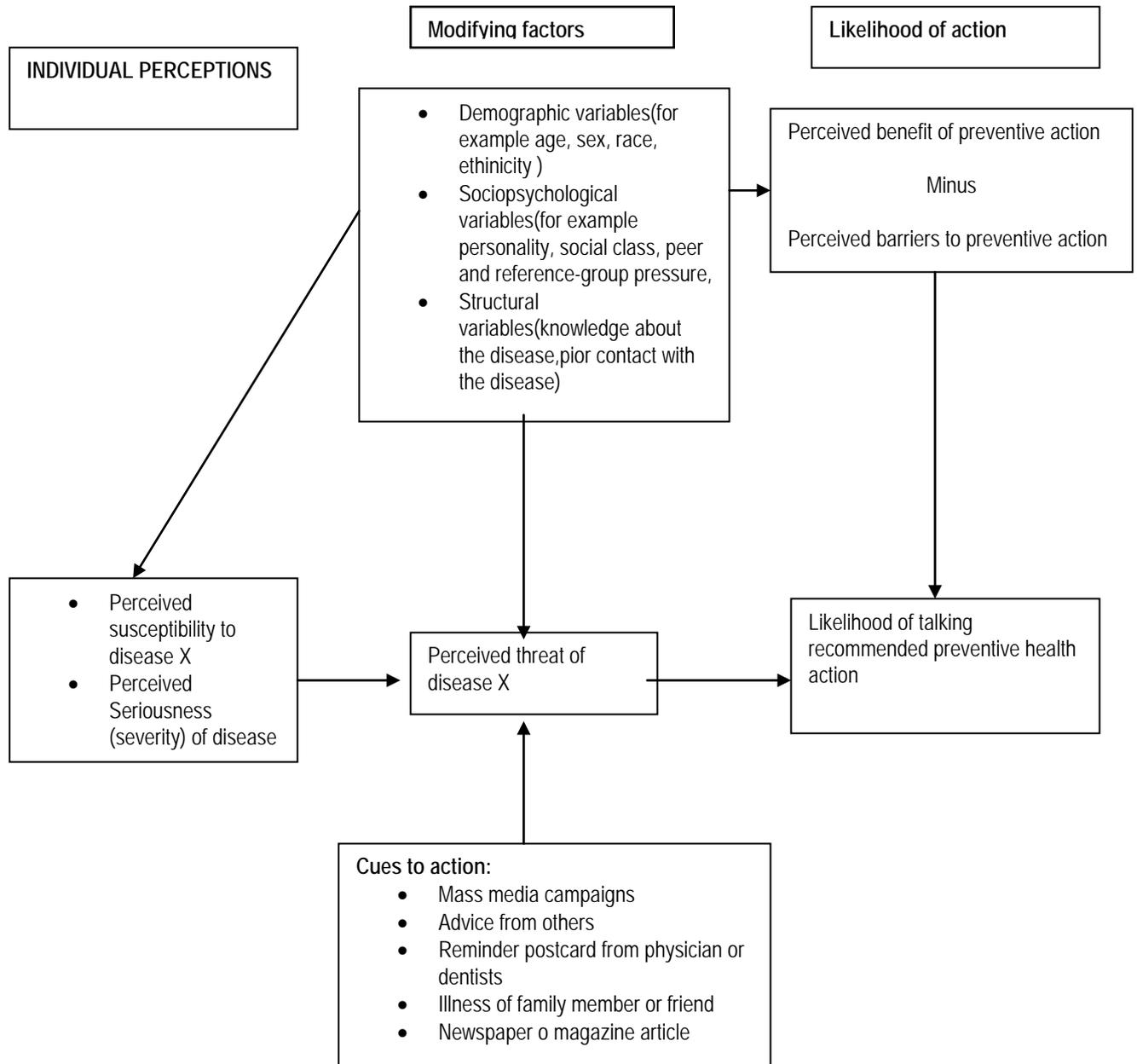


Figure 2.1 Variables and relationships in the HBM (Cookfair 1991:72)

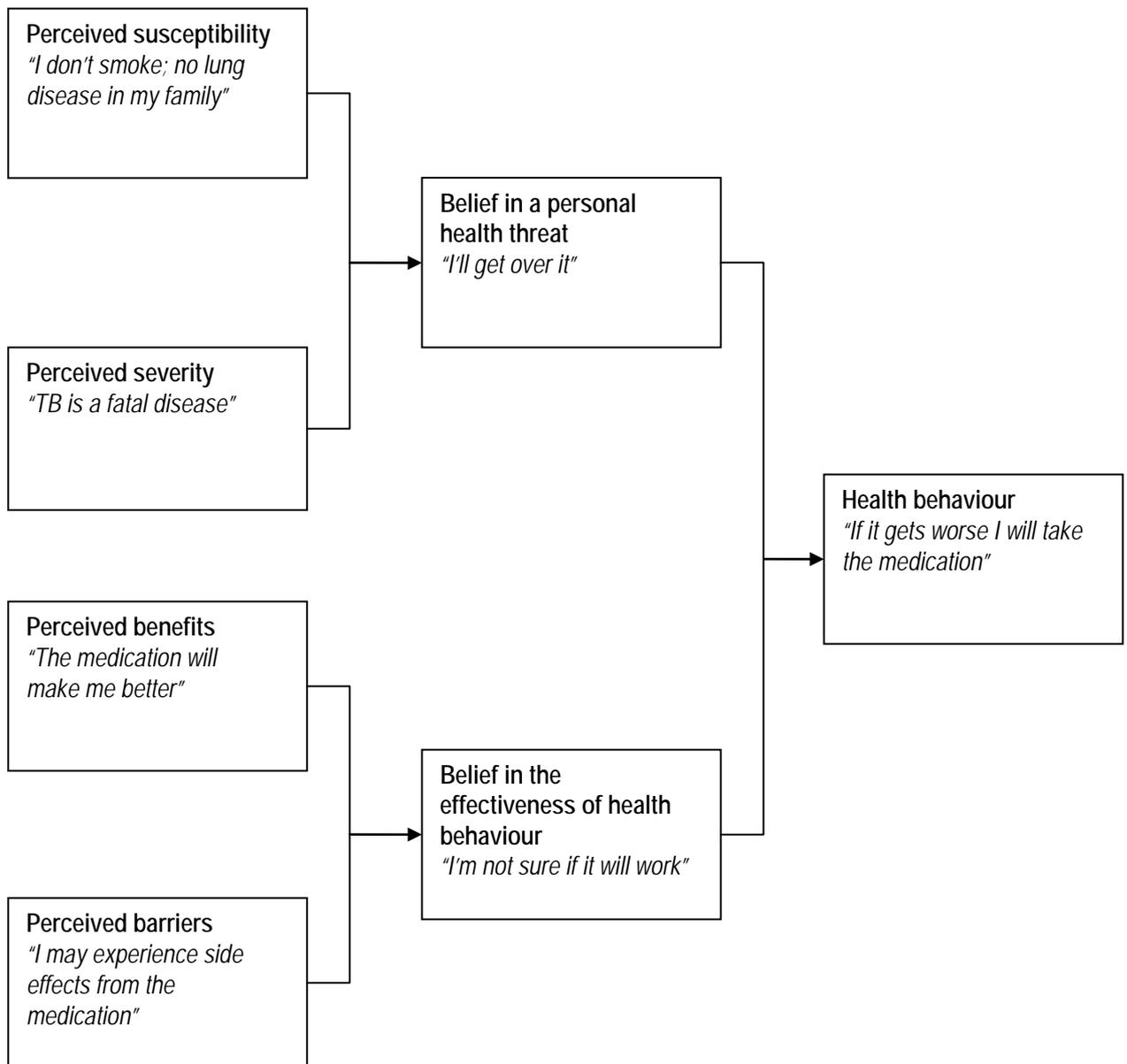


Figure 2.2 The Health Belief Model in relation to tuberculosis

(Source: Munro, Lewin, Swart & Volmink 2007:104)

2.3.1 Individuals' perceptions

An individual's risk perception is a "mental process whereby the individual organizes and interprets knowledge to determine the risk that he or she is exposed to (Bergh & Theron 1999:166). According to Salazar (1991:128-130), knowledge therefore has an influence on perceptions, which in turn enables and individual to recognize and interpret events in the environments among the workers depends on the following:

- Perceived risk of infection
- Perceived severity of Infection
- Perceived benefits of the prevention of infection
- Perceived barrier to prevent infection
- Perceived individual ability to prevent infection
- Cues for action

2.3.1.1 Perceived risk of TB infection

In the context of the HBM, perceived risk refers to persons' beliefs in the possibility of contracting disease (Edelman & Mandle 1995:228). Workers in mining industries are "at risk" as working in a TB endemic area due to exposure to a dust environment. There is a need to adequately and correctly disseminate health information to workers about TB including the route of transmission in order to increase their awareness of vulnerability to contracting TB infection. This may influence their decision to engage in preventive behavior. Personal risk or susceptibility is one of the more powerfully perceptions in promoting people to adopt healthier behavior. If people believe that they are at risk of a disease, they are more likely to act responsible to prevent a disease, such as wearing a dust masks when working in a dust area (De Sousa 2008). If people believe that they are not at risk or have a low risk of susceptibility, they are more likely to engage in unhealthy behavior (Salazar 1991:130; Mullen et al 1987:973).

When the perception of susceptibility is combined with seriousness, it results in perceived threat (Rosenstock 1966:96). If the perception of threat is to a serious disease for which there is a real risk, behavior often changes. In TB the chief causal agent is the tubercle bacillus *Mycobacterium tuberculosis*, and occasionally *Mycobacterium bovis* and *Mycobacterium africanum* (Ait-Khaled & Enarson 2003:3). In a few cases, the

bacillus is transmitted to humans from infected cows through drinking non-sterilized milk. In Germany in 2001 after an outbreak of bovine spongiform encephalitis, better known as “mad cow disease”, people feared contracting this disease through eating beef. The perception of threat of was one factor related to declining meat consumption in Europe. People changed their behaviour based on the perception of threat of a fatal disease (Ait-Khaled & Enarson 2003:3).

2.3.1.2 Perceived severity of the TB infection

The construct of perceived seriousness refers to an individual’s belief about the seriousness or severity of a disease (Rosenstock 1974:328). While perception of seriousness is often based on medical information or knowledge, it may also come from people’s beliefs about the difficulties a disease would create or effect it would have on their life in general. For example, a person may argue that most people get influenza, which for most is a minor ailment. However if a person who suffers from asthma also contracts flu, it can have serious consequences thus developing into a serious disease (Becker 1974a; Conner & Norman 1996; Glanz, Rimer & Lewis 2002).

According to Rosenstock (1974:329), perceived severity of TB infection refers to how seriously individuals view the consequences of a disease (e.g.) or an infection both from a medical and social standpoint.

2.3.1.3 Perceived benefits of the prevention of TB infection

The construct of perceived benefits refers to a person’s perception of the value or usefulness of a new behaviour in decreasing the risk of developing a disease. People tend to adopt healthier behaviours when they believe the new behaviours will decrease their chances of developing a disease (Eisen, Zellman & McAlister 1992:249; Mattson 1999).

Dennill et al (1999:157) describe the perceived benefit of taking action to prevent disease as “people’s belief in the efficacy of the advised action to reduce the risk or seriousness of impact”. In order to perceive any benefit, then, people need information regarding what action to take to prevent TB infection, how to take the action, as well as where and when to take the advised action.

According to Rosenstock (1974:329), perceived benefits play an important role in the adoption of secondary prevention behaviours. For example such as screening workers who report for periodic medical examinations without coercing them to do so.

2.3.1.4 Perceived barriers to prevent TB Infection

Since change is not something that comes easily to most people, the last construct of the HBM addresses the issue of perceived barriers to change. This is individuals' own evaluation of the obstacles in the way of their adopting new behaviour. Of all the constructs, perceived barriers are the most significant in determining behaviour change (Robinson, Bielałowicz, Rodgers, Wong & Konzelmann 2008:44). This enables the barriers to be overcome and the new behaviour adopted. People usually undertake a cost-benefit analysis to weigh up a beneficial action and its opposing limitations such as costs, side effects, time, inconvenience and effort of taking preventive measures (Becker 1974b:324). Health workers need to identify and reduce the barriers that prevent people from taking measures to prevent TB infection (Jamtsho 2008).

Xu, Fochsen, Xiua, Thorsonb, Kemp and Jiang (2003) state that people often perceive that they cannot afford the cost of TB care even where services were subsidized. Others perceive barriers such as wrong diagnosis by health care professionals (Moschetta, Bhavarju, Beneson, DeLuca & Fraire 2003), the belief that symptoms would resolve and others have excuses which are often not valid.

Moschetta et al (2003) also confirms that cultural beliefs and issues heavily impact perceptions of TB. This leads to gaps in knowledge about the mechanism of TB thereby having implications for treatment adherence.

2.3.1.5 Cues to action to prevent TB infection

Cues to action are events, people, or things that move people to change their behaviour. Examples include illness of a family member, media reports, mass media campaigns, advice from others, reminder postcards from a health care provider, and health warning labels on products (Ronald 2008). Hearing TV or radio news stories

about food-borne illness and reading the safe handling instructions on packages of raw meat and poultry are cues to action associated with safer food handling behaviours (Hanson & Benedict 2002:S25). With regard to health promotion and the prevention of TB, Jaramillo (2001:68) states that the impact of case finding through mass media carried out in Cali produced a huge increase in the demand for direct smears and in the number of new cases of the transmissible forms of TB.

Cues to action can also be internal, such as bodily events (e.g., feeling of sickness brought on by unhealthy behaviour). Though internal cues are not as easily manipulated by an intervention, cues could be created that remind individuals about an unhealthy condition in a way that might address the internal cues (e.g., "You know that persistent cough...?"). Internal and external cues to action could create a greater level of consciousness, where individuals would feel the need to think through all factors and variables related to their unhealthy behaviour and thus possibly move forward in the stages of change towards behaviour change (Atreja, Bellam & Levy 2005; Gillam 1991:510; Gillibrand & Stevenson 2006:155-156; Robinson et al 2008:44).

The combined levels of susceptibility and severity provide the energy or force to act and the perception of benefits (fewer barriers) provides a preferred path of action (Rosenstock 1974:328).

2.3.1.6 Self-efficacy to prevent TB infection

Self-efficacy is a relatively new concept added to the HBM and it refers to a persons' confidence in his or her ability to successfully perform the recommended action (Campbell 2004:28; Pender 1996:36).

Self-efficacy is the process by which "people process, weighs, and integrates diverse sources of information concerning their capability, and they regulate their choice behaviour and effort expenditure accordingly" (Bandura 1977:212). Efficacy or efficaciousness is the ability to produce an intended result and self-efficacy is individuals' confidence in their ability to take action (Glanz et al 2002). In addition, Kloeblen and Batish (1999:327) state that misunderstanding and lack of knowledge influence the decisions of people.

2.3.1.7 Summary of the components of the HBM

In table 2.1 a summary is given of the components of the HBM and its application as discussed above (see section 2.3) to enable the reader to understand and apply the theory of the HBM at a glance.

Table 2.1 The components of the HBM

Concept	Definition	Application
Perceived Susceptibility	One's opinion of chances of getting a condition	Define population(s) at risk, risk levels; personalize risk based on a person's features or behaviour; heighten perceived susceptibility if too low.
Perceived Severity	One's opinion of how serious a condition and its consequences are	Specify consequences of the risk and the condition.
Perceived Benefits	One's belief in the efficacy of the advised action to reduce risk or seriousness of impact	Define action to take; how, where, when; clarify the positive effects to be expected.
Perceived Barriers	One's opinion of the tangible and psychological costs of the advised action	Identify and reduce barriers through reassurance, incentives, assistance.
Cues to Action	Strategies to activate "readiness"	Provide how-to information, promote awareness, reminders.
Self-Efficacy	Confidence in one's ability to take action	Provide training, guidance in performing action.

Source: Glanz et al 2002:52

2.3.2 Modifying factors

According to the HBM, demographic, socio-psychological and structural variables are modifying factors in the perceived threat of a disease (Dennill et al 1999:157; Hounton, Carabin & Henderson 2005:8).

The four major constructs of perception are modified by other variables, such as culture, education level, past experience, skills, and motivation. These are individuals' characteristics that influence their personal perception (Grizzell 2003).

2.3.2.1 Demographic variables

Demographic variables such as age and gender have an effect on the perceived individual threat to illness such as TB and the ability to avoid risk behaviour (Dennill et al 1999:157; Diwan & Thorson 1999:1000-1001). People's developmental stage influences their risk behaviour in relation to TB infection. Workers are among the "at risk" group. Holmes, Hausler and Nunn (1998:96) found that more men than women are infected with TB. Men are also more likely to die of the disease. In most countries in Africa, notification rates are higher for men than for women (Holmes et al 1998:97).

Older adults are at greater risk of TB because normal aging or illness may weaken their immune systems. They are also more likely to live in nursing homes, where mini-epidemics of TB can occur (Hanson & Benedict 2002:S25). However, 30% of TB cases among 15 to 49-year-old adults in sub-Saharan Africa are attributable to HIV (WHO 2001c:287). In a peri-urban community in South Africa, Lawn et al (2006:1046) found that most of the increasing burden of TB occurred among people between 20 and 49 years old. Another example of how demographic variables may influence TB, is that between 2004 and 2006, 10% of TB cases in Thailand occurred in children under 15 years old Lolekha, Anuwatnonthakate, Nateniyom, Sumnapun, Yamada, Wanpen Wattanaamornkiat, Sattayawuthipong, Charusuntonsri, Sanguanwongse, Wells & Varma 2008:94).

2.3.2.2 Socio-psychological variables

Socio-psychological variables, such as personality, social class, and peer pressure, have an influence on an individual's perception of an illness and the likelihood of taking preventive action (Dennill et al 1999:156).

2.3.2.3 Structural variables

People's perceptions and likelihood of taking action can be influenced by structural variables such as knowledge about and previous contact with the disease (Dennill et al 1999:157). A risk perception of TB can make people feel vulnerable to TB infection and avoid engaging in risky behaviour. However, fear of TB does not necessarily lead to a high perception of risk of TB infection (Dennill et al 1999:157).

Relevant knowledge and positive perceptions are predisposing factors for behavioural change, making people more likely to seek healthcare and medical treatment (Dennill et al 1999:157). Lack of knowledge about TB limits people's ability to prevent its spread and seek early treatment. Individual perceptions related to such factors as personal susceptibility, severity, benefits and barriers represent important predictors of preventive TB behaviour (Becker 1974b:324).

People's knowledge, attitudes, and perceptions with respect to health in general and specific illness, such as TB, influence their behaviour (Petrovici & Ritson 2006:222). These factors can influence health seeking, understanding the diagnosis and treatment, treatment initiation and adherence, and general interactions with health care providers. Unless people are knowledgeable they will not get the treatment and the control of TB will be almost impossible, as the main strategy for TB control globally relies on self-presentation of adults from the community and sputum smear for diagnosis (Kasse, Jasseh, Corrah, Donkor, Antonnio, Jallow, Adegbola & Hill 2006:143).

Knowledge and perceptions regarding TB represent a vital preliminary step in TB health education programme planning in order to dispel misconceptions and improve both the knowledge and levels of awareness of TB within society (Alcon 2005; Robillard, DeLuca & Walton 2002).

Relevant knowledge and positive perceptions are predisposing factors for behavioural change. People with better knowledge of tuberculosis are more likely to seek healthcare and medical treatment (Mangesho, Shayo, Makunde, Keto, Mandara, Kamugisha, Kilale & Ishengoma 2007:38-40).

Lack of knowledge about TB limits people's ability to prevent its spread and seek early treatment. Individual perceptions related to such factors as personal susceptibility, severity, benefits and barriers represent important predictors of preventive TB behaviour. High-risk populations take TB screening based on perceptions of personal susceptibility to TB, degree of disease severity, potential screening benefits and barriers to the implementation of related screening examination (Mangesho et al 2007:42).

2.3.3 Variables affecting the likelihood of taking action to avoid risky behaviour

Variables affecting the likelihood of taking action to prevent a disease are influenced by an individual's perception of the severity and the magnitude of the disease and to what extent the individual feels at risk of contracting the disease (Dennill et al 1999:157). This is viewed together with the cost-benefit analysis of taking preventive action (Dennill et al 1999:157).

2.3.3.1 Sources of information on TB infection accessible to workers

Health communication is essential in relation to public health interventions (Strecher & Rosenstock 1997:41). Health communication according to De Souza (2008), is a relatively new area within the discipline of communication. Effective health communication means that a person must understand what is being communicated. Communication therefore involves the ability to access information, to be able to read, to understand what is being communicated and to act on health information (Neuhauser 2008:6). De Souza (2008) states that communication is the "process of understanding and sharing meaning" but that health education is the "process through which we understand and share meanings related to physical, social and mental health and illness".

2.3.3.2 Efficacy expectations in health communication

Efficacy expectations were an important addition to the HBM. These efficacy expectations come from four major sources, namely personal accomplishments,

vicarious experience, verbal persuasion, and physiological state (Strecher, De Vellis, Becker & Rosenstock 1986:73).

Personal accomplishment refers to the experience of personal mastery over a previously feared task or activity.

- *Vicarious experience* refers to the learning that occurs as a result of observation of events or persons.
- *Verbal persuasion* consists of the actual conversation concerned with trying to influence someone to change an unhealthy or adopt a healthy behaviour.
- *Physiological state* is concerned with the personal arousal felt in relation to certain behaviour (Strecher et al 1986:73-75).

From the above, it can be deduced that at least two of the defined self-efficacy expectation sources come from variables that are directly related to strategic health communication and therefore the component, cues to action: vicarious experience, and verbal persuasion. In these cases, health communication could both create situations where others can observe more healthy behaviours being practised (perhaps in the form of a health fair), and can directly engage individuals in conversation designed to persuade someone to adopt a more healthy behaviour (perhaps also in the health fair) (Conner & Norman 1996; Staples, Hurland & Higgins 1998).

2.3.3.3.1 *Television*

Television is a powerful tool to disseminate information on TB. The means to acquire a television set are within reach of most workers. Mass media messages can influence the way people understand the disease and the steps they need to take to prevent contracting or spreading this disease. Sokol (2003) states that “media is in and of itself, a channel of communication or medium. In this case, it is used as an audience because of its power to broadly communicate public health messages to a wide array of audiences”.

2.3.3.3.2 *Radio*

Radio is the main source of information for many, and a valuable means to disseminate information.

However specific actions to pursue when writing TB stories are offered as suggested by London (2008) include the following:

- Review your country's research - What are the key issues around TB in your country? Does local research reflect issues raised by research in other countries? Are there debates/ conflicting results in different studies?
- Interview a researcher, and ask questions such as: "Who is funding research? Is it independent of vested interests?"
- Highlight what research still needs to be done. What questions are not being asked? What is being done to implement research findings?
- Carry out a profile of TB in your country (based on research). What is the extent of TB? Who is most vulnerable? How do people get diagnosed and treated? Who provides that treatment? What proportion of cases is undiagnosed? What stops people getting treated? What problems need solving? Are there any success stories?
- Do a survey of ordinary people's knowledge about and attitudes toward TB. What about politicians' or decision-makers' knowledge? Are there common myths or stigmas?
- Interview people with TB (while being sensitive to issues of confidentiality). Tell their stories: what is the human cost? What are the messages for the authorities? Are there any positive stories? Profile someone well-known who has overcome TB (London 2008).

2.3.3.3.3 *Newspapers and magazines*

Although costly for many, newspapers and magazines convey powerful messages and are generally regarded as good sources of information. Health communications such as newspapers and magazines can be used to share information on TB with the general public, local communities, patients and contacts, as well as providers.

Research has demonstrated those misconceptions about TB and the stigma associated with the disease still abound, suggesting the continuing need to increase knowledge and awareness of TB through effective channels of communication. Further research to better understand informational needs, identify appropriate and effective media for channelling information, and testing health messages related to many aspects of TB for a variety of audiences will enhance the effectiveness of TB control efforts and hopefully mitigate the stigma associated with TB (National Centre for HIV/AIDS, Viral Hepatitis, Sexually Transmitted Diseases and TB Prevention 2008).

2.4 RISK BEHAVIOUR REGARDING TB INFECTION

Health care-seeking behaviour for TB includes the recognition of TB-related symptoms, presentation to health facilities and/or alternative medical resources (e.g., family and traditional/community healers), and adherence to effective treatment regimens and treatment monitoring (Xu, Focher, Xiua, Thorsonb, Kemp & Jiang 2004:139). However, individual factors, such as knowledge, attitudes, gender, ethnicity, income, and education, in addition to health service barriers, including accessibility and acceptability of care, cost of services, and quality of care, often delay or prevent a person from seeking TB care and treatment (Moschetta et al 2003; Munro et al 2007:104).

2.4.1 Adherence to treatment

The problem of poor adherence to treatment has been extensively researched by applying the HBM. However, according to Atreja et al (2005), the rates of non-adherence have not changed much in the past three decades. Health care providers play a unique and important role in assisting patients to adhere to treatment and to change behaviour. Atreja et al (2005) applied the mnemonic "SIMPLE" to illustrate behaviour. These include:

- Simplifying regimen characteristics
- Imparting knowledge

- Modifying patient beliefs
- Patient communication
- Leaving the bias
- Evaluating adherence

Non-adherence is not limited to medication intake alone, but it can take various other forms such as failure to keep appointments and to follow the recommended preventative health practices. Non-adherence, according to Atreja et al (2005), therefore go far beyond the financial aspects of medication and treatment.

Treatment regimens for TB include providing the safest, most effective therapy in the shortest period of time and ensuring adherence to prescribed regimens. The major determinant of a successful treatment outcome is patient adherence to the prescribed drug regimen. Non-adherence can lead to inadequate treatment, which can result in relapse, continued infection, and the development of drug resistance (Gelmanova, Keshavjee, Golubchikova, Berezina, Stelis, Yanova, Atwood & Murray 2007:703).

Directly Observed Treatment Short Course (DOTS) and self-administered therapy are two strategies commonly used in TB control. DOTS is one of the most cost effective of all health interventions, more cost effective than self-administered treatment, and currently recommended for all TB patients (WHO 2004:8). In addition, Bock, Sales, Rogers and De Voe (2001:96-98) found the use of incentives and enablers also enhanced treatment adherence.

2.4.2 Worker/patient satisfaction

Worker/patient satisfaction is how individuals regard the health care services or the manner in which health care providers deliver the services as useful, effective, or beneficial. Satisfaction is often based on worker expectations of care and the self-assessment of their experiences. Worker satisfaction may play a major role in their behaviours. If workers are dissatisfied with the relationship with their provider or with the clinical setting, they are far less likely to adhere to medications, keeping appointments, and identifying contacts (Rumman, Sabra, Bakri, Seita & Bassili 2008:545). Worker/patient satisfaction can be increased with effective worker/patient-

provider communication and development of a trusting relationship (National Centre for HIV/AIDS, Viral Hepatitis, Sexually Transmitted Diseases and TB Prevention 2008).

2.5 STRATEGIES FOR THE PREVENTION OF TB INFECTION

The TB organism *Mycobacterium tuberculosis*, also known as the *tubercle bacillus*, is transmitted primarily through the air by persons with TB of the lung (pulmonary TB) when they cough. Persons who share the same air with an infectious person for long periods are at risk of becoming infected. This includes persons living in the same household with the infectious person and those who travel in the same vehicle. Most persons who become infected usually develop a positive TB skin test, but remain asymptomatic and are not infectious (Hattingh et al 2008:275).

2.5.1 Prevention and control

Control of TB implies a reduction in the number of cases that occur each year within a community or population. The core of TB care and control is accurate diagnosis and effective treatment. Any clinician providing TB services to individuals is therefore assuming an important public health function as well as providing individual patient care (Migliori, Hopewell, Blasi, Spanevello & Raviglione 2006:688).

2.5.2 Diagnosis

Delay in TB diagnosis is common in Africa, due to patient- or provider-related factors, among other things. Patient-related factors include stigma of the disease, lack of information, dissatisfaction with the treatment and its delivery, and inaccessibility of treatment (Thomas 2002:371). Provider-related diagnostic delays are related to health care providers' knowledge, awareness and skills, and inadequate health infrastructure (Thomas 2002:380).

Migliori et al (2006:690) list the following standards for diagnosis:

- Patients must be given instructions on treatment.
- All persons with an otherwise unexplained productive cough lasting two to three weeks or longer should be evaluated for TB.

- All patients (adults, adolescents, and children who are capable of producing sputum) suspected of having pulmonary TB should have at least two, preferably three, sputum specimens obtained for microscopic examination. Where possible, at least one early morning specimen should be obtained
- All patients with chest radiographic findings suggestive of TB should have sputum specimens submitted for microbiological examination.

Pulmonary TB should be suspected in persons with a productive, prolonged cough (longer than 2 weeks in duration). Other common symptoms of TB include fever, chills, night sweats, fatigue, loss of appetite, weight loss, and, occasionally, haemoptysis (coughing up blood) (Bonsu, Asamoah & Bonso-Bruce 2003:7). Persons with suspected pulmonary TB should receive an immediate evaluation that includes a medical history and physical examination, chest X-ray, Mantoux tuberculin test, at least three sputum specimens (collected on separate days) for acid-fast bacilli (AFB) smear, culture and drug susceptibility testing, and HIV-antibody counselling and testing (Bonsu et al 2003:7). If the clinician confirms or suspects TB as a result of this examination, the local health authorities and the company (i.e., the mine) are notified so that appropriate examination of contacts can be initiated (Hattingh et al 2008:277).

2.5 LIMITATIONS OF HEALTH BELIEF MODEL

The HBM places the burden of action exclusively on the client. It assumes that only those clients who have distorted or negative perceptions of the specified disease or recommended health action will fail to act, this model focuses the nurse energy on interventions designed to modify the clients' perceptions (Nies & McEwen 2007:42-43). The HBM may effectively promote behavior change by altering patients perspective, but it does not acknowledge the health professionals responsibility to reduce or ameliorate health care barriers .The model reflects the type of theoretical perspective that dominate nursing education and health behavior for many years (Nies & McEwen 2007:43).

According to Roden (2004:3), other criticisms have been leveled at the HBM, including its social psychology connections; the assumption that individuals undertaking health behaviors do so in a rational or conscious way.

2.6 CONCLUSION

A conceptual framework serves as a foundation on which a study is based and enables a researcher to discover what is known or not known about the topic of interest in order to conduct research that adds to the body of knowledge. In this chapter an overview was given of the components of the HBM and its application to TB in the community.

In chapter 3, a more in-depth study of TB is constructed with specific reference to the application thereof in the mining industry.

CHAPTER 3

Literature review

3.1 INTRODUCTION

The researcher used the HBM as a theoretical framework for this study which was described in chapter 2 and contains the history and components of the HBM and its application to TB. This chapter discusses the literature review on TB, including the background and history, the description, treatment and prevention of the disease which can be added to the knowledge, awareness and practices regarding TB and the programmes related to TB control.

Researchers undertake a literature review to comprehend and extend their knowledge of the phenomenon under study (Polit & Beck 2007:105). According to De Vos et al (2002:127), a literature review is aimed at contributing to a clearer understanding of the nature and meaning of the problem under study.

Babbie and Mouton (2003:87) state that a review of existing literature is important to

- Ensure that previous studies are not duplicated.
- Discover the most recent and authoritative theory on the subject.
- Find out the most widely accepted empirical findings in the field of study.
- Identify the available instrumentation that has proven validity and reliability.

The literature review assisted the researcher in investigating the knowledge, awareness and practices regarding TB at a selected gold mine in Tanzania in order to try to close the gap on the paucity of knowledge in this area of public health.

3.2 OVERVIEW OF TB

As an introduction to TB, a short history and description of the main aspects of this disease, feared by so many, is provided to orientate the reader to the topic.

3.2.1 Historical background

Palomino, Leao and Portaels (2007) state that the *Mycobacterium* originated more than 150 million years ago and that in East Africa an early progenitor of *Mycobacterium tuberculosis*, about three million years ago. The more modern progenitor of TB seems to have originated from a common progenitor about 15,000-35,000 years ago (Gutierrez, Brisse & Brosch 2005:e5). According to Schoenstadt, (2008), TB is believed to have been present in humans for thousands of years. Evidence, according to the National Institute of Allergy and Infectious Diseases (2009), tubercular decay has been found in the spines of Egyptian, Andean, Indian and Chinese mummies thousands of years old and in remains of similar mummies found in Greece and Imperial Rome. Schoenstadt (2008) remarks that even in prehistoric humans, dated back to 4000 years BC, the evidence has led to the belief that TB is indeed a disease that can be dated back to antiquity. The term *phthisis* (consumption, to waste away), appeared first in Greek literature round about 450BC when it was described by Hippocrates as the most wide spread disease of all times, appearing in young adults and always fatal. Due to the variety of symptoms with which TB presents, it was not identified as a unified disease until the 1820s and was not named “tuberculosis” until 1839 by Schonlein (Iseman 2002:87S). Patients were advised to rest, exercise, eat or abstain from food, to travel to the mountains or to live underground to cure the disease.

In 1854, Herman Bremer, a TB sufferer proposed that TB was a curable disease after being cured by living in the Himalayas. He was the father of the development of sanatoriums for TB sufferers, a place where patients were isolated, could get fresh air, were forced to rest and strengthening the body’s defences through a healthy and nutritional diet (Palomino et al 2007; Schoenstadt 2008).

During the 17th century, exact pathological and anatomical descriptions of TB began to appear. Many famous operas such as La Boheme and Opera Medico were written to illustrate this elusive disease. However, in March 1882, Robert Koch delivered his famous presentation invented new methods of obtaining pure cultures of bacteria and

that when injected by the bacteria, animals developed typical lesions of the disease thereby proving that TB was caused by bacteria (Schoenstadt 2008).

Since these antique times, scientific advances, including the discovery of new drugs, such as Streptomycin and para-aminosalicylic acid, as well as the Bacille Calmette-Guerin (BCG) vaccine caused TB to lessen its grip on mankind during some periods in history. However, TB has never let go (Iseman 2002:87S). Today TB remains one of the leading infections of the modern world, causing the death and debilitation of millions of people. Emerging drug-resistant strains of the disease are presenting a new challenge in the ever-changing battle to control and prevent the disease (National Institute of Allergy and Infectious Diseases 2009).

TB was recognised as an important health hazard shortly after gold mining started in Africa in the 1890s. Miners for the South African mines were recruited from various African countries for short contract periods from six to nine months and often stayed at home for extended periods between contracts (Guild et al 2001:155). The high incidence of deaths due to TB led to an enquiry in 1912 and it was found that overcrowding, poor diet and poor working conditions were important factors contributing to TB in miners. Following recommendations of this investigation, TB was classified as a compensatable disease and the relevant Acts were amended and TB has become a notifyable disease.

TB is still today, a highly feared disease that affects, debilitates, and impoverishes large sections of the population and continues to ravage especially the developing world (WHO 2002a:3). TB is the biggest infectious disease among young people and adults. In 1993, the WHO declared TB a global emergency and promoted Directly Observed Treatment Short-course (DOTS). Dr Karel Styblo of the International Union against TB and Lung Disease pioneered the development of DOTS, a model of TB control, based on a managerial approach to case finding, follow-up and treatment (Toman 2004:99). An effective DOTS system would increase the case detection rate and cure rates, reduce the default rate, and thus increase compliance with the TB treatment. This would ultimately reduce the burden of the disease, and thus significantly reduce its public health importance. DOTS is a simple, cost-effective and reliable method (Toman 2004:99).

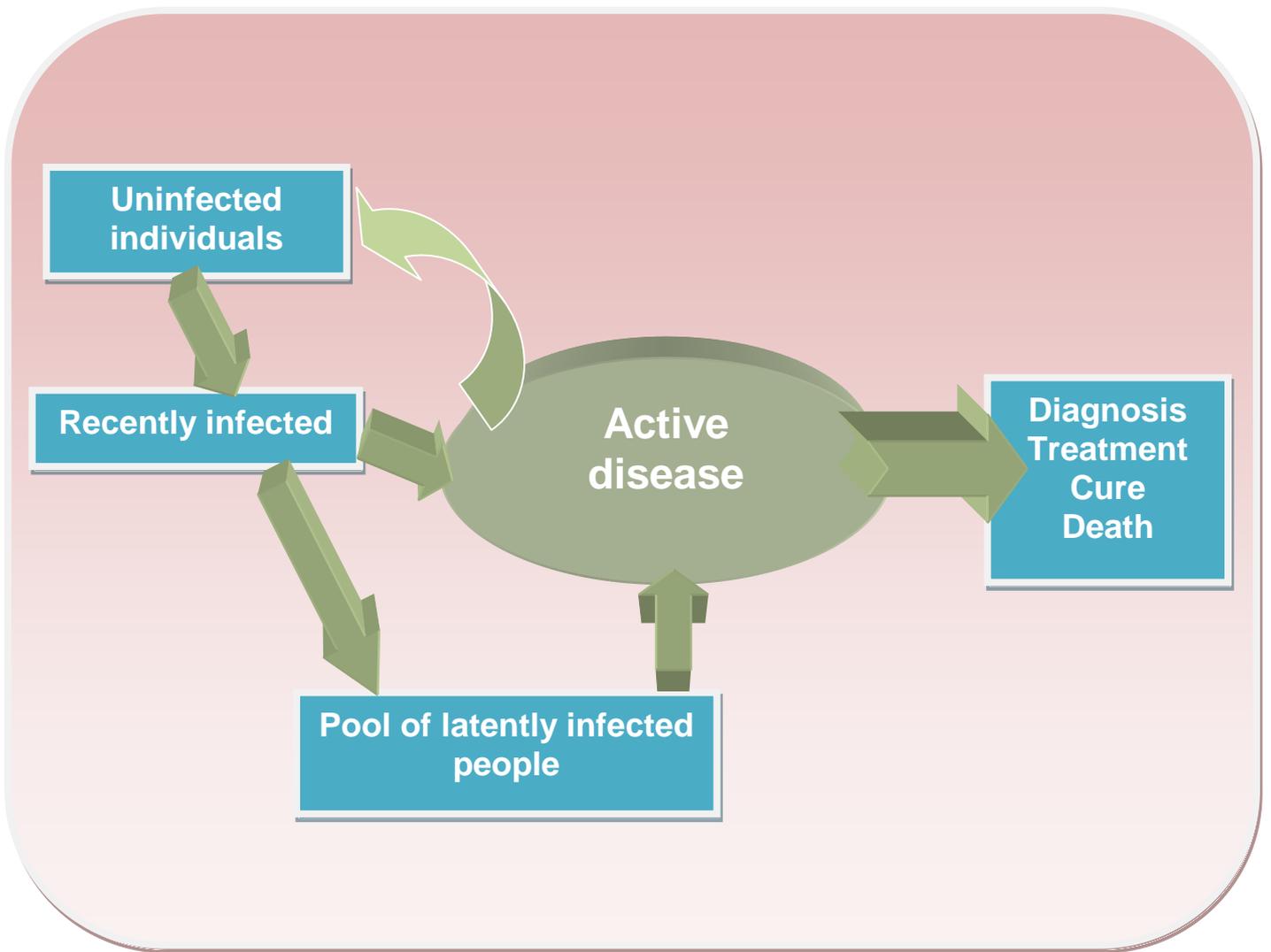
DOTS is the single, most effective health strategy available today for TB control (WHO 2001a:25). DOTS is a community-based TB treatment and care strategy which combines the benefits of supervised treatment and the benefits of community-based care and support. Lack of awareness or incorrect knowledge about TB might lead wrong beliefs and misconceptions about various aspects of the disease, which may affect the timely reporting of patients to the health institutions or poor compliance with treatment. Equally important is assessing the impact of various strategies adopted for improving knowledge and compliance.

3.2.2 Epidemiology of TB

TB is caused by *Mycobacterium tuberculosis*, a wide spread bacterial pathogen capable of prolonged survival within individuals in a state of latency or inactivity. This leads to an important distinction between latent TB infection, a state in which people are well, with normal medical investigations except for positive skin test reaction to injected TB proteins (tuberculin test) and TB disease. Individuals with TB disease usually have symptoms such as cough and weight loss as well as chest X-ray abnormalities and TB bacilli detectable at the site of tissue damage and disease (Guild et al 2001:158).

TB is transmitted by airborne droplets from person to person, and infection can be acquired only from individuals with active individuals with active pulmonary TB. The risk of carrying latent TB is particularly high in individuals living in high TB transmission setting such as mining hostels and underground mining operations.

Latency complicates both the control and treatment of TB (see figure 3.1). The risk of developing active TB is increased in latent infected individuals compared to that of infected free individuals. Latent TB bacilli are metabolically inactive and relatively insensitive to anti-TB drugs, so that treatment of infection, as distinct from disease, requires prolonged therapy to avoid a high risk of developing active TB.



**Figure 3.1 Natural history of TB infection and control
(Guild et al 2001:158)**

Mycobacterium tuberculosis is a successful pathogen because it can survive adverse conditions and persist in low numbers. Host immune-suppression or waning immunity (such as in HIV), allows the latent bacilli to reactivate to activate, transmissible disease (Kesavan, Brooks, Tufariello, Chan & Manabe 2008:17).

3.2.3 Factors determining the incidence of TB

The most important preventable factors in the mining industry influencing TB transmission and progression of TB disease are illustrated in figure 3.2. These factors include:

- The migrant labour system
- Severe HIV epidemic
- High silicosis prevalence
- Poor dust control

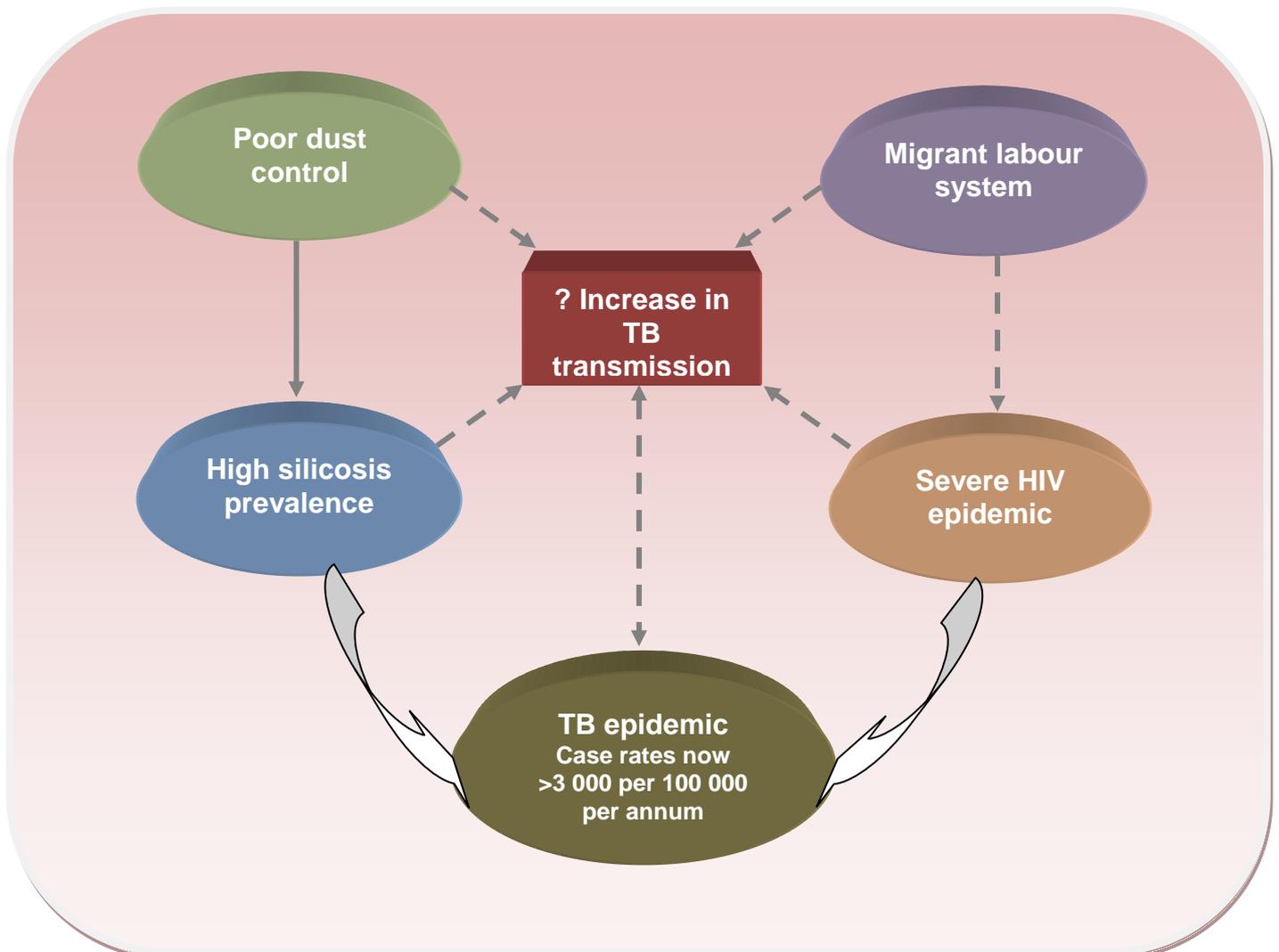


Figure 3.2 Factors influencing TB incidence in the mining industry (Guild 2001:159)

The development of TB is a two-stage process in which a susceptible person exposed to an infectious TB case becomes infected and may later develop the disease, depending upon various factors. In individuals infected with *Mycobacterium tuberculosis*, any condition modifying the balance established in the body between the

host's immune defences and the *tubercle bacilli* can have an impact on the risk of developing TB. Factors shown to influence this balance were reported to be both 'intrinsic' and 'extrinsic' to the host. However, in most studies investigating risk factors for TB, host-related and environmental factors were usually investigated separately, using different designs, making it (Lienhardt, Fielding, Sillah, Bah, Gustafson, Warndorff, Palayew & Lisse 2005:914).

TB mainly affects the lungs (pulmonary TB). In a study of 340 Gambian TB patients, Rathman, Sillah, Hill, Murray, Adegbola, Corrah, Lienhardt and McAdam (2003:943) found the following presenting symptoms (see table 3.1).

Table 3.1 Clinical finding in TB cases

FINDING	n	%
Symptoms		
Cough	340	100.0
Productive	330	97.1
Chest pain	268	78.8
Dyspnoea	183	53.8
Haemoptysis	122	35.9
Side pain	288	84.7
Night sweats	265	77.9
Fever	321	94.4
Weight loss	331	97.4
Anorexia	279	82.1
Other symptoms	49	14.4
Signs		
Pallor	126	37.1
Wasting	233	68.5
Clubbing	52	15.3
Lymphadenopathy	52	15.3
Hepatomegaly	10	2.9
Splenomegaly	7	2.1
Oedema	2	0.6

Source: Rathman et al 2003:943

From table 3.1, it is evident that TB has a range of typical signs and symptoms that could also be associated with other diseases. Therefore it is imperative that the clinical signs and symptoms be confirmed by laboratory tests including sputum, blood test and weight measurements.

When TB occurs in other parts of the body, the signs and symptoms vary, depending on the organs involved. For example, TB of the spine may result in back pain and TB

that affects the kidneys might cause blood in the urine. TB can also spread through a person's entire body, simultaneously attacking many organ systems. Cerebral TB kills or disables a higher proportion of sufferers than any other form of TB (Simmons, Thwaite, Quyen, Torok, Hoang, Chau, Mai, Lan, Dung, Quy, Bang, Hien & Farrar 2006:2014). In addition, Twaites, Chau, Mai, Drobniowski and Farrar (2000:289) demonstrated that the development of TB meningitis requires two steps. First, bacteria travel in the blood from the lungs to the meninges where they form discrete foci of infection (rich foci). Secondly, foci rupture and release bacteria into the sub-arachnoid space so heralding the onset of meningitis.

According to Komolafe, Sunmonu and Esan (2008:180), over one-third of the world's population has been infected with *Mycobacterium tuberculosis*, and over 70 000 individuals have TB meningitis.

TB has adverse effects among HIV-infected people with weakened immune systems. The HIV epidemic has had a grave impact on TB rates and control in populations where both infections are prevalent. HIV infection is more potent than any other risk factor for the progression of recent or remotely acquired TB infection to disease, and TB accelerates the course of HIV (Toossi 2003:1146)

3.3 THE GLOBAL INCIDENCE OF TB

Resulting in approximately 9 million new cases and 2 million deaths annually, TB has remained a major killer worldwide, with those living in resource-poor regions of sub-Saharan Africa and Asia suffering the greatest burden (Panjabi, Comstock & Golub 2007:828).

The rate of TB infection is alarming and statistics indicate that someone in the world is newly infected with *tuberculosis bacilli* every second of the day, with overall, one-third of the world's population currently infected with TB (Hattingh et al 2008:275).

The largest number of cases occurs in the Southeast Asia region, which accounts for 33% of cases globally (Hattingh et al 2008:275). In Africa, TB is rising at over 4% per year, fuelled by the HIV epidemic. The WHO's African Region has the highest TB

burden per capita. Lawn et al (2006:1040) point out that although Africa has only 11% of the world's population, the continent accounts for approximately 25% of the global TB burden. In the African region, 34 of the 48 member states face an estimated TB prevalence of 300 per 100 000 of the population (Sampaio 2007:333). Lack of coordination, strengthening health systems and addressing the health workforce crisis are major issues. Sampaio (2007:333) emphasises that TB and HIV/AIDS cannot be dissociated. The co-infection must be tackled together. Collaborative TB/HIV activities on a limited or sporadic basis are not enough.

3.3.1 TB in Africa

The annual TB incidence rates have doubled and in some cases tripled in many countries in sub-Saharan Africa since 1990 (Lawn et al 2006:1040). The African continent, which contains just 11% of world's population, now accounts for 27% of the global burden of TB and 30% of TB-related deaths; an estimated 2.4 million new TB cases and 540 000 TB-related deaths occur in Africa annually (Lawn et al 2006:1040). In countries with a low TB incidence, the prevalence of HIV infection is generally low, but variations occur both between and within countries over time. In the USA in 1998, an estimated 20% of all patients with TB were HIV co-infected, compared to 4.8% in France in 2000, and 4% in the Netherlands in 1993-1995 (Frieden, Sterling, Munsiff & Watt 2003:887).

More than 70% of the 36.1 million HIV-1-infected individuals worldwide live in sub-Saharan Africa, and a high proportion of these are co-infected with TB (Badri, Wilson & Wood 2002:2059). TB is the leading cause of morbidity and mortality among HIV-1-infected patients in sub-Saharan Africa (Badri et al 2002:2059).

According to Currie, Floyd, Williams and Dye (2005:130), Kenya is a low-income country with a per capita income of US\$390 in 2003, and a population of just under 32 million. With almost 200,000 new cases of TB in 2003, Kenya ranks tenth globally in terms of total TB burden, and HIV prevalence among adult TB patients aged 15 to 49 is estimated at 29%.

While the African region has always had a huge TB burden, the region has experienced a huge upsurge in the incidence of TB cases and deaths especially since the mid

1990s, largely due to the direct impact of the HIV/AIDS pandemic currently affecting many countries in the region (WHO 2002b:296). The HIV epidemic is now considered the most important factor driving the TB epidemic that is threatening to overwhelm even effective TB control programmes in the region. It is estimated that between 30-50% of all newly diagnosed TB cases are also infected with HIV and that about 40% of all AIDS deaths in the region are due to TB (WHO 2002b:296).

TB is the commonest opportunistic infection and the primary cause of death in HIV patients in developing countries, and accounts for about 40% of all manifestations in HIV patients (Pape 2004:144). About 25% to 65% of patients with HIV/AIDS have TB of some organ and TB accounts for about 13% of all HIV-related deaths worldwide (Ngowi, Mfinanga, Bruun & Morkve 2008:341).

In Tanzania, the National Tuberculosis and Leprosy Programme indicates that since 1983 the number of TB cases has increased almost sixfold from 11,753 to 65,665 in 2004. The majority of cases occur in adults aged 15 to 45 years, the same age group affected by HIV/AIDS (Matee, Mtei, Lounasvaara, Wieland-Alter, Waddell, Lyimo, Bakari, Pallangyo & Von Reyn 2008:68).

3.3.2 TB in the mining industry

The gold mining industry has historically been one of South Africa's largest employers and currently employs about 250 000 miners. Their exposure to dust with a high concentration of crystalline silica puts the miners at risk of developing respiratory diseases such as silicosis, chronic obstructive lung disease, and pulmonary TB (Hnizdo, Churchyard & Dowdeswel 2002:698).

Statistics from gold mines in South Africa illustrate the impact of HIV on TB, where the overall TB incidence now exceeds 4000 per 100 000 population per year (i.e., 4%). TB incidence was already high in this setting before the spread of HIV infection, largely because of a high prevalence of silica dust exposure (Grant, Charalambous, Fielding, Day, Corbett, Chaisson, De Cock, Hayes & Churchyard 2005:2719).

Despite meeting the targets for the detection and cure of TB, the rates of TB among workers in the RSA gold mining industry have risen sharply, in tandem with the onset of

the HIV epidemic in the country (WHO 2005a:345). According to the WHO (2005a:345), since 1990, the rate of TB has tripled in countries in Africa with a high incidence of HIV/AIDS. This is in stark contrast to a decline in the rate of TB in developed countries. According to Kipp, Stout, Hamilton and Van Rie (2008:107), the incidence of TB in the USA has gradually declined except for resurgence from 1985 to 1992. In 2006, the number of TB cases in the USA reached an all-time low with 13 779 new cases, corresponding to an incidence of 4.6 cases/100 000 persons.

According to Grant et al (2005:2719), a rising HIV prevalence has resulted in increasing TB incidence, despite well-implemented TB control programmes in mines using directly observed rifampicin-based short-course chemotherapy and active case detection using an annual miniature chest radiograph screening programme.

3.3.3 The costs related to TB

The NTP budgets in high burden countries (HBCs) amounted to US \$1.8 billion in 2008, up from US \$0.5 billion in 2002 but almost the same as budgets for 2007; NTP budgets for the 90 countries with 91% of global TB cases that reported complete data totalled US \$2.3 billion in 2008. Budgets are typically equivalent to about US \$100–300 per patient treated (WHO 2008a:4). Since the age group mostly affected by TB is 15-45, which forms the bulk of the nation's workforce, TB increases poverty at both national and household level. On average, three to four months of work are lost as a result of TB. If a patient has a family or dependants, they also suffer from loss of income. Basic provisions such as food, health services and education are affected. If the patient dies, there is a further 15 years of lost income because of premature death (Johansson, Diwan, Huong & Ahlberg 1996:178).

In addition to the resultant suffering and loss of workers' income, it disrupts workflow, reduces productivity, and increases direct costs related to care and treatment as well as indirect costs, such as the replacement and retraining of workers. Without effective treatment, workers with TB often spend months off work. Given effective treatment, however, many workers can safely return to work within 2 to 4 weeks (WHO 2003:323).

In southern Ethiopia, TB treatment is free to the patient, in-company or through area health services, because of the need for prolonged treatment periods and high levels of

patient adherence to prevent the emergence of drug-resistant strains. As much as untreated TB threatens the well being of an individual and society, defaulting from treatment may increase the risk of drug resistance, relapse, and death, and may prolong infectiousness (Estifanos, Biru, Shargie, Bernt & Lindtjørn 2007:37).

Anglo Gold South Africa (Anglo Gold 2008) estimates that each case of TB among unskilled workers in its operations in the Vaal River and West Wits regions costs US \$410 in lost shifts. The company runs a comprehensive TB control programme for the workforce, spending about US \$90 per worker each year but saving US \$105 through the prevention of active TB among HIV-positive workers.

In high TB-incidence environments, TB is a major contributor to ill health and poverty in a community. Business success is closely linked to the health and prosperity of the community, which is a source of workers, services, contractors, and customers – a key part of the overall business environment. As part of their corporate responsibility, many businesses have a broad commitment to improving the well being of the community. A TB control programme is a practical way to demonstrate to the local community that businesses care about their well being. It can be part of a “local license to operate” (WHO 2003:323).

3.3.4 Deaths due to TB

Death from TB comprises 25% of all avoidable deaths in developing countries (Mishra, Hansen, Sabroe & Kafle 2005:1134). TB is a leading cause of death worldwide, especially in low-income and middle-income countries. Although TB prevalence and death rates have fallen globally for several years, the total number of new cases continues to rise slowly, due to the case-load continuing to grow in the African, Eastern Mediterranean and South-East Asia regions.

For centuries, TB has remained a grave public health problem, particularly in the developing world, taking a heavy toll of those in their prime. The emergence of human immunodeficiency virus (HIV infection) and its close association with TB poses an even greater challenge to the health systems in general and TB programmes in particular, in African and Asian countries (Narain & Lo 2004:277). According to Narain and Lo (2004:278), a number of factors contribute to the global TB crisis, but the leading cause

is the spread of HIV/AIDS. TB and HIV have a deadly relationship — each fuels the other's progress.

In sub-Saharan Africa, the incidence of pulmonary TB has increased six fold, with a prevalence of HIV infection among TB patients of up to 70%. In countries with low TB incidence, the prevalence of HIV infection is generally low, but variations occur both between and within countries over time. In the USA in 1998, an estimated 20% of all patients with TB were HIV co-infected, compared to 4.8% in France in 2000, and 4% in The Netherlands in 1993–1995 (Haar, Cobelens, Kalisvaart, Van der Have, Van Gerven & Deutekom 2006:768).

Pulmonary TB is currently an epidemic on South African goldmines, being associated with both silicosis and HIV infection. These latter conditions are themselves running at high prevalence in the gold mines. PTB incidence rates among gold miners are very high at 3000/100 000, when compared with PTB incidence rates among coal and platinum miners, and that of the general South African population of 344/100 000. It is notable that TB associated mortality has increased in absolute terms to become the leading cause of death in in-service gold miners since 1996, mainly because of AIDS (White, Thompson, Myers, teWater, Naude, Ehrlich, Churchyard, Pemba, Dekker & Vermeis 2006:187).

According to Badri et al (2002:2059), more than 70% of the people living with AIDS in South Africa also have TB. Infection with HIV suppresses the immune system, making it difficult for the body to control TB bacteria. As a result, most HIV-positive people who are newly infected with TB progress to active TB. HIV is also likely to reactivate dormant TB bacteria. People with HIV are many times more likely to progress from dormant to active disease than are HIV-negative people (Badri et al 2002:2059).

3.4 GLOBAL PREVENTION STRATEGIES

The establishment of targets and indicators for TB control within the framework of the United Nations Millennium Development Goals (MDGs) stimulates national TB control programmes to evaluate the epidemiological impact of control activities

Because the MDG framework does not, on its own, provide a complete and fully-defined set of targets for TB control, the WHO expanded the framework to provide targets for all MDG indicators. These targets for the MDG indicators have been endorsed by the Stop TB Partnership (WHO 2006a:9) A complete set of existing indicators and targets will guide TB control through to 2015, the target year for all MDGs These indicators and targets will measure progress made by the Stop TB Strategy (Raviglione & Uplekar 2006:952). This extends and enhances the DOTS strategy. The implementation of the Stop TB Strategy over the next decade is set out in the second Global Plan to Stop TB (WHO 2006a:35).

The measurement of DOTS implementation has so far focused on assessing progress in case detection and treatment success. The evaluation of epidemiological impact (due to any control method, not just DOTS) requires the evaluation of changes in TB incidence, prevalence and deaths over the period 1990 to 2015 and beyond. The success, or failure, of TB control will ideally be assessed for all countries and for the world as a whole (Dye, Maher, Weil, Espina & Raviglione 2006:460).

3.4.1 Targets set by the World Health Assembly

In 1991, all WHO member states adopted a World Health Assembly (WHA) resolution setting two targets for global TB control to be reached by the year 2000, namely:

- to detect at least 70% of all new infectious cases arising each year, and to cure at least 85% of those detected
- to detect of infectious cases which is measured as the number of new smear-positive patients detected each year divided by the estimated number arising in that year (WHO 2006e.368).

Cure for TB is measured as treatment success among smear-positive patients; that is, the number whose sputum smears become negative during treatment plus the number who complete treatment, divided by the total number evaluated (also expressed as a percentage (WHO 2005b:349). Although these are global targets, they have been adopted, occasionally with slight variations, as national targets by individual countries.

The targets were based on the assumption that achieving 85% cure rate and 70% case detection would reduce the prevalence of infectious TB cases, the number of infected contacts, and hence the burden of illness and mortality due to TB WHO (2005b:241). The choice of these targets in 1991 balanced the need to achieve significant epidemiological impact while setting goals that were known to be feasible in the field. Reaching the targets was expected to cause a decline in the annual TB incidence rate of 5 to 10% per year or more, in the absence of HIV co-infection.

In 2000, the WHA postponed the target date to 2005 by means of Resolution WHA 53.1 (WHO 2000a). In terms of Resolution WHA 53.1, countries that did not reach the targets by 2005, should aim to reach them as soon as possible thereafter, because the expected epidemiological impact remains dependent on high performance of TB control programmes in ensuring the highest possible case detection and cure rates. In 2005, the WHA passed a resolution advocating “sustainable financing for TB control and prevention”, with member states making a commitment to strengthen efforts to achieve the TB-related targets included in the MDGs (WHO 2006d:368). In Tanzania TB notifications appeared to have stabilized. Treatment success slowly increased towards the 85% target through improved case holding and evaluation, but the death rate was still 10% in the 2003 cohort. The estimated case detection rate was less than 50% in 2004 (WHO 2006a:128).

3.4.2 Millennium development goals

The United Nations Millennium Development Goals (WHO 2000b:55) commit the international community to have halted and begun to reverse the incidence of TB by 2015 and to have reduced TB prevalence rates by 50% compared with the year 1990. These goals build on and complement earlier targets, ratified by the World Health Assembly in 1991, aimed at detecting 70% of new infectious TB cases and successfully curing 85% of these cases. Currently, around 50% of the estimated of new cases each year are reached, detected and treated (WHO 2006e:37).

3.4.3 Targets set by the “Stop TB” partnership

While the MDGs for TB implicitly encourage the measurement of epidemiological impact, the MDG framework set no targets for reducing TB prevalence and death rates. The Stop TB Partnership therefore set targets itself, namely to halve TB prevalence and death rates by 2015, in comparison with the rates estimated for 1990 the baseline for all MDGs (Dye, Watt, Bleed, Hosseini & Raviglione 2005:2767).

The targets for reducing TB incidence, prevalence and death rates, as used in the Global Plan to Stop TB, include patients infected with HIV, because the intent of the Plan is to reduce the burden of all TB, not just TB among HIV-negative patients. Target prevalence and death rates are estimated to be approximately 150 and 15 per 100 000 population in 2015, respectively, and the number of people dying from TB in 2015 should be less than approximately one million. Going beyond the MDG target year 2015, the Stop TB Partnership has made a commitment to eliminate TB as a public health problem by 2050 (WHO 2001a:35).

The major achievement of the Stop TB Partnership in 2005 was the development of the Global Plan to Stop TB, 2006–2015, a blueprint for TB control over the coming period (WHO 2006b:35). This landmark achievement was the result of intense work by the Partnership's Working Groups and all its partners, and is underpinned by the new Stop TB Strategy (WHO 2006e:368). The targets set by the Stop TB partnerships were to diagnose at least 70% of people with positive smear-sputum. In addition, the target was also to cure at least 85% of people diagnosed with TB by the year 2015, summarized below.

- *By 2005:* At least 70% of people with sputum smear-positive TB will be diagnosed (i.e., under the DOTS strategy), and at least 85% cured. These are the targets set by the World Health Assembly of the WHO (see figure 3.1).
- *By 2015:* The global burden of TB (per capita prevalence and death rates) will be reduced by 50% relative to 1990 levels.
- *By 2050:* The global incidence of TB disease will be less than 1 case per million population per year (Dye et al 2006:461).

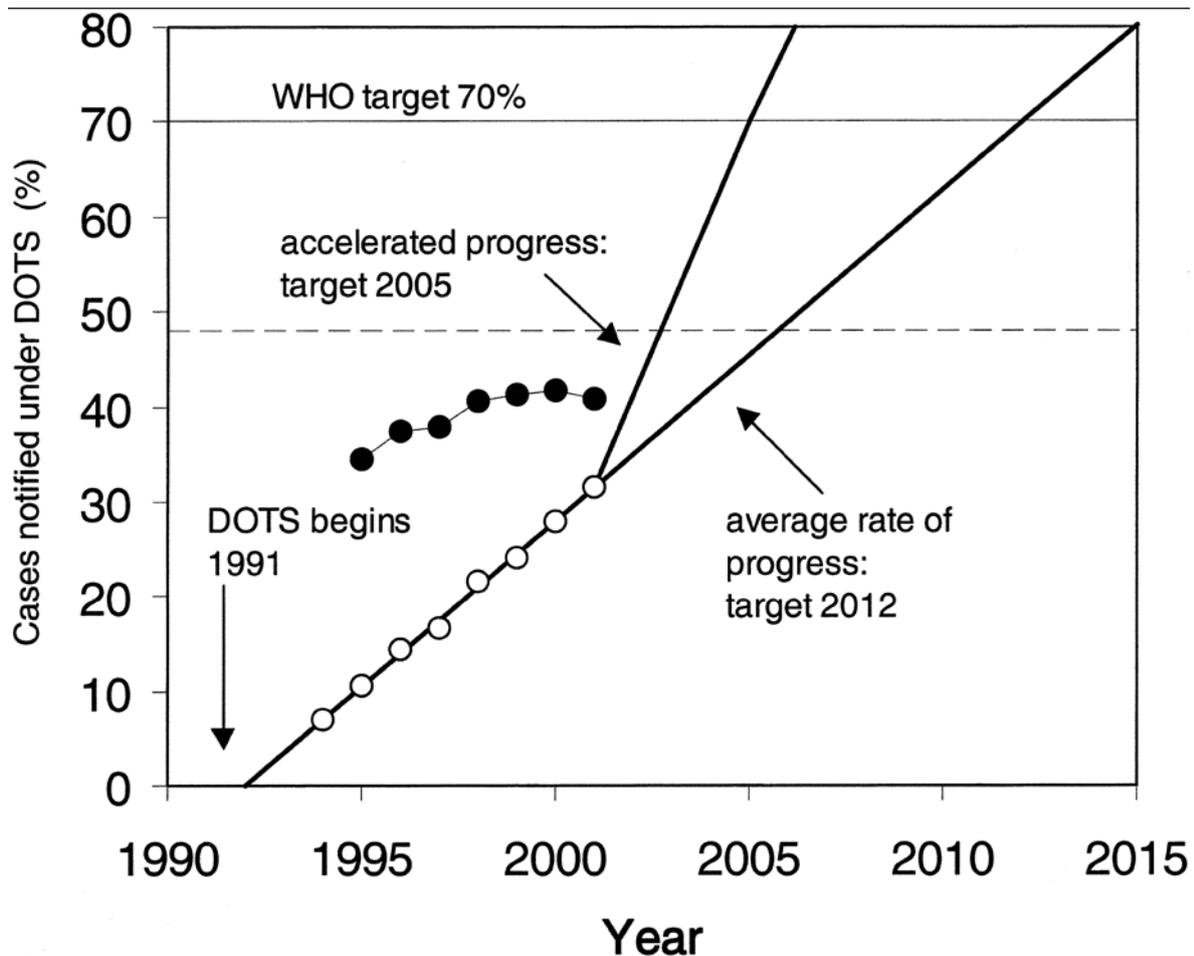


Figure 3.3 Progress towards WHO 2005 targets for case detection under DOTS

Source: Kumaresan, Heitkamp, Smith and Billo (2004:122)

The WHO targets for DOTS and non DOTS were not achieved, hence the revision and postponement to 2005.

3.5 FACTORS ENHANCING TB

TB is a major infectious cause of death among adults in sub-Saharan Africa. The situation is compounded by low socio-economic status, displacement due to famine, drought and war, and HIV/AIDS. The WHO declared TB to be a global emergency in 1993 (WHO 1994:177). Poverty, malnutrition, overcrowding, alcoholism and HIV/AIDS are among the factors that contribute to the spread of TB.

The association of TB with poverty is well established at population and neighbourhood level, usually in relation to socio-economic disadvantage and associated ethnicity or

class. The economic effects of TB are usually considered from two perspectives (Walker & Stevens 2003:359). The first is estimating the cost of illness aggregated at the national level from the spending of health care providers at various government levels. The second is from the patients' perspective of direct and indirect costs of illness and loss of income (Walker & Stevens 2003:359).

3.5.1 Overcrowding

According to Marks (2006:571), poverty, malnutrition, overcrowding, alcoholism and measles seem pale shadows against the dark spectre of HIV infection, which may trigger millions of people infected with *Mycobacterium tuberculosis* into frank clinical disease, often well before other manifestations of AIDS become apparent. TB bacteria also flourish in nursing homes because older adults often have immune systems weakened by illness or aging. In a household contact study in Kampala, Uganda, active TB was common among household contacts of infectious index cases, occurring in 6 percent of contacts. Most secondary cases were present at the time of baseline household evaluation, although some incident disease did occur despite treatment of latent tuberculous infection in children and HIV-infected adults (Guwatudde, Nakakeeto, Jones-Lopez, Maganda, Chiunda, Mugerwa, Ellner, Bukonya & Whalen 2003:887).

According to Lönnroth, Williams, Stadlin, Jaramillo and Dye (2008:289), there is a strong association between alcohol use and risk of TB. Prevalence of alcohol use disorders among TB patients range from 10% to 50% in Australia, Canada, Russia, Switzerland, and the USA.

3.5.2 Poverty and lack of access to medical care

TB is a disease of the poor and those one contract it become poorer because of the costs of a protracted process of diagnosis and treatment. A 2004 joint report by the African Union and the Economic Commission for Africa estimated an economic loss of 4-7% of GDP annually in countries with a high burden of TB (Spence, Hotchkiss, Williams & Davies 1993:759).

The world's poor are the most likely to have TB but the least likely to receive medical care. The problem is compounded because people living in poverty and in unstable

political situations often move or migrate and so may not complete their treatment, leading to drug-resistant forms of TB (Tang & Squire 2005:93). International mass migration is increasingly identified as a significant factor in the international resurgence of TB whilst poverty and social exclusion continue to shape the epidemiology of TB and pose challenges to its control (Tang & Squire 2005:104).

3.5.3 Drug-resistant strains of TB

Factors associated with the emergence of multi-drug resistant TB (MDR-TB) and their effects on the epidemiology of TB include inadequate treatment, irregular drug supply, inappropriate regimens and poor patient compliance. Primary resistance to anti-TB drugs occurs when a patient is infected with wild type *Mycobacterium TB* which is resistant to anti-Tb drugs. Acquired resistance to anti-TB drugs occurs when a patient is infected with susceptible forms of *Mycobacterium TB*, which become resistant during treatment. Much higher rates of primary resistance have been observed in HIV-infected patients (Urassa, Mugusi, Villamor, Msamanga, Moshiro, Bosch, Saathoff & Fawzi 2008:58).

According to Hattingh et al (2008:277), the problem of MDR-TB is a cause of great concern and will require revision of the existing control programmes such as early identification of outbreaks by means of rapid testing for drug sensitivity, including methods based on nucleic acid amplification and the selective DNA finger printing of isolates of *Mycobacterium tuberculosis*.

A total of 23 353 cases of MDR-TB were notified in 2006, of which just over half were in the European Region. Among these notified cases, only the 2 032 cases reported from projects and programmes approved by the Green Light Committee (GLC) were known to have been enrolled on treatment that meets the standards established in WHO guidelines (WHO 2007b:393).

In Myanmar (formerly Burma), institution-based studies carried out in 1994–1995, 2000 and 2002 by the Union Tuberculosis Institute (UTI) at Yangon reported rates of MDR-TB, defined as resistance to minimum isoniazid (INH) and rifampicin (RMP) among new sputum smear-positive TB cases of respectively 3%, 2% and 5% (Ti, Lwin, Mar, Maung, Noe, Htun, Kluge, Wright, Aziz & Paramasivan 2006:1111).

3.5.4 Risk factors associated with TB

Risk factors such as age, sex, malnutrition, diabetes, HIV infection (biological factors), tobacco smoking, alcoholism (behavioural factors), poverty, overcrowding and poor housing (socio-economic factors) are known to be associated with the development of pulmonary TB. Some of these risk factors contribute to risk of infection rather than to progression to disease, while others are mostly responsible for progression from infection to disease (Kolappan, Gopi, Subramani & Narayanan 2007:999). These factors may be regarded as perceived barriers towards the combating of TB especially in the developing countries where this disease is escalating.

3.5.4.1 Lowered immunity

When the immune system is healthy, macrophages can often successfully wall off TB bacteria, but the body cannot mount an effective defence if resistance is low. A number of factors can weaken the immune system (Hattingh et al 2008:279). Someone who is HIV-positive and infected with TB is many times more likely to become sick with TB than someone who is HIV-negative and infected with TB, and TB is a leading cause of death among people who are HIV positive. Having a disease that suppresses immunity, such as HIV/AIDS, diabetes or the lung disease silicosis, and receiving treatment with corticosteroids or chemotherapy drugs can damage body's ability to protect itself. The unprecedented growth of the TB epidemic in Africa is attributable to several factors, the most important being the HIV epidemic (Hattingh et al 2008:279).

In Africa, TB is often the first manifestation of HIV infection, and is the leading cause of death among HIV-infected patients (Corbett, Marston, Churchyard & De Cock 2006:926).

3.5.4.2 Close contact with someone with infectious TB

In general, people need to spend an extended period of time with someone with untreated, active TB to become infected; people are most likely to contract TB from a family member, roommate, friend or close co-worker. According to Hattingh et

(2008:275), left untreated, each person with active TB will infect between 10 and 15 people, on average, every year.

3.5.4.3 Gender

The term “gender” encompasses features of males and females that are socially constructed, distinct from those features that are biologically determined (sex-linked). Higher TB notification rates in men may partly reflect epidemiological differences (i.e., differences in exposure, risk of infection, and progression from infection to disease). Some studies indicate that women may have higher rates of progression from infection to disease and a higher case fatality in their early reproductive ages (WHO 2000b:280).

Globally, more men than women are infected with TB. Men are also more likely to die of the disease. The observed association of TB with males has been reported in most countries in Africa, where notification rates are higher for men than for women (Holmes, Hausler & Nunn 1998:96). There are considerable gender differences with regard to stigma and its social consequences, which may result in differential health-seeking behaviour and access to care between males and females. However, the consistent effect of male gender observed, both with household and community controls and throughout the sites, suggests that selective under-diagnosis relating to gender is unlikely (Holmes et al 1998:97).

3.5.4.4 Age

Older adults are at greater risk of TB because normal aging or illness may weaken their immune systems. Moreover, they are likely to live in nursing homes, where mini-epidemics of TB can occur. However, 30% of TB cases arising among the 15 to 49-year-old adults in sub-Saharan Africa are attributable to HIV and a continuous 10% per year increase in TB is projected in countries most severely affected by HIV infection (WHO 2001a:287). According to Lawn et al (2006:1046), most of the increasing burden of TB occurs among 20 to 49 year-old adults. In Thailand, about 10% of TB cases occur in children under 15 years old (Lolekha et al 2008:94).

3.7.2.5 Substance abuse

Drug use is associated with increased rates of TB disease and TB infection (WHO 2008b:14). Infection refers to evidence of the presence of TB bacilli, but the large majority of infected people do not become ill. TB can lie dormant for years, although the risk of developing disease is greatest in the first year. Infection with HIV dramatically increases progression to TB disease. People who have TB infection without HIV co-infection have a 5% to 10% lifetime risk of developing the disease, whereas people living with HIV have a 5% to 10% annual risk of developing it. TB rates among drug users in New York City in the early 1970s were already more than 10 times higher than those in the general population, before the emergence of HIV (WHO 2008b:14).

3.7.2.6 *Living in a refugee camp or shelter*

The WHO (2008b:14) estimates that there are at least 23 million refugees in camps and shelters around the world. Weakened by poor nutrition and ill health and living in crowded, unsanitary conditions, refugees are at especially high risk of TB infection. According to Hattingh et al (2008:278), many refugees originate from countries with a high TB incidence rate where neglected health care and malnutrition has contributed to them being at particularly high risk of developing TB.

3.7.2.7 *Health care workers*

Regular contact with people who are ill increases the chances of exposure to TB bacteria. Wearing a mask and frequent hand washing greatly reduce the risk (Naidoo & Jinabhai 2006:676). In South Africa, two studies were conducted in the 1990s with respect to TB in health care workers. Between 1991 and 1996, a district hospital in rural KwaZulu-Natal showed an increasing frequency of TB among staff, associated with the expanding HIV epidemic in the community. In 1997, a review of staff health records from 1986 to 1997 in four dedicated TB hospitals in Mpumalanga found the incidence of TB in health care workers (275/100 000) to be similar to that in the community (286/100 000) (Naidoo & Jinabhai 2006:676).

3.8 TREATMENT OF TB

Since the World Health Assembly recognized TB as a major public health problem in 1991, global efforts to control TB have expanded hugely, resulting in a significant increase in case detection and the proportion of cured patients (WHOc 2006:362).

Until the 1940s, treatment of TB consisted mainly of bed rest, nutrition, and exposure to sun or sea air in sanatoria (Scano & Nunn 2004:185). However, the outcome of the disease was more associated with natural history than with such interventions. One unintended effect of isolating patients in sanatoria was the protection of the community from infection. Such practices remained even when drugs became available. The first drug shown to have a bacteriological effect on the bacillus was found to be streptomycin in the early 1940s. The trial published in 1946 demonstrated the value of streptomycin in addition to bed rest (Scano & Nunn 2004:185).

With the introduction of the globally recommended DOTS strategy for managing TB, TB control programmes across the world are diagnosing more TB patients and successfully treating them. Regarding global TB control, the WHO (2005a:34) reported a global cure rate of 83%, close to the expected target of 85%.

Poor TB therapy is one of the greatest problems facing TB programmes today. The reasons for this are complex and range from social and economic factors to individual patient characteristics. TB patients' knowledge about general management of TB is an important factor influencing compliance with TB treatment. Disruption of treatment often occurs because patients fail to fully understand the necessity and importance of prolonged, uninterrupted treatment (WHO 2005a:34).

3.9 CONSEQUENCES OF THE DELAYS IN TREATMENT FOR TB

Delay in treatment of TB can result in a higher risk of mortality among patients and transmission of the disease in the community (Rojpibulstit, Kanjanakiritamrong & Chongsuvivatwong 2006:422). Early detection and effective treatment, the two key factors in successful TB control, can be achieved by shortening the time from the first symptom to arriving in standard health care (patient delay) and time between first visit and diagnosis (health system delay). Weaknesses and delays have been reported in the diagnosis of smear-positive pulmonary TB in high prevalence countries, resulting in dissemination of the disease, death, or spontaneous healing with serious sequelae

(Ouédraogo, Kouanda, Boncounou, Dembélé, Zoubga Ouédraogo & Coulibaly 2006:184).

There are increased costs associated with a delayed diagnosis, both to the patient in terms of lost employment and visits to the health care system and to the health care system in terms of additional clinic visits and the need for hospitalisation. In addition, a delay in diagnosis means that the untreated individual remains an infectious risk in the community for longer, contributing to increased TB transmission (Meintjes, Schoeman, Morroni, Wilson & Maartens 2008:72).

According to Ouédraogo et al (2006:185), patients do not always visit a doctor at the very beginning of their disease, often because the symptoms, especially coughing, are common to other conditions.

Gagliotti, Resi and Moro (2006:305-306) define patient delay as the time from onset of TB symptoms to the first consultation with a health provider. Health care delay is the time from the first consultation with a health provider to the initiation of treatment.

Delays in both diagnosis and treatment initiation are a major impeding factor in the control of TB (Oduyano & Babafemi 2004:18). In Mwanza, Tanzania, Wandwalo and Morkve (2000:135) found that about 80% of studied patients reported to health facilities longer than thirty days after the onset of symptoms, with a mean delay of 162 days, while 34% of the patients reported as late as six months later.

3.9.1 Compliance improves effectiveness

In an effort to help people adhere to their treatment regimen, some doctors and clinics use the DOTS programme (see description under 3.14). DOTS stands for *Directly Observed Treatment Short Course*, which means that a trained second person watches the patient swallowing the tablets to ensure that the patient takes the right combination of drugs and for the appropriate duration. The important and unique feature of DOTS is the use of patient observers. The strategy, then, ensures that TB patients regularly take the medicines as prescribed and monitors their progress towards cure (Harries, Maher & Graham 2004:45).

Since its inception in 1991, the DOTS strategy has led to a 95% cure rate in even the poorest countries. Not only does DOTS save lives and prevent the development of drug-resistant strains of bacteria, but it is also a very cost-effective treatment programme (Khatri & Frieden 2002:457; Thomas 2002:373).

3.9.2 Treating MDR-TB

A projected 50 000 MDR-TB cases were on treatment in 2007 and 2008. The projections for 2008 were much less than the target of 98 000 set in the Global MDR-TB/XDR-TB Response Plan. Most of the shortfall was in the European, South-East Asia and Western Pacific regions, particularly in China and India. A major expansion of services that meet the standards established in the WHO guidelines are therefore needed (WHO 2008c:393).

Multi-drug-resistant strains of *Mycobacterium tuberculosis* (resistant to at least INH and RMP) arise from inadequate treatment of active TB, and can then be further transmitted, either because people skip doses, do not finish their entire course of medication, or are given the wrong treatment regimen (Corbett et al 2006:926). This gives bacteria time to develop mutations that can resist treatment with first-line TB drugs. Because MDR-TB is spreading rapidly and could potentially make all TB incurable, some believe that ineffective treatment is ultimately worse than no treatment at all (Corbett et al 2006:926).

Several developments have led to improvements in the management of MDR-TB. The use of fluoroquinolones has improved the success of treatment even in low- and middle-income countries. MDR-TB patients successfully treated with regimens containing these drugs have relapse rates as low as patients with susceptible strains in long-term follow-up (Chiang, Deun & Caminero 2006:827). To address the challenge of MDR-TB globally, the Green Light Committee (GLC) mechanism was established to regulate access to second-line drugs at reduced prices. Managing MDR-TB was included in the Stop TB Strategy and the Global Plan to Stop TB, 2006–2015 (Chiang et al 2006:827).

3.10 PREVENTION OF TB

In general, TB is a preventable disease. From a public health perspective, the best way to control TB is to diagnose and treat people with TB infection before they develop active disease and to take careful precautions with hospitalised TB patients. In most cases, TB control is based on the DOTS strategy, whose philosophical basis is prompt diagnosis and effective treatment of individuals with smear-positive TB to interrupt continuing transmission (Corbett et al 2006:926).

In figure 3.4 a summary is given of the potential interventions that may be followed to reduce the TB incidents in the mining industry and in the community.

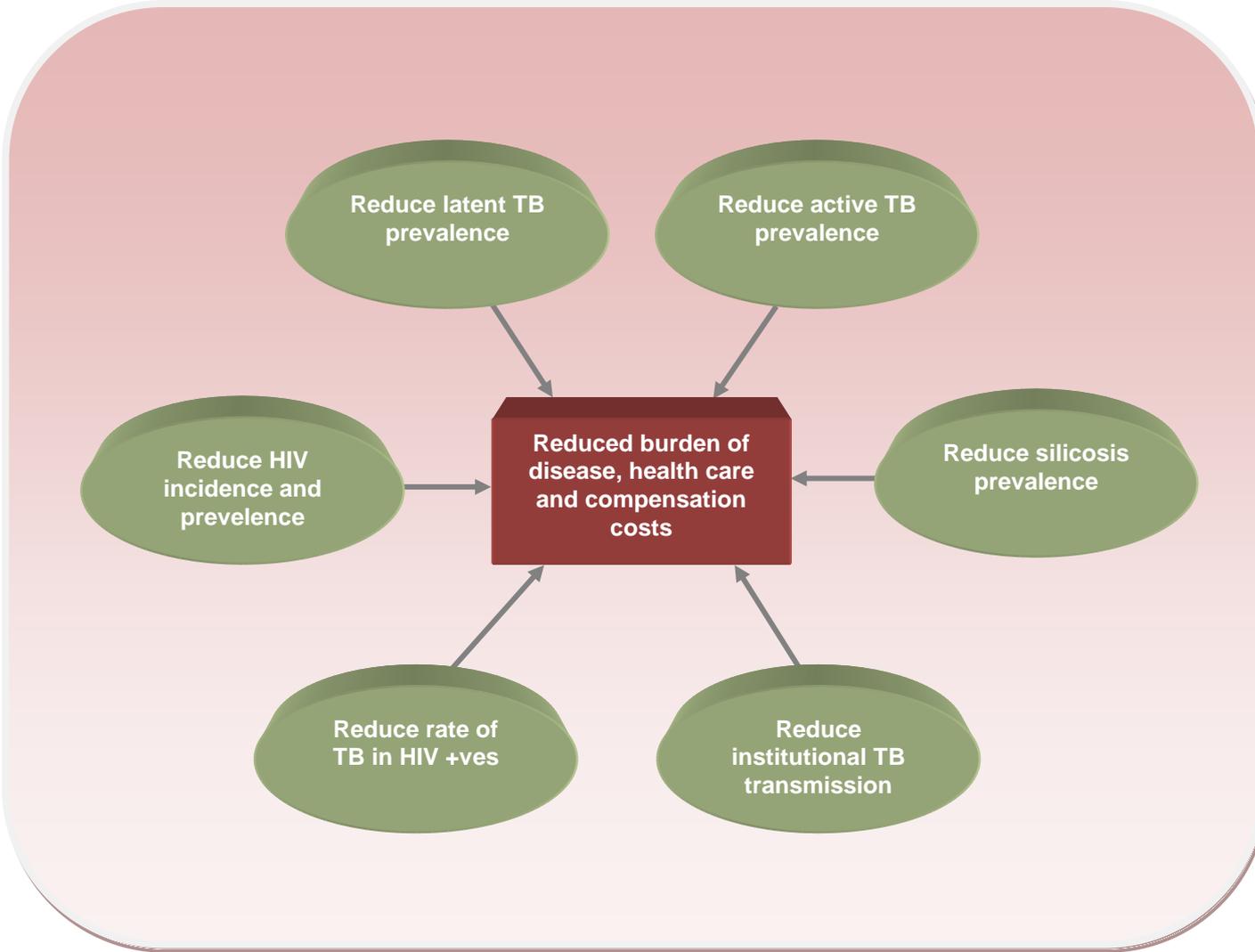


Figure 3.4 Potential interventions to reduce TB incidence (Guild et al 2001:163)

The Tanzanian Ministry of Health and Social Welfare, Dr Mwakyausa (Keregero 2008:1) emphasised that the mass media “have a significant role to play in fighting TB, it helps to set in motion, through information dissemination, the recognition of TB as a disease that can be treated and cured rather than simply treating it as news”. There appears to have been little TB coverage in the media. Moreover, what coverage there has been has focused more on the clinical issues of TB rather than the problems afflicting it in Tanzania and the social and economic implications.

The role of the mass media in the war against TB is to inform, educate, sensitise and mobilize people to take action on matters concerning their lives. The mass media can also be used as a tool to disseminate TB information, particularly to empower people to take action to minimise or contain its spread. Through the dissemination of information, then, the mass media can play a significant role in shaping and moulding attitudes, perceptions and values in society in relation to TB so that TB-infected people are regarded as human beings despite the infection.

The DOTS strategy is believed to be the most valuable strategy for TB control (Khatri & Frieden 2002:457). The implementation of DOTS in 184 countries accounted for 99% of all estimated TB cases and 93% of the world’s population in 2006 (WHO 2008a:393). DOTS is effective for TB control and the World Bank reported that TB chemotherapy is “one of the most cost-effective of health interventions”.

The establishment of a timely diagnosis is one of the main preventative measures to be taken in the prevention of morbidity and mortality associated with TB. However, low access to diagnostic laboratories, and shortage of resources and trained personnel, coupled with low sensitivity of smear microscopy, challenges the global target in case detection (WHO 2006a:39). In Africa, the case detection rate was below 50% and the treatment success rate did not exceed 73% (WHO 2005b:349).

3.7.3 Screening and diagnosis for TB

Most TB can be successfully treated if diagnosed in time. Currently, most cases of TB are diagnosed using one or more established approaches. Clinical signs and symptoms of TB, as well as chest X-rays are commonly used, but these criteria are non-specific and their use may lead to both under- and over-diagnosis. According to Corbett et al (2006:926), TB diagnosis in Africa relies on sputum microscopy followed by broad-spectrum antibiotics and chest radiography if smears are negative. Laboratory diagnosis in many parts of the world relies solely on acid-fast bacilli (AFB) microscopy in which stained smears of sputum specimens from TB suspects are examined microscopically. This test is the basis for the diagnostic procedure recommended by the WHO (Albert, Heydenrych, Brookes, Mole, Harley, Subotsky, Henry & Azevedo 2002:529).

Among the new rapid diagnostic tests for TB, the nucleic acid amplification assays are sensitive and specific, but also expensive and require sophisticated laboratory facilities and quality controls (Mathur, LoBue, & Catanzaro 1999:732). An alternative approach to the diagnosis of TB is the use of serologic testing, which is generally inexpensive and rapid. Most serologic tests for the diagnosis of TB are based on the enzyme-linked immunosorbent assay (ELISA). These tests detect antibodies to *Mycobacterium tuberculosis* and are reported to have high sensitivities and specificities. Despite their relative simplicity, however, ELISA assays also require laboratory resources that are not widely available in many developing countries (Mathur et al 1999:732).

The *FASTPlaqueTB*[™] test (Biotec Laboratories Ltd., Ipswich, UK) is based on novel phage amplification technology in which mycobacteriophage (phage specific for mycobacterium) are used as indicators of the presence of viable *Mycobacterium tuberculosis* in a clinical specimen 14–19. This test utilizes mycobacteriophage to reflect the presence of viable *M tuberculosis* (Albert et al 2002:529).

The standard WHO recommendation for TB diagnosis in the DOTS programme is the use of direct sputum microscopy on three stained sputum specimens (Matee et al 2008:68). First and third are on spot, while the second is the early morning sample. Currently no other diagnostic tool, including sputum culture, is available which could be implemented affordably in resource poor settings, where the burden of disease is greatest (Matee et al 2008:68). Further to that, that WHO recommends TB disease

screening in children who live in the household of a smear-positive case (Lolekha et al 2008:94).

3.7.3.1 Chest X-ray

Radiographic manifestations of PTB can vary according to age, prior exposure to TB and underlying immune status (Kiyani Kilicaslan, Gurgan, Tunaci & Yildiz 2003:768). In patients with immune-suppression, PTB often has an atypical presentation. The chest radiographic manifestations of TB in HIV-infected patients without AIDS and those with AIDS are well described, namely HIV-sero-positive patients without AIDS demonstrate findings of reactivation TB, characterized by upper lobe infiltrates and cavitations.

Figure 3.5 represents the X-rays of a Gambian patient with an abnormal chest X-ray (Rathman et al 2003:944).

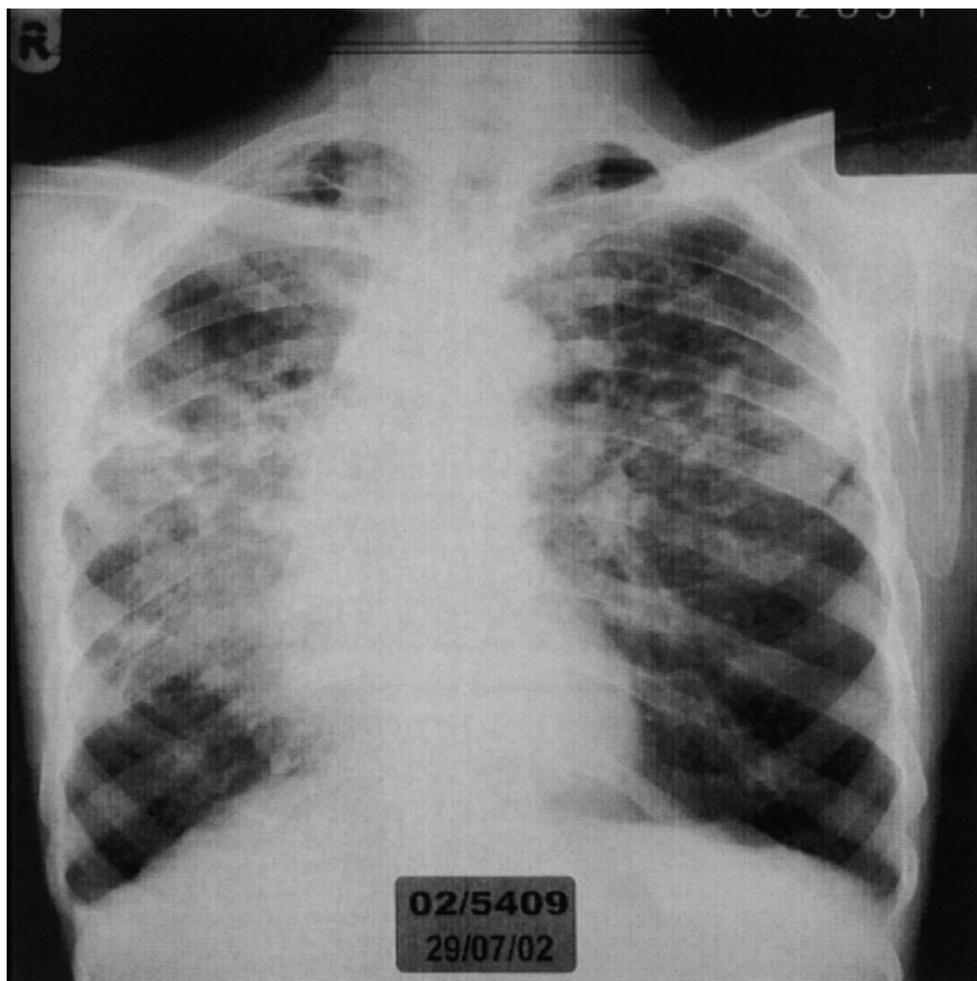


Figure 3.5 Chest X-ray of an adult male with extensive bilateral patchy change and cavitations

3.10.1 Regular testing

People suffering from HIV or another disease that weakens the immune system, live or work in a prison or nursing home, were born in a country where TB is prevalent, or have other risk factors for the disease are recommended to have a skin test every six months (WHO 2006a:13).

In asymptomatic a person's exposure to, and potential infection with, TB is demonstrated by a positive skin test, or more recently from a positive blood-based immunological (interferon-gamma) test. Those with a strongly positive skin test are then regarded as having been infected with TB. The majority of exposed persons will not be affected by the inhaled bacteria, and be left only with a positive skin test as a marker of exposure. About half of those who develop the clinical disease will do so within five years of the initial infection.

In cases where there is a considerable time lapse between being infected and development of TB, dormant bacilli are thought to remain in either the lung or other sites, which can 'reactivate' in favorable circumstances for the organism. Until recently, only TST (Mantoux and Heaf tests) was available to give evidence of exposure. The tuberculin tests had the advantage of being cheap and relatively easy to perform, but suffered from a number of problems. The test results have to be interpreted within a certain timescale, and people who do not return, or delay returning, will have either no result or a possibly inaccurate one. False positive results can occur because of the sensitising effect on the immune system of either prior BCG vaccination or opportunist environmental mycobacteria. False negative results can occur due to anything reducing immunity, particularly co-infection with HIV, but also treatments such as cytotoxics, or immunosuppression.

Extensive TB (pulmonary or miliary) can itself also temporarily depress the immunity, and can lead to a paradoxically negative TST. More recently, selective immunological (interferon-gamma) tests have been developed using the TB antigens 'early secretion antigen target 6' (ESAT-6) and 'culture filtrate protein 10' (CFP-10), which are not present in BCG, and are found in only a few species of environmental mycobacteria. These can be done on either cells or cell products derived from whole blood tests.

These tests aim to be more specific by removing false positive results, and to be better correlated with latent infection or dormant organisms.

3.10.2 Preventive therapy

If a test is positive for latent TB infection, but there is no evidence of active TB, the individual will be advised to start therapy with INH to reduce the risk of developing active TB in the future (Mohsenifar 2008:6). The Bacille Calmette-Guerin (BCG) vaccine is available and has been of some benefit in preventing TB. BCG is not widely used in the USA and is more often administered in countries where TB is common. The vaccine is not very effective in adults, although it can prevent TB from spreading outside the lungs in infants. Vaccination with BCG also causes a false-positive result on a Mantoux skin test and for that reason, is not recommended for general use.

3.10.3 Coping skills

Undergoing treatment for TB can be complicated; yet adhering to the therapy is the only way to cure the disease. The DOTS (see discussion under 3.14) programme assists patients to have the medication administered by a nurse or other health care professional on time. In addition, patients should try to maintain normal activities and hobbies and stay connected with family and friends (Nyamathi, Chrisatiani, Nahid, Gregerson & Leake 2006:775).

3.10.4 TB control in mine workers

All workers at AngloGold Ashanti's RSA operations are given chest X-ray examinations on engagement and at intervals varying from six to 12 months depending on occupation, as part of the company's TB surveillance programme.

In South Africa, gold miners with chronic obstructive airway disease from working in a dusty atmosphere in scheduled mines or works were entitled to workmen's compensation, as judged by lung function tests for airflow obstruction (Hnizdo, Murray & Davison 2000:235). Despite significant interventions to identify, treat and prevent exposure, TB infection rates in the RSA gold mining industry have increased in recent years. These higher rates are attributable to the increasing average age of the

workforce and the increasing levels of HIV/AIDS in a silica exposed workforce. Corbett et al (2003:1159) found age a strong risk factor for TB in each of the three cohorts, as was silicosis grade in the two cohorts for which it was determined.

According to Rees and Murray (2007:481), workers' compensation benefits in poorer countries may be critical in providing financial support for families and covering medical costs. Even in the absence of respiratory impairment, workers with silicosis may be excluded from many jobs due to an abnormal chest radiograph, so compensation benefits are generally provided.

3.11 FACTORS INFLUENCING PERCEPTIONS AMONG MINE WORKERS REGARDING TB

Perception is important factor in the battle against any disease (Van der Werf, Chechulin, Yegorova, Marcinuk, Stopolyanskiy, Voloschuk, Zlobinec, Vassall, Veen, Hasker & Turchenko 2006:390). Individual perceptions of those suffering from TB could influence the utilization or non-utilization of services that provide DOTS. Treatment interruption is also evident in literature as some TB sufferers do not believe that they have TB. They often cease treatment once the symptoms were less visible. This leads to the spread of TB and the development of MDR-TB which takes long to cure and is more complex.

In Kiev, in the Ukraine, TB patients often presented with advanced disease due to non-adherence to medication. In 2003, 1 404 TB patients commenced treatment in Kiev, and in the same period, 195 TB patients died from the disease. In many instances, disease-related factors such as co-infection with the HIV and MDR-TB, (defined as resistance to at least INH and RMP) or patient-related factors explain presentation with advanced disease and high mortality rates (Van der Werf et al 2006:390).

TB-HIV co-infection was diagnosed in newly diagnosed TB patients in Eastern Europe and in 2002 in Kiev, which could partially explain the high mortality rate (Van der Werf et al 2004:393; Hamers & Downs 2003:16). High mortality rates are also observed in individuals with MDR-TB (Lockman, Kruuner & Binkin 2005:2732).

Today, medications are the cornerstone of TB treatment, but the therapy is still lengthy. Normally, patients take antibiotics for six to 12 months to completely destroy the bacteria. The exact drugs and length of treatment depend on age, overall health, and the results of susceptibility tests, regardless of having TB infection or active TB (WHO 2006).

HIV/AIDS and silicosis are mutually reinforcing and intertwined epidemics. Both dramatically increase the susceptibility of workers to TB and furthermore, “the combined effect of silicosis and HIV infection is an example of interaction or synergistic risk, in which the two risks do not merely add to each other, but multiply each other” (Churchyard & Corbett 2001:161).

The perceptions that influences people’s timely seeking of medical diagnosis and treatment, adherence/non-adherence to DOTS and the related therapies and the change in health behaviour are diverse and complex in nature. The HBM posits that individuals perceive themselves to be at risk of a health threat before they will take actions to reduce risky behaviour or to engage in healthy alternative behaviour. The influence of people’ adherence to treatment is dependent on their interpretation of illness. Some individuals, who are affected by the TB medication, for example experiencing side effects, are more likely to interrupt treatment. The interpretation of wellness, illness and disease by those suffering from TB may be different from that of the health professional. This could adversely affect the conceptualisation of health education received by the individual.

3.11.1 Knowledge of TB and DOTS

In India, Uplekar, Juvekar, Morankar, Rangan and Nunn (1998:324) found that private practitioners’ knowledge of recognition of TB, as well as their perceptions about the public health significance of TB control, particularly the importance of three sputum examinations, is influenced by a number of factors, including the provider’s educational background, experience with managing TB cases and knowledge of NTP guidelines. The type of diagnostic procedure employed and treatment regimens prescribed, patient recording and case notification are all influenced by these factors. Furthermore, some people of high socio-economic status or social position usually opt for private services, as they perceive private providers as delivering high quality service.

Another factor that needs to be considered is that despite the international attention of TB and DOTS, knowledge of TB is not well established in Africa. There are still many superstitions and cultural beliefs surrounding TB which hampers its prevention, early diagnosis and treatment.

3.11.2 Lack of trust and stigma

Among the greatest challenges in public health centres in the Addis Ababa TB control programme is the difficulty of management of TB cases referred for treatment from private clinics (Hurtig, Pande, Baral, Newell, Porter & Bam 2002:79). There is a lack of trust among public health care providers about the reliability of the diagnosis of TB made by private practitioners. Consequently, TB patients referred from private clinics for treatment are required to repeat all diagnostic procedures, and TB control has been successful mainly in urban areas (Hurtig et al 2002:1013).

Today, TB is stigmatised due to its association with HIV, and many patients appear to seek private treatment to avoid exposure (Uplekar et al 1998:324). At the same time, however, public health services are appreciated for their ubiquitous nature and variety of services and affordability, although perceived as being of low quality, with long waiting times, unmotivated staff, shortages of medicines and lack of privacy, which also results in the community being more attracted to the private sector (Uplekar et al 1998:325). In Burkina Faso, Sanou, Dembele, Theobald & Macq, (2004:5) found that TB is stigmatised as a disease of the poor. In addition, some patients delay in seeking medical help since other social causes are considered first such as witchcraft. Poverty, lack of knowledge about the disease negatively affect adherence to TB treatment (Dembele et al 2004:4).

3.11.3 Educational status

According to Dennill et al (1999:30), people in the developing world suffer persistent ill health due to extreme poverty and illiteracy. Illiterate people cannot read to follow instructions. A person's literacy level impacts on his or her understanding and the ability to make informed decision. This may negatively impact on a person's awareness of his or her rights and choices. According to the WHO, people need to be aware that TB kills, but many don't know how to read and therefore cannot take informed decisions about health (WHO 2003:21).

According to Edelman and Mandle (1995:222), the success of health education depends largely on the person's ability to learn and process information and the

person's motivation to change his or her behaviour to address and to improve the present condition and to move towards health.

3.11.4 Religious and cultural beliefs

According to Suarez-Almazor, Newman, Hanson and Bruera (2002:2134) social and cultural structures play an important role on a person's perception of illness. In Africa, many religious and cultural beliefs are not consistent with modern western biomedical explanations which adversely affect their motivation to adhere to modern medicine (Goercke 2004:17). The role of traditional healers and medicines should not be ignored as many individuals only seek modern health care services if the symptoms persist and/or if the person's health deteriorates. The beliefs surrounding ancestors, witches and witchcraft and gods are often regarded as causal agent of illness which warrants divine interventions rather than western medication and therapy (Bouwer, Dreyer, Herselman, Lock & Zeelie 1997:24).

In some cultures, health communication is complicated by having to rely on third parties rather to the patient him/herself. There also exists a vast array of treatments and cures for TB including traditional remedies, prayer, for example the Moslem beliefs and other forms of traditional rituals which, according to Citrin (2006:3) may complicate treatment.

3.11.5 Perceived susceptibility

Understanding how individuals experience or perceive their illness may shed light on factors affecting voluntary presentations and adherence which may influence the outcome of TB control efforts. In a study by Nnoaham, Pool, Bothamley and Grant (2006), it was found that the participants agreed that they have heard about TB but that they were convinced that the disease will never affect them.

Treatment interruption is related to perceptions of TB. Chivonivoni (2008:25) found that people want medication only for as long as critical symptoms lasted, others would continue with the treatment long after they were cured and no further symptoms were present, because they believed that the "roots" of the disease had to be removed.

3.11.6 Perceived severity/seriousness of TB

People's perception of the severity of TB is related to their views of the serious consequences of the disease. Perceptions of TB seriousness require addressing the perceived costs of having untreated/partially treated TB which are the loss of a job, spread of TB to an entire family or community, the development of MDR-TB and eventually death. People who value good health as a priority are more likely to engage in promotive and preventive health activities and adhere to DOTS. If people do not take TB seriously, they will not understand the need to adhere to DOTS (Chivonivoni 2008: 12).

3.11.7 Social structures

There is a positive association between social support as well as encouragement from friends, relatives or church groups and healthy behaviour. Taking treatment for a long time is difficult unless this is encouraged through social support from significant others. Families are reportedly more influential on behaviour than friends or health care professionals (Pender 1996:269). The WHO (2003a:48) states that "if you do not have the support from the family, the community and society, then you lose the fight". People without support are less likely to recover as they increasingly find themselves alone. Social support can help people to overcome structural and personal barriers and may influence their knowledge, attitudes and beliefs about TB and DOTS (Munro, Lewin, Smith, Engel, Fretheim & Volmink 2007).

Peer and group support have been known to increase adherence to DOTS. TB sufferers who successfully completed the DOTS programme could be used to give health education to TB sufferers on DOTS. Sharing experiences could also lead to adherence and removal of stigma (Chivonivoni 2008:12).

3.12 TB CONTROL PROGRAMMES

With the introduction of the globally recommended DOTS strategy for managing TB, control programmes across the world are diagnosing more TB patients and successfully treating them. In 2005, the WHO (2005a:349) reported a global cure rate of 83%, which was close to the expected target of 85%. However, the reported case detection rate was still far below the expected 70% (WHO 2005a:349).

Effective control strategies aim at reducing the burden of disease, health care and compensation costs (Guild et al 2001:163). This can only be achieved if there are combined efforts from a variety of sources.

Control of TB is a public health activity that is important for society and in which it is appropriate for the state to play a dominant role. According to Hattingh et al (2008:276), due to its infectious and resistant nature, TB cannot be stopped at national borders, and virtually every international airport and border post in the world is therefore a port of entry for TB carriers. Guild et al (2001:164), describe the objectives of TB control programmes as:

- Reduce the morbidity and mortality attributable to TB
- Prevent development of resistance to anti-TB drugs
- Ensure accurate and ongoing evaluation of the programme performance

Specific objectives should include:

- Bacteriological evaluation of all pulmonary TB cases
- DOTS for all cases
- Cure of at least 85% of new smear positive cases using standard short course chemotherapy

Treatment of TB with short course chemotherapy is a highly cost-effective intervention from a societal perspective and one of the most important basic health care interventions for the state to finance, particularly where health care resources are very scarce. Accordingly, organized TB control is publicly financed and managed mainly within the public health care sector in many countries (Simwaka, Bello, Banda, Chimizi, Squire & Theobald 2007:24).

3.13.1 TB control programmes in mines

Mine workers may self-report for medical care with any symptoms at any time, and most TB patients are found in this way. Active case finding comprises chest

radiographic screening as well as contact tracing (one sputum smear and a chest radiograph) of workers who sleep in the same room as persons with TB (Murray, Sonnenberg, Stuart, Shearer & Godfrey-Faussett 1999:733). In Tanzanian mining industries, workers clinically suspected of having TB have at least three sputum smear examinations, and a minimum of one specimen is cultured and routinely tested for drug-resistant organisms *Mycobacterium tuberculosis* is bacteriological confirmed in 94% of patients who receive treatment for pulmonary TB. Smear-positive patients are initially hospitalised until they are smear negative, after which they report every weekday to the primary health care facilities, where DOTS is administered and recorded.

There are two facets to workplace TB control activities. Firstly, the workplace represents an opportunity for making TB control convenient and accessible to infected workers. Secondly, workers have the right to operate in an environment that does not pose undue hazards to health, and employers have the responsibility to implement measures that decrease the occupational risk of TB. These measures comprise environmental controls and the steps to identify and ensure the treatment of employees with TB and therefore to stop the cycle of TB transmission (WHO 2003a:323).

According to Guild et al (2001:164-5), over and above the recommendations of a national TB control programme there are a number of considerations specific to a mining operation that require additional measures, including:

- The recruitment of workers from high TB incidence communities, including those coming on site as part of contractor operations.
- The additional risk of TB conferred by silica dust at certain operations.
- The additional risk of TB conferred by high HIV infection rates among workers or prospective workers.
- The in-house spread of TB facilitated by camp or hostel accommodation (and of HIV to and from surrounding communities).
- In-migration caused by the mining operation and associated overcrowding and/or development of informal housing, resulting in poor living conditions and the increased spread of TB.
- Occupational disease compensation laws requiring the reporting of PTB with or without pneumoconiosis.

- While the initial target of a company TB programme should be its own workers and those of contractors, TB in the surrounding area.
- The strong connection between TB and HIV may transfer some of the stigma of HIV to TB communities and should be considered an important part of the extended mining environment.

Treatment consists of two months of INH, RMP, pyrazinamide, and ethambutol, followed by four months of INH and RMP. All patients, regardless of their history of previous TB treatment, receive the same regimen except for those with multi-drug resistance, who are treated according to their drug sensitivity pattern, which is available within 6 weeks after testing for TB. Patients are followed-up at a TB clinic at the hospital, with an average of three visits during the six-month treatment period. At each visit the patient is assessed clinically by a physician, a sputum smear is examined, and a chest radiograph taken. At the end of treatment, sputum is cultured and, if positive, the organism is tested for drug susceptibility (WHO 2006b).

3.14 SUMMARY OF THE DOTS PROGRAMME

DOTS is a package of the minimum care essentials for the control of TB. It is a comprehensive strategy developed by the WHO which primarily focuses on primary health services around the world to detect and treat TB patients (WHO 2008b).

Directly observed treatment (DOT) means that a health worker or a supporter/supervisor or significant other person supports and watches the patient swallowing the tablets to ensure that he or she is taking the prescribed combination of drugs, at the right time and for the appropriate duration. Remembering to take drugs for 6 to 8 months can be a problem (WHO 2002a:13) The DOTS strategy aims at detecting at least 70% of new smear positive cases and successfully treating 85% of them. Short- course refers to a treatment regimen that lasts for six to eight months and uses a combination of powerful anti-TB drugs (WHO 2002a:10). To ensure that the treatment cures the patient, there is a need to ensure the patient's adherence to his/her treatment regimen. Patient adherence to anti-TB treatment means that the patient takes every dose of the recommended treatment regimen (WHO 2001c:17). This is assured through DOTS.

Countries in Africa were the first to implement the DOTS strategy, following the experiences of Tanzania. By the year 2000, 40 out of 46 (85%) countries in Africa were implementing DOTS, 20 (43, 5%) of them having achieved a nationwide coverage and the rest piloting or expanding the strategy (WHO 2001b:4).

3.14.1 Elements of DOTS

From the mid-1990s until 2005, the internationally-recommended strategy for achievement of TB control targets was DOTS. The DOTS strategy has five components:

- sustained political commitment to tuberculosis control
- diagnosis by sputum smear microscopy
- standardized short-course chemotherapy using first-line drugs, provided under proper case management conditions including directly observed treatment (DOT)
- regular supply of free drugs
- recording and reporting system with assessment of treatment outcomes

In March 2000, 20 of the 22 high-burden countries that collectively account for 80% of global cases committed to achieving the WHO targets through implementation of the DOTS strategy (Amsterdam Declaration 2000) (WHO 2001d) and DOTS remains the foundation of the new Stop TB Strategy developed by WHO to guide TB control efforts during the period 2006–15. However, while 82% of new smear-positive cases enrolled in DOTS programmes in 2002 were successfully treated, only 45% of estimated new smear-positive cases were detected by DOTS programmes in 2003 (WHO 2001d).

- **Sustained political commitment**

DOTS programmers need government support not just funding, but also letting people know that government is behind the campaign (WHO 2002a:16). The political and financial commitment permitted everyone with infectious TB regardless of financial status to access high quality TB treatment free of charge in the TB dispensaries (Chen, Zhao , Duanmu, Wang, Du & Chin 2002:430). The DOTS can shrink overall

expenditure for TB control despite its higher initial funding requirement; hence the programme can be cost-effective.

- **Access to quality assured TB sputum microscopy**

Sputum smear microscopy is the most effective way of positively diagnosing TB. Smear microscopy confirms that the bacilli are present and detects the most infectious patients so that they can be treated and cured, to prevent the spread of TB to other people in the community. The WHO aims to achieve a 70% case detection rate of TB cases and cure 85% of those detected (Borgdoff et al 2002: 3).

- **Standardised drug regimen for six to eight months**

According to the WHO (2004a:25) four drugs are used across the world. The drugs which are commonly used are:

- *Isoniazid* (INH) acts in both alkaline and acid media (mainly alkaline) on both intracellular and extra cellular bacilli, action commences after 24 hours of administration (DOH 1998:48) *Isoniazid* kills 90% of the total population of bacilli during the first few days of treatment. The patient might develop peripheral neuropathy and hepatitis (WHO 2004a:130).
- *Rifampicin* acts in both alkaline and acid media on both intracellular and extracellular bacilli, and on bacterial populations including dormant bacilli. Action commences within a few hours of intake. Since *rifampicin* is bactericidal with a high potency, it is the most effective sterilizing anti-B drug and makes short-course therapy possible (Merck Manual 2008).
- *Pyrazinamide* acts only in an acid medium, on intracellular bacilli only (inside macrophages) and mainly on slow growing bacilli. It achieves sterilising action within 2-3 months. *Pyrazinamide* is bactericidal with a low potency (Merck Manual 2008).
- *Ethambutol* acts in both alkaline and acid media on all bacterial populations, minimises the emergence of drug resistance. *Ethambutol* is bacteriostatic with

low potency. The drug may cause visual disturbance, skin rashes and joint pains (Morbidon 2004).

The continuation of these drugs is necessary to minimise the possibility of relapse. Lack of supervision of anti-TB treatment, poor prescribing by clinicians and the use of single drugs, and patients' non-adherence to their treatment regimens can cause acquired multi-drug resistant (MDR) TB. HIV positive persons who have TB pose TB treatment challenges but can and do get cured from TB provided that they adhere strictly to the correctly prescribed TB regimens (Floyd, Arora, Murthy, Lonroth, Singla, Akbar, Zignol & Uplekar 2006).

- **A regular, uninterrupted supply of drugs**

Health facilities should have adequate supplies of drugs since mycobacterium tuberculosis quickly becomes resistant to drugs, if treatment is inadequate or interrupted for any reason and if the supply of drugs runs out. This might result in patients developing MDR-TB (WHO 2003a:17).

- **A standardised recording and reporting system**

The purpose of recording and reporting is to provide information to help information to help better manage the TB programmes at all levels. Accurate record keeping for each patient, maintaining up to date registers and reporting data to the central unity monthly, quarterly and annually is essential for the proper management of the TB programme. This results in having fewer patients slipping through the net (WHO 2002a:16-17). It also means that by knowing patients' stories, a relationship is built with them.

3.14.2 Multi-drug resistant TB (MDR)

MDR TB refers to resistance to both *isoniasid* and *rifampicin* with or without resistance to other drugs. It means that these drugs have little or no effect against the TB bacilli causing the disease in a patient. MDR TB is a result of errors and omissions in the following areas:

- **Prescription of short course chemotherapy**

The standard treatment for TB is *isoniasid*, *rifampicin*, *pyrazinamide* and *ethambutol* for two months followed by *isoniasid* and *rifampicin* for 4 months. The prescription of inadequate combination of anti-TB drugs can lead to MDR-TB. A certain amount of TB germs are naturally resistant to one or another of the standard drugs prescribed. This is why it is important to use a combination of drugs. If the treatment is stopped before all the bacteria are killed, (because the patient feels better), cannot get to the clinic to get a re-supply, because of drug shortage or if an incomplete combination of drugs is given, the resistant bacteria can grow and cause the symptoms to return (Floyd et al 2006).

- **Management of drug supply**

The challenges experienced by poor patients in obtaining all the drugs that they need (due to lack of financial resources or social insurance and lack of funds for transport) may lead to interruption in taking drugs. In some cases, there are prolonged shortages of anti-TB drugs due to poor management and or financial constraints mainly in developing countries.

- **Case management**

Poor case management results when the treatment is not directly observed especially during the initial phase. There might be poor implementation of the TB control programme by the health workers. The health workers have a responsibility to prevent poor adherence by supervising patients taking the anti-TB treatment and providing DOTS.

- **Process of drug delivery to the patient**

In some cases, the patient's inadequate knowledge due to lack of information or due to lack of sufficient explanation by the health workers before treatment may result in the patient developing MDR-TB. Health education should be given to TB patients. Health information in the form of pamphlets in languages understandable by the patients should be available to the patients.

MDR is complex and expensive to manage. If a person has drug resistant TB, anyone they pass it on will also have the same resistance. Cure rates are low and fatality rates are high.

Bacterial cultures grown in the laboratory can tell the doctors which drugs kill the bacteria. In poor countries, many TB services do not have the resources or facilities for culture or resources to provide the drugs needed. A standardised drug regimen, DOT, a good supply of high quality drugs and isolation of infectious patients with drug resistant forms of the disease are some of the main means of preventing the spread of MDR-TB.

3.14.3 The effectiveness of DOTS

DOTS is recommended by the WHO for treating TB. Since it was introduced throughout the world in 1994, 10 million people have been successfully treated (WHO 2003a:13). A total of 202 countries and territories out of 210 reported data to the WHO for the year 2000, 148 countries have adopted the DOTS strategy, 95 countries had more than 90% DOTS coverage. DOTS is reportedly able to cure up to 95% or more of TB patients.

According to Jackson (2002:51) DOTS in the SSA countries costs between US\$15 and US\$30 per patient and is ranked by the World Bank as one of the top ten most cost effective public health interventions. DOTS is affordable to most TB patients (Borgdoff et al 2002:2). Countries in Africa were the first to implement the DOTS strategy, 40 out of 46 (85%) countries in Africa are implementing DOTS, 20 (43.5%) of them have achieved a nationwide coverage and the rest are still piloting or expanding the strategy (WHO 2001b: 4); 95% countries had more than 90% DOTS coverage.

DOTS reduces poor outcomes (failure, relapse, acquired drug resistance) which are usually more frequent with unsupervised treatment and costly to manage (Hill, Ross, Manikal, Vivek Paul & Riska 2000:3).

The DOTS strategy can shrink overall expenditure for TB control programmes despite its higher initial funding requirement thereby making the programme cost effective. DOTS works not only by making patients take their medication but also by creating an environment where everyone from government to health workers to patients work together to fight the disease (WHO 2003a:13).

3.15 CONCLUSION

This chapter discussed the literature review, which indicated that little has been researched and written on TB knowledge, awareness and practices in the mining industry in Africa, particularly in Tanzania where mining is new.

Chapter 4 describes the research design and methodology.

CHAPTER 4

Research design and methodology

4.1 INTRODUCTION

This chapter describes the research design and methodology used in the study, including population, data collection, validity and reliability, and ethical considerations. Research methodology is the application of all steps, strategies and procedures for gathering and analysing data in a research investigation in a logical and systematic way (Burns & Grove 2001:26). The selection of the research methodology or strategy is the core of a research design and is probably the single most important decision the investigator has to make.

The aim of this study was to investigate the knowledge, awareness and practices regarding TB at a selected gold mine in Tanzania in order to try to enhance the paucity of knowledge in this area of public health.

The objectives of this study were to

- Investigate the mineworkers' knowledge, awareness and practices regarding TB at the selected gold mine.
- Determine what programmes are available to promote the mineworkers' knowledge, awareness and practice regarding TB at the selected gold mine.
- Investigate the mineworkers' perceptions of the recent programmes at the selected gold mine.
- Develop guidelines to enhance mineworkers' knowledge, awareness and practices regarding TB at the selected gold mine.

Cohen et al (2000:44) refer to methodology in research as a systematic way of gathering data from a given population so as to understand a phenomenon and to generalize facts obtained from a large population. Du Plessis, Appelbaum and Pretorius (2001:23) posit that methodology is concerned with the "logic of method".

Methodology embraces the research design, population, instruments used to collect data, ethical considerations, data analysis and its interpretation. Methodology therefore helps the researcher and the reader to understand the process of the research thus giving it a scientific merit.

4.2 RESEARCH DESIGN

A research design is a blueprint for conducting the study that maximizes control over factors that could interfere with the validity of the findings (Burns & Grove 2005:211). The design guides the researcher to plan and implement the study so as to achieve the set goals and is referred to by Polit and Beck (2006:509) as a “general plan for addressing research questions, including specifications for enhancing the studies’ integrity”. Green and Thorogood (2004:34) refer to the research design as “the what, how and why of data production” to answer the research question.

A quantitative, descriptive cross sectional research design was chosen for this study in order to provide a detailed description of the knowledge and awareness of TB among gold miners In Tanzania.

4.2.1 Quantitative

Quantitative research is a formal, objective and systematic process for generating information about the world. The specific questions generate knowledge, which directly improves understanding the phenomenon under study, which in this case was the level of worker’s knowledge, awareness and practices regarding TB.

In quantitative research, evidence is gathered according to a specified plan, using formal instruments to collect the needed information (Somekh & Lewin 2005:215).

According to Burns and Grove (2005:26), quantitative research is the “formal, objective, systematic process in which numerical data are used to obtain information about the world”. Furthermore, this method is used to describe variables, examine relationships among variables and determine cause-effect interactions between variables. This is currently the method of choice for scientific investigations in health care practice and requires rigorous control to identify and limit the effects of extraneous variables not

under study (Burns & Grove 2005:26). The researcher also controls the study by imposing conditions on the research situation so that biases are minimised.

In this study, quantitative information was gathered on the knowledge, awareness and practices regarding TB among gold miners working at a selected gold mine in Tanzania by using a structured questionnaire. The data were analysed using the Statistical Package for the Social Sciences (SPSS), version 14.0, microcomputer program. Frequencies were determined for the responses to all the questions. The respondents were permitted to respond affirmatively to none, some, or all of the statements in the questions.

4.2.2 Descriptive design

Burns and Grove (2005:248) state that descriptive designs help to identify problems in current practice with a view to improve practice outcomes. When a study is not structured formally as an analytical or experimental study, implying that it does not aim specifically to test a hypothesis; it is called a descriptive study, and belongs to the observational category of studies (WHO 2001b:16). Salks and Allsop (2007:6) describe a descriptive study as “providing current information or intelligence on a problem”. In descriptive studies, researchers’ intention is to “portray an accurate picture of reality” (Stommel & Wills 2004:437). McMillan and Schumacher (2001:283) describe descriptive research as “concerned with the current status of something and ‘asks’ what is and reports things as they are”.

The purpose of descriptive research is “to observe, explore, describe and document aspects of a situation as it naturally occurs” (Polit & Beck 2006:192). Descriptive studies have little or no researcher control. Subjects are examined as they exist in their natural settings, for example, in their homes, hospital or at work (Burns & Grove 2005:28). Descriptive research is “...the exploration and description of a phenomenon in real-life situations. It provides an accurate account of characteristics about particular individuals, situations or groups” (Burns & Grove 2005:24). The outcome of descriptive research includes the description of concepts, identification of relationships, and development of hypotheses that provide a basis for future quantitative research (Burns & Grove 2005:25).

This study wished to investigate and describe the knowledge, awareness and practices regarding TB at a selected gold mine in Tanzania in order to enhance the paucity of knowledge in this area of public health.

4.2.3 Cross-sectional

Cross-sectional studies entail the collection of data from a cross-section of the population, which may comprise the whole population or a proportion (sample) of it (WHO 2001b:17). Somekh and Lewin (2005:216) point out that a cross-sectional study involves the collection of quantitative data on at least two variables at one point in time and from a number of cases. The WHO (2001b:17) concurs, adding that cross-sectional studies provide a prevalent rate at a particular point in time (referred to as point prevalence) or over a period of time (referred to as period prevalence).

In this study, research assistants collected data from mine workers employed at a selected gold mine in Tanzania.

4.3 POPULATION AND SAMPLE

4.3.1 Population

The population is the entire set of individuals having some common characteristic(s). The accessible population comprises the individuals who conform to the eligibility criteria and are available for a particular study (Burns & Grove 2005:342; De Vos et al 2002:198).

The population for this study was all workers employed by a selected gold mine in Tanzania during the study period.

According to Polit and Beck (2006:259), a population is the entire aggregate of cases that meet specified criteria. Bryman (2004:85) describes a population as the totality of persons, events, organisation units, case records or other sampling units from which the sample is selected and with which the research problem is concerned. The population can also be regarded as the group to which results of a study are generalised (Trochim 2006:32). In addition, Somekh and Lewin (2005:217) refer to a population as a “complete

set of units being studied when time, costs and accessibility often prohibit the collection of data from every member or about every item”.

4.3.2 Sampling frame

Once the study population is identified, the accessible population is listed from which the sample is drawn. This is referred to as a *sampling frame* (Trochim 2006:32). *Sampling* is the process of selecting a portion of the population to represent the entire population (Polit & Beck 2006:260). According to Polit and Beck (2006:260), a *sample* is a subset of a population selected to participate in a study.

Sample size refers to the number of elements that are included in the sample. Involving a representative sample in a study enhances the generalisability of the research results. According to Polit and Beck (2006:267), sample size is the number of subjects in a sample.

Generally, as the sample size increases proportional to the population size, sampling error is likely to decrease. The larger the sample, the more representative it is likely to be (Polit & Beck 2004:268). If the sampling error is small, the sample is likely to be representative of the population. Representativeness is enhanced by conducting probability (random) sampling and involving a suitable sample size, considering the population size. If a sample is representative of the population, it may be possible to generalize the research findings to the population (Burns & Grove 2005:344; Polit & Beck 2006:299).

The sample selected for this study included all workers who were randomly selected and filled in a questionnaire in order to measure the knowledge, awareness and practices regarding TB among the workforce at a selected mine.

4.3.3 Sampling and sample

A sample is a subset of a population selected to participate in a study (Polit and Beck 2006:260). According to Somekh and Lewin (2005:218), a sample is studied in order to understand the population from which it is drawn. Terre Blanche and Durrheim (2004:44) state that sampling involves decisions about “which people, events, behaviour or social processes are selected and/or observed”. The aim of sampling is to select subjects that will be representative of the population about which the researcher aims to draw conclusions regarding what is being studied (Terre Blanche & Durrheim 2004:44).

Complete coverage of the population is seldom possible and even if it were possible, time and cost considerations usually make this a prohibitive undertaking. Sampling is the science and practice of selecting information from populations in a manner that allows defensive inferences to be drawn from those data (Saks & Allsop 2007:157). The use of samples may therefore result in more accurate information because with a sample, time, money and effort can be concentrated to produce better-quality research information (De Vos et al 2002:199).

The method of sample selection may be based on a probability or non-probability approach. A probability sample is one that has been selected using random selection so that each unit in the population has a known chance of being selected (Bryman 2001:85). The best-known kinds of probability sampling are stratified random sampling, simple random sampling, systematic sampling, cluster sampling, and panel sampling (De Vos et al 2002:203).

4.3.4 Sample size estimation

According to Polit and Beck (2006:267), sample size is a major issue in conducting and evaluating quantitative research. There is no simple equation to determine how large a sample is needed, but quantitative researchers are generally advised to use the largest sample possible. According to Somekh and Lewin (2005:218), the sample size rather than the relative size or proportion of the population sampled is the crucial factor. Saks and Allsop (2007:158) state that the larger the sample size, the smaller the error will be in estimating the characteristics of the whole population, but the more it will cost to

administer a survey and analyse the data. The sample size is dependent on the accuracy required and the likely variation of the population characteristics being investigated.

This study used a convenience sampling method of the non-probability sampling design to select the respondents. A convenient sample consists of using the most readily available or most convenient group from the sample (Cohen et al 2000:102). This method was chosen because it provides easy access to the respondents.

The respondents were randomly chosen as the workers walked in the front gate to report to work. From the selected workers every second worker was enrolled to the study after obtaining their consent to participate on the study. The sample consisted of 100 workers who met the set criteria, being employed for more than six months by the mining company.

Generally, as the sample size increases proportional to the population size, sampling error is likely to decrease. If the sampling error is small, the sample is likely to be representative of the population. Representativeness is enhanced by conducting probability (random) sampling and by involving a suitable sample size, considering the population size. If a sample is representative of the population, it may be possible to generalize the research findings to the population (Burns & Grove 2005:343-345; Polit & Beck 2006:299).

The study sample included employees who were randomly selected to participate in the study in order to measure the knowledge, awareness and practices regarding TB among the workforce.

4.4 DATA-COLLECTION INSTRUMENT

Measurement is the process of allocating numbers to objects or events or situations based on specific rules (Burns & Grove 2007:40). A component of measurement is “instrumentation” which is the application of specific rules to the development of a measurement device or instrument (Burns & Grove 2007:40).

A structured questionnaire enabled the researcher to analyse the data quantitatively. Structured questions (also called limited response or selected response questions) are followed with a set of choices and respondents select one of the choices as an answer (McMillan & Schumacher 2001:26-9). The questions developed for this study focused on the knowledge, awareness and practices regarding TB among the workforce.

Burns and Grove (2001:49) define data collection as “the precise systematic gathering of information relevant to specific research objectives or questions”. Data can be collected in several ways depending on the study and can include a variety of methods; however, the research objectives must be accomplished with the instrument used (Burns & Grove 2001:50).

Research data, particularly in quantitative studies, are often collected according to a structured plan that indicates what information is to be gathered and how to gather it. Structured methods yield data that are relatively easy to quantify and analyse. Structured methods also enhance the objectivity of the data collected by eliminating bias due to the researcher’s personal feelings or beliefs (Burns & Grove 2001:50; Polit & Hungler 1995:310-311).

4.4.1 Development of a data-collection instrument

In order to collect the needed data or information in the study, researchers need to develop a measuring instrument, to be given to all the participants, to ensure uniformity and consistency. According to McMillan and Schumacher (2001:185), there might be a need to develop a new measuring instrument for the research evaluation for a specific setting.

Taylor et al (2006:222-224) list the following criteria for the development of a questionnaire:

- The concepts should be relevant to the study question
- Concepts should be translated into items
- One question per item
- Items should be worded clearly
- The most important items should be placed at the beginning of the questionnaire

In this study, the research methodology was quantitative, which required that all the participants to be exposed to the same measuring instrument. Accordingly, the researcher developed a new questionnaire and used existing questions from questionnaires compiled by the WHO in order to obtain the relevant information needed for this study. The questionnaire items facilitated quantification of the results thus meeting the requirements for quantitative data analysis.

4.4.2 Structure of the questionnaire

Gerrish and Lacey (2006:369) state that when designing a questionnaire, the researcher should decide what, how and why questions need to be asked. In addition, Gerrish and Lacey (2006:369) emphasise that the questions should be relevant and the language should be at the level of the participants.

4.4.3 Instrument development

The researcher developed a structured questionnaire for this study from previous WHO questionnaires (WHO 2008a:46). A guide to developing a knowledge, attitude and practice survey was also consulted.

The strength of structured questionnaires is the ability to collect unambiguous and easy to count answers, leading to quantitative data analysis (Bowling 2007:258).

The items included in the questionnaire were carefully chosen to elicit responses specific to the research objectives. A combination of open-ended and closed questions was used to offset the strengths and weaknesses of each type of question (Polit & Hungler 1995:336). According to Bowling (2007:278), open-ended questions (without pre-coded response choices) are essential where replies are unknown, too complex or too numerous to pre-code. Closed questions with pre-coded response formats are preferable for topics about which much is known, and so a suitable response code can be developed, which is simple (Bowling 2007:279).

The workers were chosen on the basis that they had been in the company for more than six months. The researcher developed the questionnaire in English and Swahili, languages in which the researcher is fluent.

The questionnaire consisted of four sections:

- Section 1: Respondents' demographical profile
- Section 2: Knowledge of TB, awareness and lastly practices regarding TB
- Section 3: Illicit understanding of TB programmes
- Section 4: Respondents' perceptions of the programmes and suggestions on measures to enhance TB prevention and the programme.

4.4.2 Reliability

Polit, Beck and Hungler (2001:305) describe reliability as “the consistency with which an instrument measures the attribute”. An instrument is said to be reliable if its measures accurately reflect the true score of the attribute under investigation. Assessing the reliability of the instrument means “...to establish consistency and accuracy with multiple measures” (Rossouw 2003:122).

Reliability relates to the precision and accuracy of the instrument. If used on a similar group of respondents in a similar context, the instrument should yield similar results (Cohen et al 2000:117). According to Somekh and Lewin (2005:216), reliability refers to the stability or consistency of measurements; whether or not the same results would be achieved if the test or measure were applied repeatedly. Accurate and careful phrasing of each question to avoid ambiguity and leading respondents to particular answers ensured the questionnaire's reliability. The respondents were informed of the purpose of the study and the need to respond truthfully.

In general, reliability refers to the extent to which the independent administration of the same instrument consistently yields the same (or similar) results under comparable conditions (De Vos et al 2002:168). Two aspects of reliability were used in this study, namely internal consistency and equivalence. An instrument is said to be reliable if it always generates the same results (Somekh & Lewin 2005:216). Questions relevant to the subject of investigation were used in order to enhance the reliability of the instrument.

In this study, careful training, development of a clearly defined questionnaire and the use of a small number of research assistants enhanced the accuracy of observer ratings and classifications. To test the questionnaire used in this study, the researcher gave it to colleagues for peer review to determine whether they all interpreted the items the same. The researcher identified five staff members from the clinic at the mine to test the questionnaire for relevance and structure. These colleagues did not participate in the study.

4.4.3 Validity

According to Somekh and Lewin (2005:216), validity refers to whether or not the measurement collects the data required to answer research questions .A measure can be reliable (always generate the same results) but not valid (not measure the intended concept).

Validity also refers to the ability of an instrument to measure exactly what it is supposed to measure (De Vos et al 2002:167). In this study, the researcher focused on content validity, which refers to the accuracy with which an instrument measures the factors under study. Content validity is concerned with the sampling adequacy of the items for the construct being measured. This was assured by using questions from various instruments that had been used in other similar studies. The questionnaire was also subjected to evaluation and approval by the study supervisors.

4.4.4 Pre-test

The researcher conducted a pre-test study with 20 mine workers that was randomly chosen, who did not participate in the final study. The data collected during the pre-test was analysed carefully to determine whether the respondents had answered the research questions and to determine if the questions were clear to them. The questionnaire was subsequently altered on the basis of the feedback from the pre-test and administered in the main study (De Vos et al 2002:177).

4.5 DATA COLLECTION

The researcher selected and trained a team of two research assistants for the data collection. The research assistants were trained to uphold confidentiality of information, exercise patience and perseverance, be pleasant, have a positive attitude, and follow instructions. The researcher supervised the research assistants throughout the data collection. The researcher checked the completed instruments at the end of each day for omissions, incomplete answers, unclear statements or illegible writing. Data was collected for a period of three days during October 2008.

4.6 ETHICAL CONSIDERATIONS

Ethics deals with matters of right and wrong. *Collins English Dictionary* (1991:533) defines ethics as “a social, religious, or civil code of behaviour considered correct, esp. that of a particular group, profession, or individual”. Research ethics involves protecting the rights of respondents and institutions in which research is done, and maintaining scientific integrity (Babbie & Mouton 2001:531; Burns & Grove 2005:181). A researcher is responsible for conducting research in an ethical manner. Failure to do so undermines the scientific process and might have negative consequences (Brink et al 2006:30).

The researcher obtained permission from the Ethics Committee of the University of South Africa and from the mining company where the study was conducted (see annexure A and B). In addition, all the information obtained was solely used for the purposes of this study and any publication in journals would be subject to prior permission from the mining company.

According to Trochim (2006:22), the principle of voluntary participation requires that people should not be coerced into participating in research. Closely related to the notion of voluntary participation is the requirement of informed consent. Essentially, this means that prospective research participants must be fully informed about the procedures and risks involved in the research and must give their consent to participate.

Ethical standards also require that researchers should not put participants in situations where they might be at risk of harm as a result of their participation. Harm can be defined as both physical and psychological (De Vos et al 2002:64). The respondents' privacy was ensured during the research process. According to Trochim (2006:22), two

standards are applied in order to help protect the privacy of research participants, namely confidentiality and anonymity.

The researcher assured the respondents that any information they provided would be treated with confidentiality and not made available to anyone who was not directly involved in the study. Not disclosing any identifying information or using their names ensured the respondents' anonymity.

Conducting research ethically begins with identification of the topic and continues through to the end when the finding is published. Researchers' conduct therefore requires not only expertise and diligence, but also honesty and integrity (Burns & Grove 2001:1991; De Vos et al 2001:24).

The researcher adhered to the principles of voluntary participation, informed consent, minimisation of harm, confidentiality and anonymity in this study. The risk of harm was minimal because the study was non-invasive, involving participants filling in a structured questionnaire. The scope and benefits of the study were explained to the respondents and informed consent obtained. The respondents' anonymity was maintained by not recording their names on questionnaire sheet, and the data collected was kept in the researcher's possession in a safe place to ensure confidentiality.

4.7 LIMITATIONS OF THE STUDY

Although measures were taken to minimise errors through using a structured questionnaire and training the research assistants, the information obtained was vulnerable to respondent and researcher biases.

Moreover, being a cross-sectional study, the state of affairs found on the data-collection days might have been influenced by recent special activities or events at the mine.

4.8 DATA ANALYSIS

In most social research, data analysis involves three major steps, namely cleaning and organising the data for analysis, describing the data, and testing hypotheses and models (Trochim 2006:101).

Data preparation involves checking or logging the data in; checking the data for accuracy; entering the data into the computer; transforming the data; and developing and documenting a database that integrates the various measures (Trochim 2006:101). A statistician analysed the data, using the Statistical Package for the Social Science (SPSS), version 14.0, microcomputer program.

4.9 CONCLUSION

This chapter covered the research design and methodology and described the population, sampling and sample, research instrument, data collection, ethical considerations, study limitations and data analysis in detail.

Chapter 5 discusses the data analysis and interpretation and results.

CHAPTER 5

Data analysis and interpretation

5.1 INTRODUCTION

In the previous chapter the research design and methodology of this study was described. This chapter discusses the data analysis, findings and interpretation of the results. The data was analysed and the results were presented with the aid of percentages, tables and graphs, whenever applicable and relevant research findings and literature to support the findings are included.

The purpose of the study was to investigate workers' knowledge, awareness and practices regarding TB at a selected gold mine in Tanzania in order to enhance the paucity of knowledge in this area of public health.

The objectives of the study were to

- Investigate the mineworkers' knowledge, awareness and practices regarding TB at the selected gold mine.
- Determine what programmes are available to promote the mineworkers' knowledge, awareness and practice regarding TB at the selected gold mine.
- Investigate the mineworkers' perceptions of the recent programmes at the selected gold mine.
- Make recommendations to enhance mineworkers' knowledge, awareness and practices regarding TB at the selected gold mine.

5.2 DATA COLLECTION

The data was collected by means of a structured questionnaire, consisting of four sections:

Section 1: Respondents' demographical profile

Section 2: Respondents' knowledge, awareness and practices regarding TB

Section 3: Respondents' understanding of TB programmes

Section 4: Respondents' perceptions of current programmes and suggestions for enhancing TB prevention and programmes.

The population consisted of workers employed as miners at a gold mine in Tanzania sampled to participate in this study. A sample of 100 respondents was taken from various levels or categories of workers, namely in management positions, working on ground level and working underground. However, two respondents did not qualify because their case files were missing key variables and they were excluded. Accordingly data was collected from 98 respondents, using a structured questionnaire.

The data was kept safely and protected by a secret password, to which only the researcher had access.

5.3 DATA ANALYSIS

A statistician analysed the data captured from all 98 files using the Statistical Package for the Social Science (SPSS), version 14.0, microcomputer program, and converted into percentages and collated in the form of tables, graphs and figures to make the data presentation meaningful. The data was analysed according to the sections and items of the questionnaire.

5.3.1 Section 1: Demographical data

This section covered the respondents' age, gender, highest level of education, marital status, and the distance to the nearest health clinic or hospital.

5.3.1.1 Age distribution

The respondents were asked to select their age from a list of age groups. Figure 5.1 depicts the respondents' age distribution.

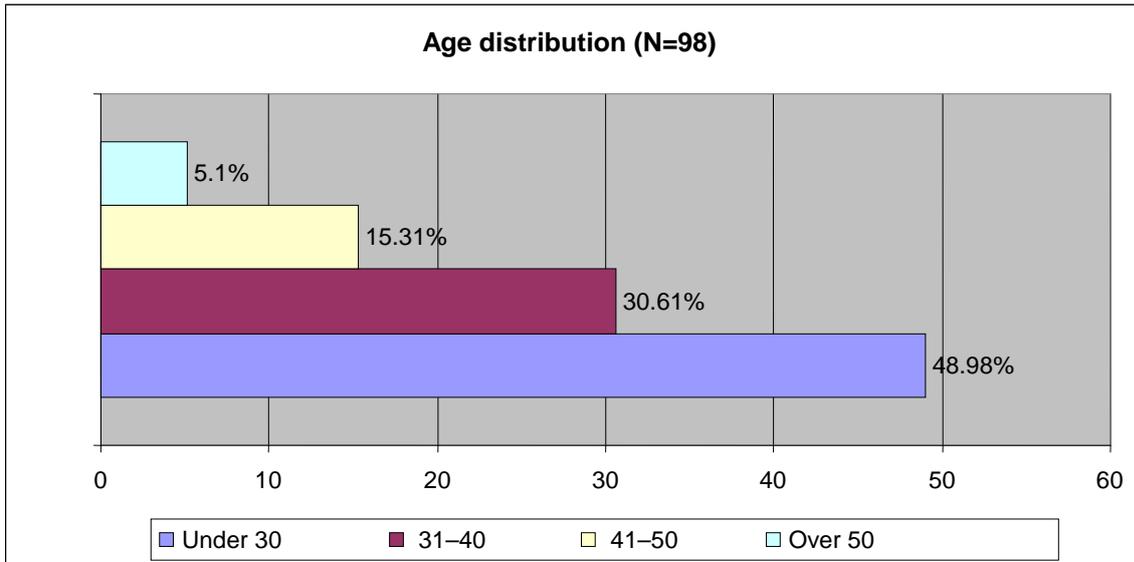


Figure 5.1 Respondents' age distribution (N=98)

Of the respondents, 48.98% were under 30 years old; 30.61% were between 31 and 40; 15.31% were between 41 and 50, while 5.1% were older than 50.

TB affects those in their most productive work-life. In a study conducted by Mathur (2005:80), the average age of 458 workers suffering from silicosis and TB were 33.7 years and the average age of death 46 years. Groom (2008) states that TB leads to a decline in worker productivity of around \$12 billion annually even though healthy people with latent infection have only a 10% chance of suffering active TB over their lifetime (this rises if HIV is also present).

5.3.1.2 Gender distribution

The respondents were asked to indicate their gender. Figure 5.2 depicts the respondents' gender distribution.

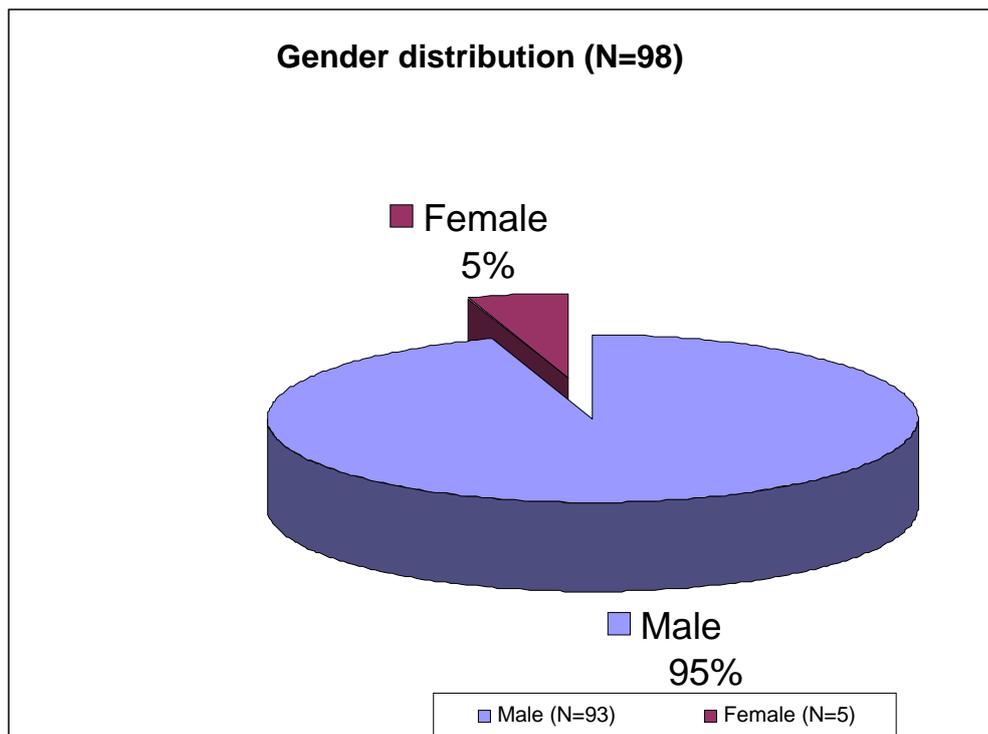


Figure 5.2 Respondents' gender distribution (N=98)

Of the respondents, 95% were males and 5% were females. This reflects the general demography in the company. Mining is new in Tanzania and heavily dominated by males as mining because it is viewed as a labour intensive activity. This is consistent with the views of Aiken (2006), who states that for centuries mining has been primarily a masculine occupation and the mining industry has neither recognised nor acknowledged the contribution of women. The iconic image that most people have of mining is of a male miner in a “harsh, man’s world”. In most African countries, any direct benefits of mining operations have largely accrued to men via royalty payments to traditional leaders, land/crop compensation, and employment skills. However, the role of women are changing and in South African mining industries, 4,3% of the mining employment force are now women, while globally 15% of the workforce in the mining industries consists of women. Some mining companies have found that hiring women in non-traditional occupations such as mining truck operators optimizes efficiency, since safety risks, accidents, and maintenance costs are minimized (Lonmin 2008).

5.3.1.3 Highest level of education

The respondents were asked to indicate their highest educational level achieved (see table 5.1).

Table 5.1 Respondents' highest level of education (N=98)

Level of education	Frequency	Percentage
No formal education	0	0.00
Primary education	22	22.45
Secondary education	30	30.61
Tertiary level	46	46.94
Total	98	100.00

The respondents' highest education qualification was indicative of income range, and general health understandings and living status. Increased risk of TB is generally associated with poverty and poor living conditions. Of the respondents, 46.94% had attained tertiary education; 30.61% had attained secondary education; 22.45% had attained primary education, and none were without some formal education. More respondents with secondary and tertiary education indicates better pay and better living conditions. In Tanzania underground mining is less than ten years old and currently attracts high talent with better pay.

Educational level according to Dennill et al (1999:30) in the developing world suffer persistent ill health which is linked to extreme poverty and illiteracy because illiterate people cannot depend on the written word to get informed thereby influence informed consent. This is consistent with the views of Mohamed, Yusif, Ottoa and Bayoumi (2007:21) who found that knowledge about TB and its treatment generally increased significantly with educational level. However in Mwanza in Tanzania, Wandwalo and Morkve (2000:133-134) found that misconceptions and limited knowledge about TB was not an indication that people was illiterate. In their study they found that despite peoples' higher educational levels respondents still had misconceptions and limited knowledge of TB.

5.3.1.4 Respondents living with partner/family

The respondents were required to indicate whether they were living with the family or partner (see figure 5.3).

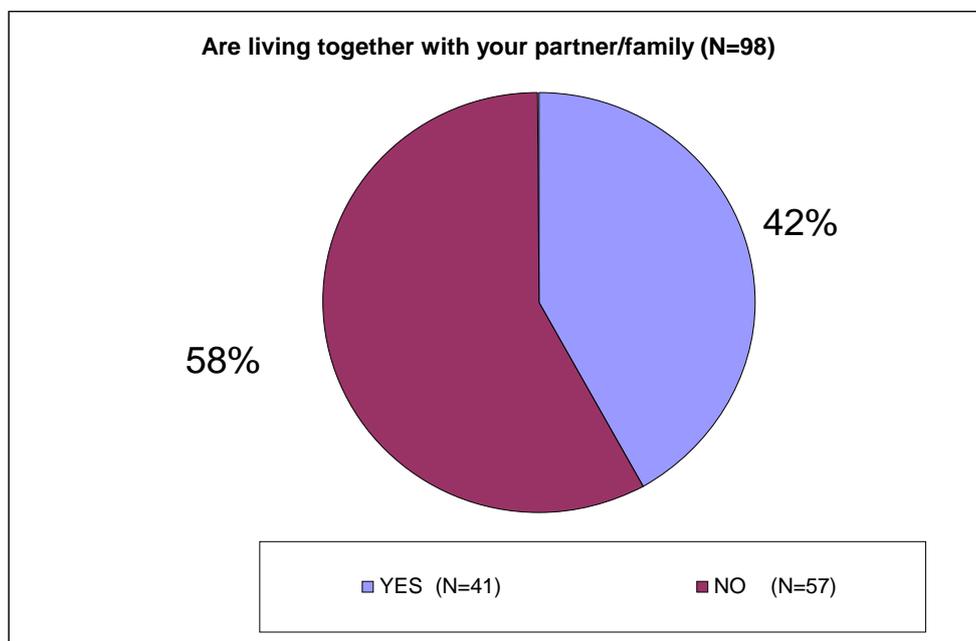


Figure 5.3 Respondents living with partner/family (N=98)

Of the respondents, 58% (n=57) were single and 42% (n=41) were married or living with a partner or family, which is consistent with the respondents' ages (see figure 5.1).

Living with a partner or family is important in providing support during treatment and is related to better compliance and good treatment outcome. Taking treatment for a long time is difficult unless this is encouraged through the support of significant others. Family, according to Pender (1996:269), are more influential on the health behaviour than friend or co-workers. In addition, the WHO (2003:48-49) is of opinion that "If you do not have the support of the family, community and society, then you lose the fight".

People without support are less likely to recover as they increasingly find themselves alone. Social support can help workers and others to overcome structural and personal barriers and may influence their knowledge, attitudes and beliefs towards TB and DOTS (Ogden 2000:13).

Not all families and partners are however supportive. Gelmanova, Keshavjee, Golubchikova, Berezina, Strelis, Yanova, Atwood and Murray (2007:703-704) mention that substance abuse are often one of the predictors of non-adherence to TB treatment. This supports the view of Munro, Lewin, Smith, Engel, Fretheim and Volmink (2007:104) who state that adherence to TB treatment is a complex, dynamic phenomenon with a wide range of factors impacting on treatment-taking decision-making behaviour

5.3.1.5 Distance to the nearest health clinic or hospital

The distance to the nearest health clinic indicates the accessibility of healthcare services therefore the respondents were asked to indicate the distance to the nearest health clinic or hospital (see figure 5.4).

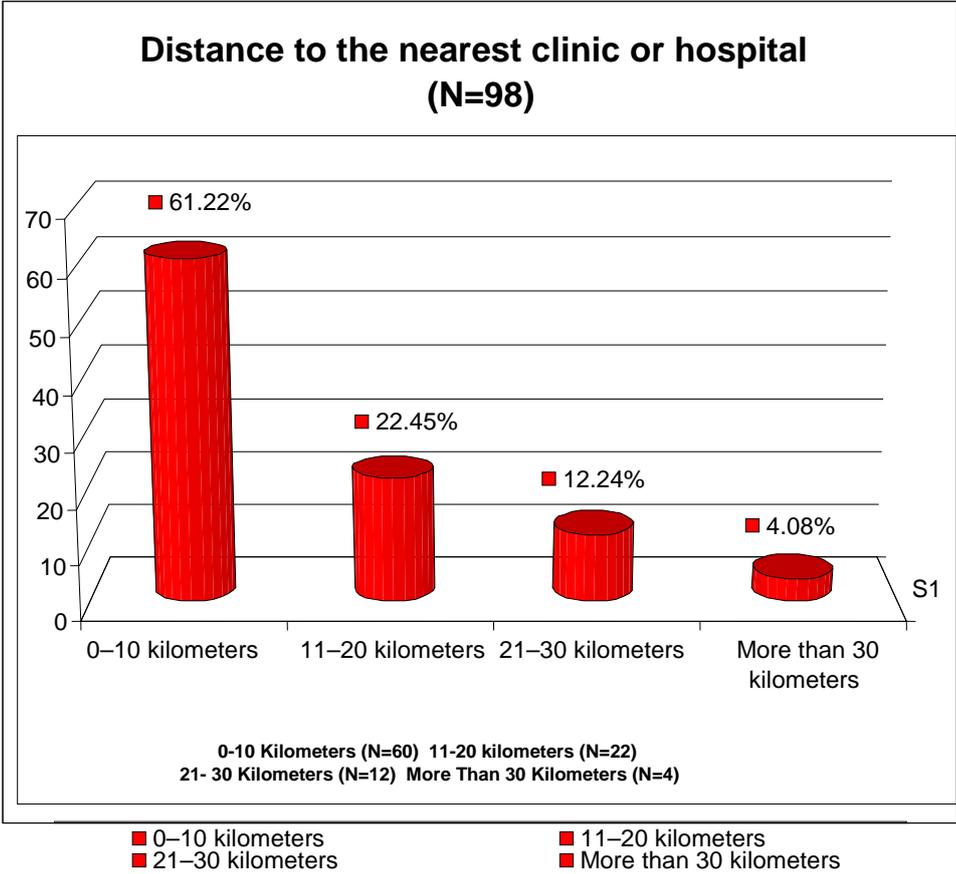


Figure 5.4 Respondents’ distance to the nearest health clinic or hospital (N=98)

Of the respondents, 61.22% lived in the nearby mining town, which is within 10 kilometres from the mine health clinic, and only 4.08% lived more than 30 kilometres away.

According to Waisbord, (2005) a significant number of studies conducted in Gambia, Tanzania and Zambia indicated that distance from the nearest DOTS clinic had a significant influence on the adherence to TB treatment and contact screening. Transportation costs which is associated with distance between residence and DOTS clinic, account for variations in timing and diagnosis of TB.

According to Shargire and Lindtjorn (2004), defaulting from treatment remains a challenge for most TB control programmes. It may increase the risk of drug resistance, relapse, death, and prolonged infectiousness. A cohort of smear-positive tuberculosis patients diagnosed and registered in Hossana Hospital in southern Ethiopia was prospectively studied. Using a structured questionnaire, potential predictor factors for defaulting from treatment were recorded at the beginning of treatment, and patients were followed up until the end of treatment. Of the 404 patients registered for treatment, 81 patients (20%) defaulted from treatment. A total of 91% (74 of 81 patients) of treatment interruptions occurred during the continuation phase of treatment. Distance from home to treatment centre and necessity to use public transport to get to a treatment centre were found to be independently associated with defaulting from treatment.

5.3.1.6 Number of years working at this mine

The respondents were asked to indicate how long they had worked for the mine (see figure 5.5).

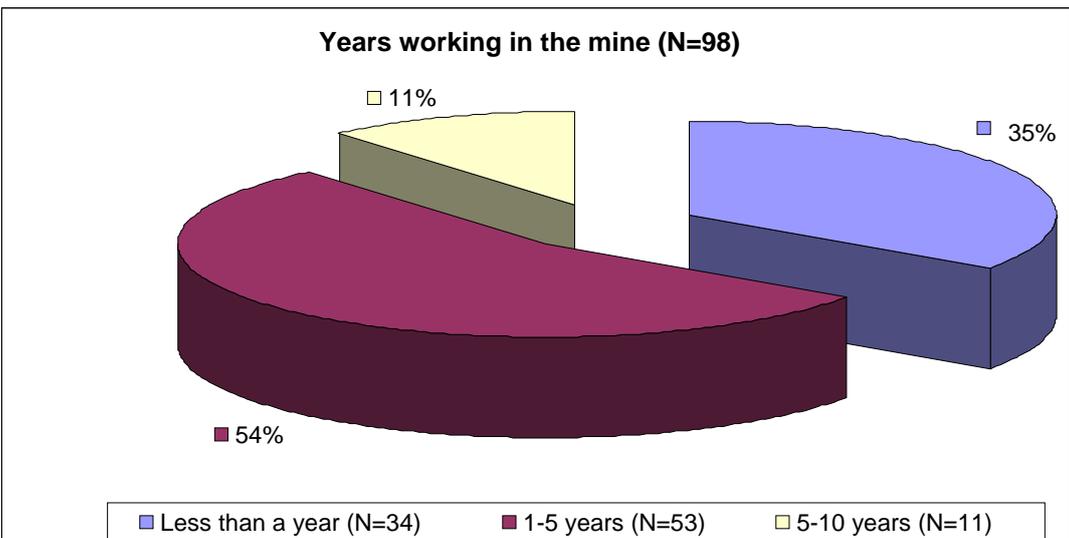


Figure 5.5 Respondents' number of years working at this mine (N=98)

Figure 5.5 indicates that of the respondents, 89% had worked for the mine for under one year to five years and 11% had worked there for five to 10 years. The mine has been in operation for only seven years and three years of exploration stage. The longer the duration of employment, the longer employees are exposed to the company education and TB prevention programmes.

Guild et al (2001:160) state that the incidence of TB in gold miners is strongly age-dependent with a progressive increase in the disease rates with increasing age. This is likely to be at least partly due to the effect of silica exposure since the age and length of service are closely related to one another and to cumulative silica exposure.

5.3.2 Section 2: TB knowledge and awareness

This section examined the respondents' TB knowledge and awareness.

5.3.2.2 First source of information about TB

Table 5.2 lists the respondents' first source of information about TB.

Table 5.2 Respondents' first source of information about TB (N=98)

First source of information	Frequency	Percentage
Newspapers and magazines	40	40.82
Radio	90	91.84
TV	45	45.92
Billboards	30	30.61
Brochures, posters and other printed matter	40	40.82
Health workers	49	50.00
Family, friends, neighbours and colleagues	31	31.63
Religious leaders	40	40.82
Teachers	60	61.22

*Multiple-response question, sum not equal to 100%

Of the respondents, 91.84% (n=90) first learned about TB on the radio; 61.22% (n=60), learned about TB from their teachers; 31.63% (n=31) indicated from their family members, and 30.61% (n=30) indicated from billboards. There were many FM radio stations in the area and the respondents could afford to radios. In addition, the national leprosy and TB programme makes good use of radio broadcasting.

The National Centre for HIV/AIDS, Viral Hepatitis, STD and TB Prevention (2008) states that health communications can be used to share information on TB with the general public, local communities, patients and contacts, as well as providers. Research has demonstrated that misconception about TB and the stigma associated with the disease still abound, suggesting the continuing need to increase knowledge and awareness of TB through effective channels of communication such as the media.

5.3.2.2 Respondents’ view of seriousness of TB

Figure 5.6 illustrates the respondents’ view of serious a disease TB is.

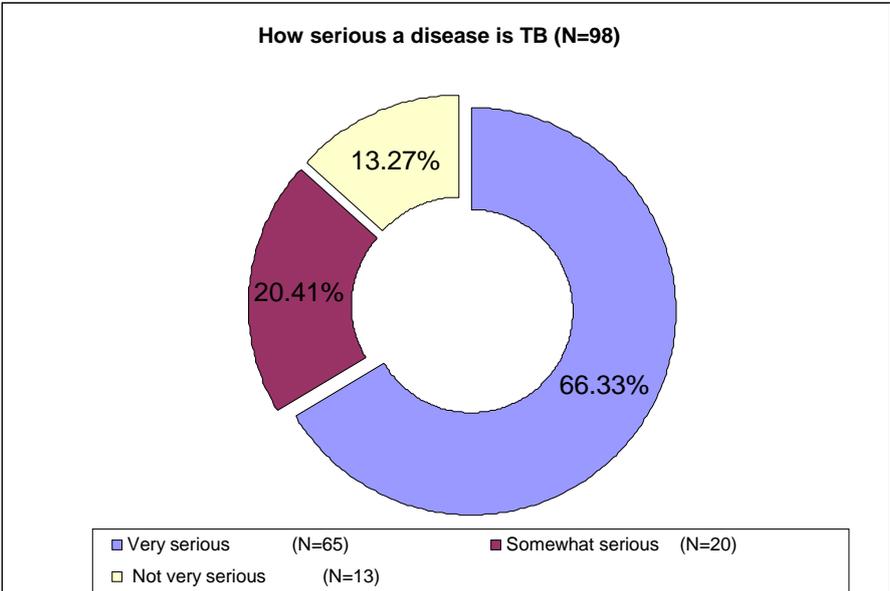


Figure 5.6 Respondents’ views on how serious a disease TB is (N=98)

Of the respondents, 66.33% (n=65) viewed TB as a very serious disease; 20.41% (n=20) viewed it as somewhat serious, and 13.27% viewed it as not very serious.

This question was asked because perceiving a disease as serious could prompt individuals to take the necessary precautions and educate themselves more on the disease and preventive measures.

In a study conducted by Westway and Wolmarans (1994:448), it was found that the majority of respondents were aware of the infectious nature of TB, that it could be cured and the length of treatment. The most problematic issues were isolation for TB sufferers and the harm TB sufferers do to others. Cognitive/affective reactions were similar for TB patients and community members. The predominant cognitive/affective reactions towards TB were personal threat, social rejection and social stigma. The researchers state that the powerful force of social rejection and social stigma cannot be underestimated and suggest that these inhibiting factors require urgent attention to improve voluntary presentation and compliance behaviour.

5.3.2.3 *How serious a problem TB is in your country/region*

Figure 5.7 reflects the views of respondents on how serious they regarded the problem of TB in the country or region is.

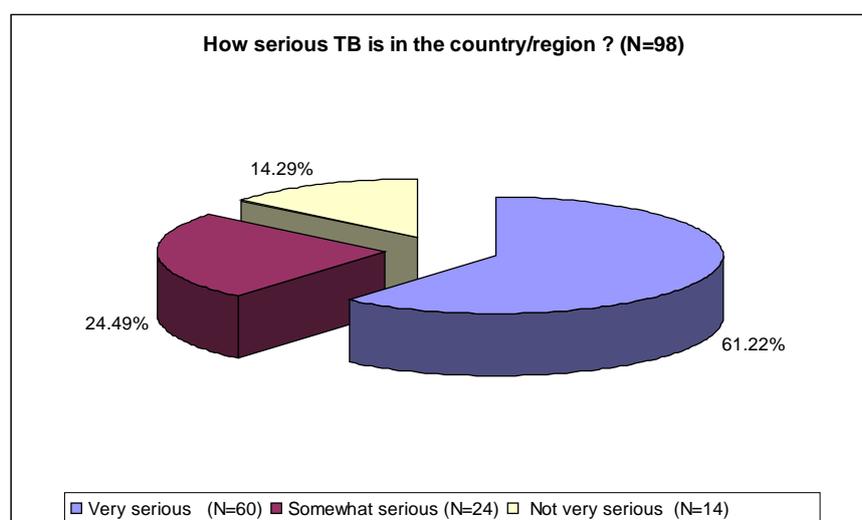


Figure 5.7 Respondents' view of how serious a problem TB is in the country/region (N=98)

Of the respondents, 61.22% (n=60) viewed TB as a very serious problem in the country; 24.49% (n=24) viewed it as somewhat serious, 14.29% (n=14) viewed it as not very serious.

Tanzania is among the 22 most heavily TB burdened counties in the world, with an annual incidence of 308 per 100 000 (Tanzania Ministry of Health and Social Welfare 2003:39).

5.3.2.4 Signs and symptoms of TB

Table 5.3 indicates the respondents' knowledge of the signs and symptoms of TB.

Table 5.3 Signs and symptoms of TB (N=98)

Symptoms	Frequency	Percentage
Rash	20	20.41
Cough	92	93.88
Cough that lasts longer than 3 weeks	56	57.14
Coughing up blood	45	45.92
Severe headache	25	25.51
Nausea	15	15.31
Weight loss	70	71.43
Fever	24	24.49
Fever without clear cause that lasts more than 7 days	10	10.20
Chest pain	95	96.94
Shortness of breath	40	40.82
Ongoing fatigue	30	30.61
Do not know	10	10.20
Other	5	5.10
Total	98	100.00

Of the respondents, 96.94% (n=95) indicated chest pain; 93.88% (n=92) indicated a cough, and 71.43% (n=70) indicated weight loss. In addition, 30.61% (n=30) indicated ongoing fatigue; 15.31% (n=15) indicated nausea, and lastly 10.20% (n=10) indicated fever without clear cause that last more than seven days.

HIV in patients infected with HIV may present atypically. These patients have a higher risk for developing MDR-TB and milliary TB. Usually a longer course of therapy is needed and because of interactions with other medications, the regimen may require adjustment (Swierzewski 2000). In a study conducted by Kawai, Soto, Gilman, Bautista, Cavierdes, Huaroto, Ticona, Ortez, Tovar, Chavez, Rodriques, Escombe & Evans (2006:1027), it was pointed out that delayed diagnosis, minimal access to anti-retroviral drugs and coexistant infections contribute to MDR-TB and mortality.

5.3.2.5 How a person gets TB

The respondents were asked how people got TB (see table 5.4).

Table 5.4 Respondents’ views on how people get TB (N=98)

Means of TB transmission	Frequency	Percentage
Through handshakes	24	24.49
Through the air when a person with TB coughs or sneezes	84	85.71
Through sharing dishes	33	33.67
Through eating from the same plate	44	44.90
Through touching items in public places	50	51.02
Do not know	10	10.20

*Multiple-response question, sum not equal to 100%

Of the respondents, 85.71% knew that TB is transmitted through air when a person with TB coughs or sneezes, while 51.02% indicated through touching items in public places.

In a study conducted by the Centres for Disease Control and Prevention (CDC) (2008), it was found that only one-third of Somali respondents understood TB as a communicable disease but mentioned that the disease was due to heredity, smoking, being cold, hunger and malnutrition, injury to the chest or lifting heavy items. Respondents also reported perceived factors responsible for contracting TB as hot weather and being overworked, sharing meals, utensils, cloths and household items.

5.3.2.6 How to prevent getting TB

Table 5.5 indicates the respondents’ knowledge of how to prevent TB.

Table 5.5 Respondents’ knowledge of how to prevent getting TB (N=98)

Means to prevent getting TB	Frequency	Percentage
Avoid shaking hands	76	77.55
Covering mouth and nose when coughing or sneezing	80	81.63
Avoid sharing dishes	50	51.02
Washing hands after touching items in public places	44	44.90
Closing windows at home	24	24.49
Through good nutrition	30	30.61
By praying	40	40.82
Do not know	20	20.41

*Multiple-response question, sum not equal to 100%

Of the respondents, 81.63% (n=80) said people could prevent getting TB through covering their mouth and nose when coughing or sneezing; 77.55% (n=76) indicated by avoiding shaking hands; 40.82% (n=40) indicated praying, and 20.41% (n=20) did not know.

Although some of the respondents knew how to prevent getting TB, ignorance is still a great concern among mine workers of contracting TB. Williams and Maher (2007:6-8) state that DOTS alone is unlikely to control TB in sub-Saharan Africa, which raises two questions, namely what is meant by “control” and secondly, what would be needed to achieve this end? Rapid screening and early case finding to prevent MDR-TB is suggested by Streicher, Louw, Warren & Van Heerden (2006:97), molecular markers to allow early identification of the non-Beijing drug resistant strain of TB (Victor, Streicher, Kewley, Jordaan, Van der Spuy, Bosman, Louw, Murray, Young, Van Helden & Warren 2007:195), improvement of environmental conditions in mines (Olson 2004), the development of new anti-TB drugs strengthening laboratories in Tanzania (Ducati, Ruffino-Netto, Basso & Santos 2006:697).

5.3.2.7 Who can be infected with TB

Table 5.6 reflects the respondents’ perception of who can contract TB.

Table 5.6 Respondents’ views on who can be infected with TB (N=98)

Means of infecting with TB	Frequency	Percentage
Anybody	96	97.96
Only poor people	72	73.47
Only homeless people	80	81.63
Only alcoholics	60	61.22
Only drug users	40	40.82
Only people living with HIV/AIDS	66	67.35
Only people who have been in prison	48	48.98

*Multiple-response question, sum not equal to 100%

Of the respondents, 97.96% said anybody could get infected; 81.63% said only homeless people, and 40.82% said drug users could get TB.

The WHO (2005) remarks that in some cultures, TB is considered to be an inherited and/or incurable disease associated with unclean or undesirable habits or livelihood. These kinds of perception often reinforce the stigma associated with TB. When the

perceptions persist, this stigma leads to fear that a person might lose his job, income and social standing. These fears promote the denial, undermine self-esteem and prevent timely diagnosis. It can also lead to resistance to seek medical advice and treatment.

5.3.2.8 Can TB be cured

Figure 5.8 reflects the views of respondents whether TB can be cured.

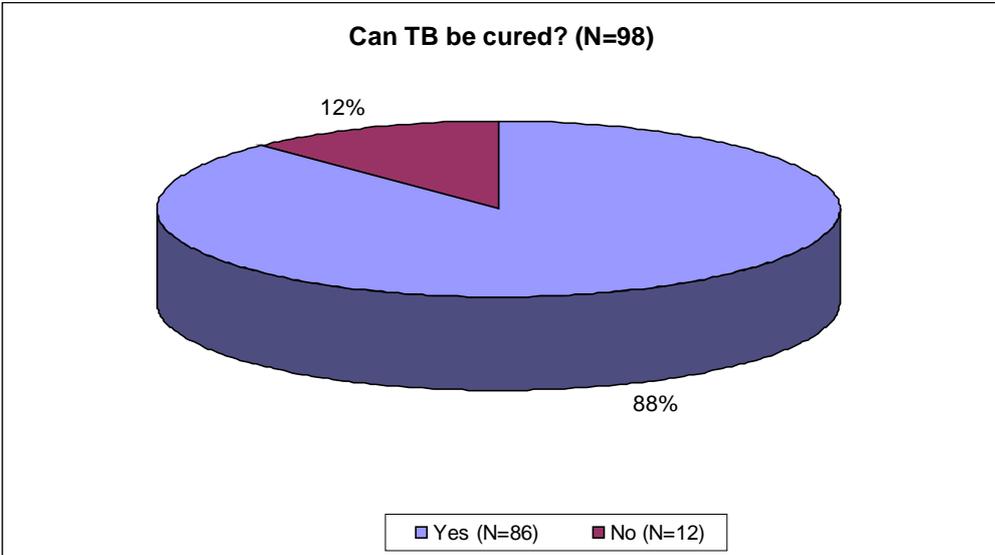


Figure 5.8 Respondents' views on whether TB be cured (N=98)

Of the respondents, 88% (n=86) believed that TB could be cured, and only 12% (n=12) indicated that TB was not curable.

At the time of the study, most of the respondents who indicated that TB was curable had been on treatment for a period of time and felt free of symptoms. However, patients who complete treatment and then relapse may doubt whether the disease is curable (Mohamed et al 2007:26). According to Reyes-Guillen, Sanchez-Perez, Cruz-Burguete and De Juan (2008:251), health education and media efforts should focus on informing the public of correct transmission and symptoms, that TB services are free, and of the necessity of adhering to treatment and regular check ups.

Perceptions regarding TB are similar between patients and their families, but this view differs from that of the institutional physicians, and this may be considered an inter-actor communication barrier. One repercussion is that patients and their families do not have appropriate information about PTB and are not aware of the importance of strict adherence to their anti-tuberculosis. In this regard, lack of information from health workers about PTB is a predictor of non-compliance TB treatment. Reyes-Guillen et al (2008:251) also state that physicians don't give sufficient support to patients and their families for dealing with the secondary effects of TB and do not take either patients or their families into account. If patients and their families are met with disinterest, indifference and display negative attitudes on the part of health personnel, it will be difficult to get them to change behaviour patterns.

5.3.2.9 How can someone with TB be cured

Regarding how TB could be cured, 86.73% (n=85) of the respondents said use of specific drugs given in the health centres; 62.24% (n=61) said DOTS; 40.8% (n=40) said praying would cure TB; 15.31% (n=15) said herbal remedies; 7.14% (n=7) said home rest without medicine was enough, and 13.27% (n=13) were not aware of any treatment model (see table 5.7).

Table 5.7 Respondents' views of how TB can be cured (N=98)

Treatment modalities	Frequency	Percentage
Herbal remedies	15	15.31
Home rest without medicine	7	7.14
Praying	40	40.82
Specific drugs given by health centre	85	86.73
DOTS	61	62.24
Do not know	13	13.27
Other	12	12.24

*Multiple-response question, sum not equal to 100%

In-depth interviews by the University of KwaZulu-Natal's Department of Public Health with a small number of TB patients found that basic knowledge of the importance of completing their six-month course of medication, how TB is transmitted and the links

between TB and HIV was often lacking, despite regular contact with their DOTS supporters. "I feel cured," said one respondent. "What is the point of continuing with medication?" (Omerod 2005:18).

5.3.2.10 Do you think you can get TB

In table 5.8 the views of the respondents are given of how they think about their own susceptibility to TB.

Table 5.8 Respondents’ susceptibility to TB (N=81)

Do you think you can get TB	Frequency	Percentage
Yes like anybody else	30	37.04
I do lots of exercise	13	16.05
I eat well and have good house	12	14.81
I do not live with an individual who has TB	6	7.41
I do regular health checks	4	4.94
Not sure if I could catch TB	16	19.75
TOTAL	81	100.00

Regarding whether they were susceptible to TB, 37.04% (n=30) of the respondents said they could like anybody else; 19.75% (n=16) were not sure whether they could catch TB. Several of the respondents, however, did not appear to think they could contract TB, because 16.05% (n=13) did lots of exercise; 14.81% (n=12) ate well and lived in good housing; 7.41% (n=6) did not live with individuals who had TB, and 4.94% (n=4) underwent regular health check ups.

Ogden (2007:412) refers to the work of Weinstein (1983, 1984 in Ogden 2007:412) who suggested that one of the reasons people continue to practice unhealthy behaviours is their inaccurate perceptions of risk and susceptibility. He gave participants a list of health problems to examine and then asked: ‘Compared to other people of your age and sex, are your chances of getting [the problem] greater than, about the same as, or less than theirs?’ Most participants believed that they were less likely to experience the health problem. Clearly, this would not be true of everyone, so Weinstein called this phenomenon unrealistic optimism. Weinstein (1987 in Ogden 2007:412) described four cognitive factors that contribute to unrealistic optimism: namely lack of personal

experience with the problem; the belief that the problem is preventable by individual action; the belief that if the problem has not yet appeared, it will not appear in the future; and the belief that the problem is infrequent.

5.3.2.11 What would be your reaction if you found out that you had TB

The respondents were asked to indicate what their reaction would be to the news that they had TB (see figure 5.9). Of the respondents, 71.43% indicated fear; 67.35% indicated sadness and hopelessness, while 51.02% indicated that they would be surprised if they were found to have TB. These results seemed surprising since 97.96% had earlier responded that anybody could get TB (see table 5.6).

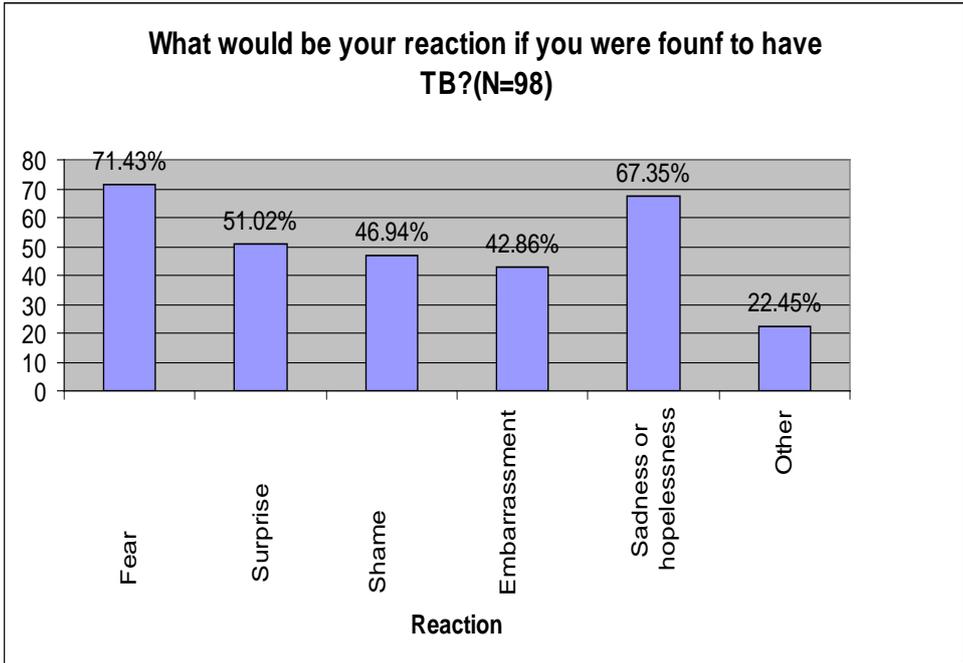


Figure 5.9 Respondents' reaction if they were found to have TB (N=98)

The International Council of Nurses (2004:26) states that many people are extremely shocked when they are told they have TB some refuse to accept it and others simply take it in their stride. The reaction depends on many factors including cultural beliefs

and values, previous experience, and knowledge of the disease. TB now has a higher profile in the media; the reports are often alarmist and a stigma still remains attached to the disease. Even though TB is more common among vulnerable groups it can affect anyone and it is important for patients to be able to discuss their concerns. Nurses are well-placed within communities, working closely with patients and their families, to play a crucial role in providing a caring environment for all patients suffering from TB. This is essential to the success of TB control programmes which need to offer good access to effective diagnostic and treatment facilities

5.3.2.12 Who would you talk to about your illness if you had TB

The respondents were asked whom they would talk to about the disease if they had TB (see figure 5.10). Of the respondents, 93.08% would talk to doctors and health care workers; 87.76% would talk to their spouses; 85.71% would talk to their parents; 77.55% would talk to close friends; 62.24% would talk to their children. However, 14.29% would talk to no one, and 8.16% indicated “Other” but did not specify. These results correlate with the respondents’ level of education and awareness of TB (see table 5.1).

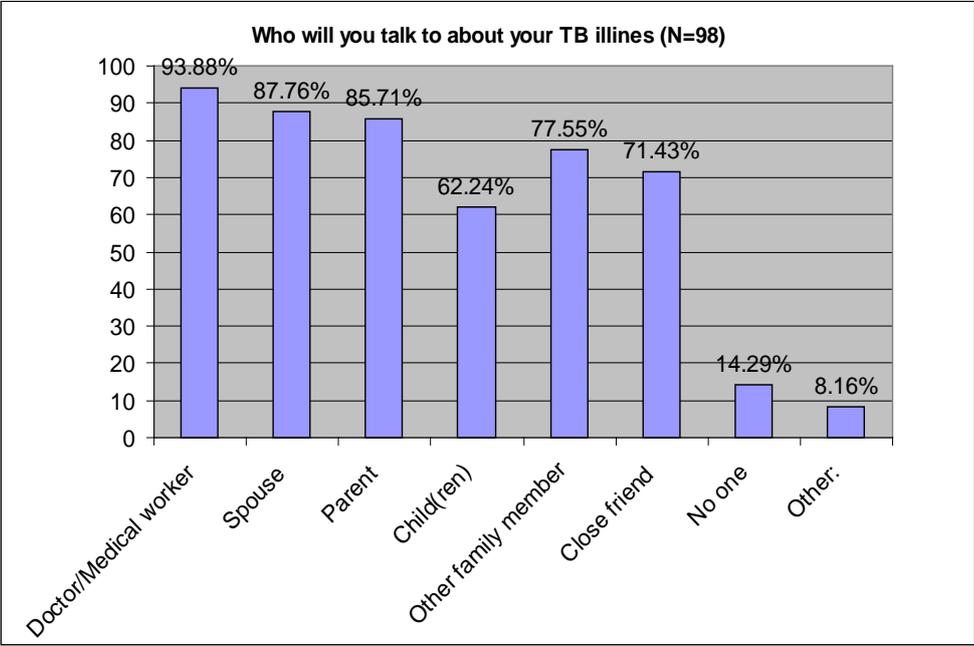


Figure 5.10 Who respondents would talk to if they had TB (N=98)

Nurses working in primary health care settings are often the first to identify and manage TB suspects and MDR-cases. To ensure a high level of case detection, a cornerstone of control, nurses working with individuals, families, communities and other services need to know their role in controlling this preventable disease. The International Council of Nurses (2004:23) believes that nurses are in a position to advocate and to control programmes and to implement the elements of the DOTS and DOTS-Plus strategies.

The protection of information revealed during patient-health care worker encounters, including all written or electronic records of these encounters. Confidentiality is an essential issue in many different aspects of TB control. Health care workers need to be aware of confidentiality issues that are relevant to patient-health care worker encounters, as well as to the collection, management, and sharing of information gathered on TB patients.

Health care workers should keep patient information in confidence and only divulge it with the permission of the patient except as otherwise required by law. It is the responsibility of the health care worker to protect the patient's private information and ensure that only those persons who need to know information have access to patient records. Only persons directly involved in patient care or public health activities should have access to patient information. Safeguarding patient information should be a priority for all members of the health care team.

Confidentiality is a very important issue in TB control because the diagnosis of TB disease is potentially damaging to patients. For some patients, a diagnosis of TB can lead to stigmatization or rejection by family, friends, and co-workers; the loss of a job; and possibly eviction from housing.

The South African Department of Health (2002:10) states that the implementation of DOTS ensures that every person suffering from TB should have the support of another person to ensure that they swallow their medication daily. The treatment supporter does not have to be a professional health worker, but can be any responsible member of the community. Employers, colleagues and community members can act as treatment supporters. Using family members is often problematic but has been successful in exceptional cases. This person should know the signs and symptoms of side effects of

drugs and the importance of taking medication regularly for the patient. They should also motivate and empower patients and their and provide them with a better understanding of and the importance of cure. Treatment supporters are best recruited as part of a community based system which is reviewed annually and its results documented. Treatment supporters should work closely with local health authorities.

5.3.2.13 *What would you do if you thought you had symptoms of TB*

Figure 5.11 reflects what the respondents would do if they suspected they had TB symptoms.

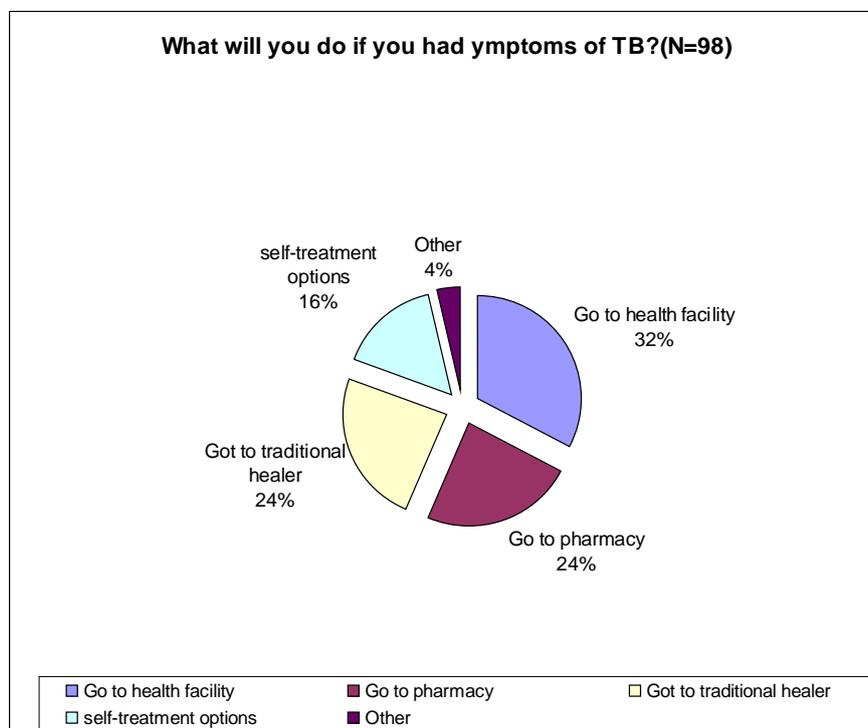


Figure 5.11 Respondents’ actions do if they suspected TB symptoms (N=98)

With regard to preventive strategies, 32% of the respondents would go to a health facility if they suspected they had TB symptoms; 24% would go to a pharmacy; 24% would go to traditional healers; 16% would take self-treatment options, and 4% would consider “other” options (not specified).

The South African Department of Health (2002:24) states that because of the length of time the patient has to take treatment; completing treatment is a special challenge and

requires an unyielding sense of commitment. This may be easy to sustain while the patient feels sick. However, after a few weeks of taking treatment, patients often feel better and see no reason for continuing their treatment. It is thus essential for health workers or treatment supporters to be supportive and use the initial period to bond with the patient. This will enable them to build a strong relationship in which the patient believes and trusts advice given by the treatment supporter.

5.3.2.14 How expensive do you think TB diagnosis and treatment is in this country

In a question on how expensive the diagnosis and treatment of TB in Tanzania is, the respondents showed limited knowledge about the costing of the services provided. Their responses are reflected in figure 5.12.

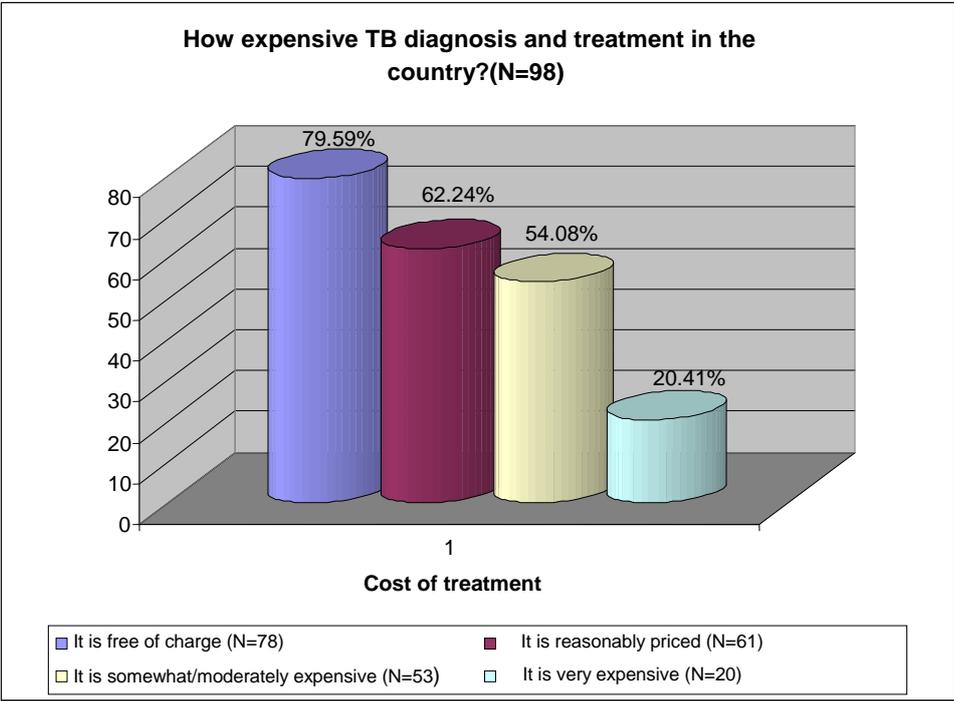


Figure 5.12 How expensive do you think TB diagnosis and treatment is in this country (N=98)

The cost of TB diagnosis and treatment is frequently perceived as a barrier to people accessing these services. Of the respondents, 79.59% thought it was free; 62.24%

thought it was reasonably priced; 54.08% indicated moderately expensive, and 20.41% indicated very expensive (see figure 5.12).

The direct and indirect costs of accessing care are generally higher before diagnosis than after diagnosis. Inappropriate use of diagnostic procedures such as X-rays increases the costs of diagnosis thus forcing patients to delay making their next appointment (Jaramillo 2001:68). Personal and family income often seriously affect adherence to TB treatment which again is worsened by the long duration of TB treatment. These costs add to the economic burden of households and lead to wider impacts such as replacing activities within the family. The financial costs of TB is one fo the many barriers that face the DOTS services for the poor (Liverpool School of Tropical Medicine 2005).

5.3.2.15 Do you know people who have/had TB?

Of the respondents, 79.59% (n=78) knew people who had TB while only 20.41% (n=20) did not (see figure 5.13). This finding is consistent with the high TB prevalence in the country. Tanzania ranked was ranked fourteenth on the list of African countries most burdened with the disease (Tanzania Ministry of Health and Social Welfare 2003:39).

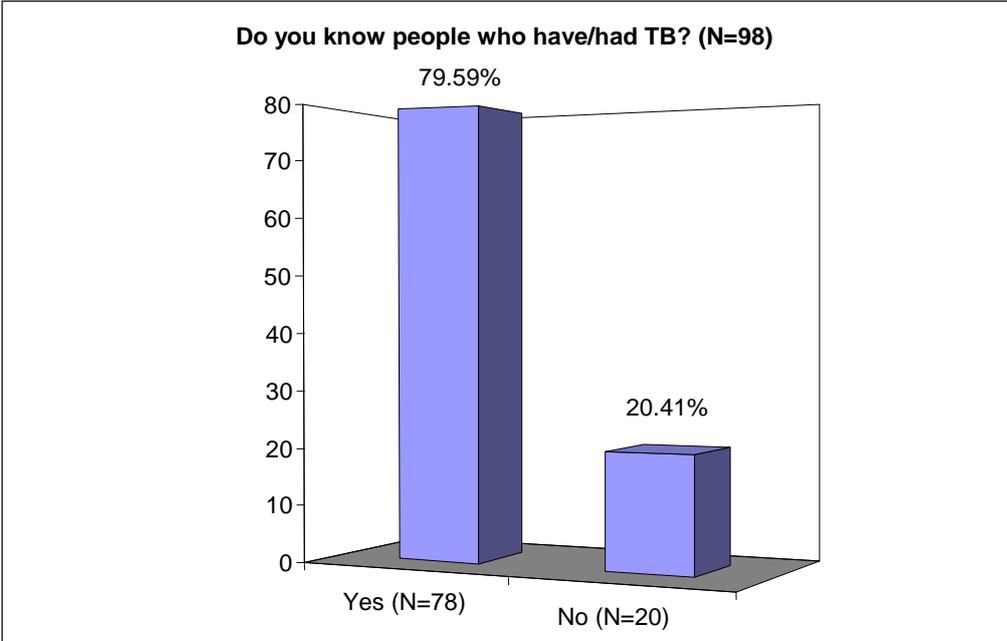


Figure 5.13 Respondents' acquaintance with people who have/had TB (N=98)

5.3.2.16 What is your feeling about people with TB?

TB remains a stigmatised disease. This item wished to gauge the respondents' perception of TB and the stigma attached to it. Accordingly, the respondents were asked to choose the statement that most closely matched their feelings about people with TB (see figure 5.14). Of the respondents, 30.6% feared being infected by people with TB; 22.45% felt compassionate but tended to stay away from them; 18.3% felt compassion for and wanted to help them; 14.29% said it was affected individuals' problem and they could not get the disease, and 14.29% had no particular feeling about them.

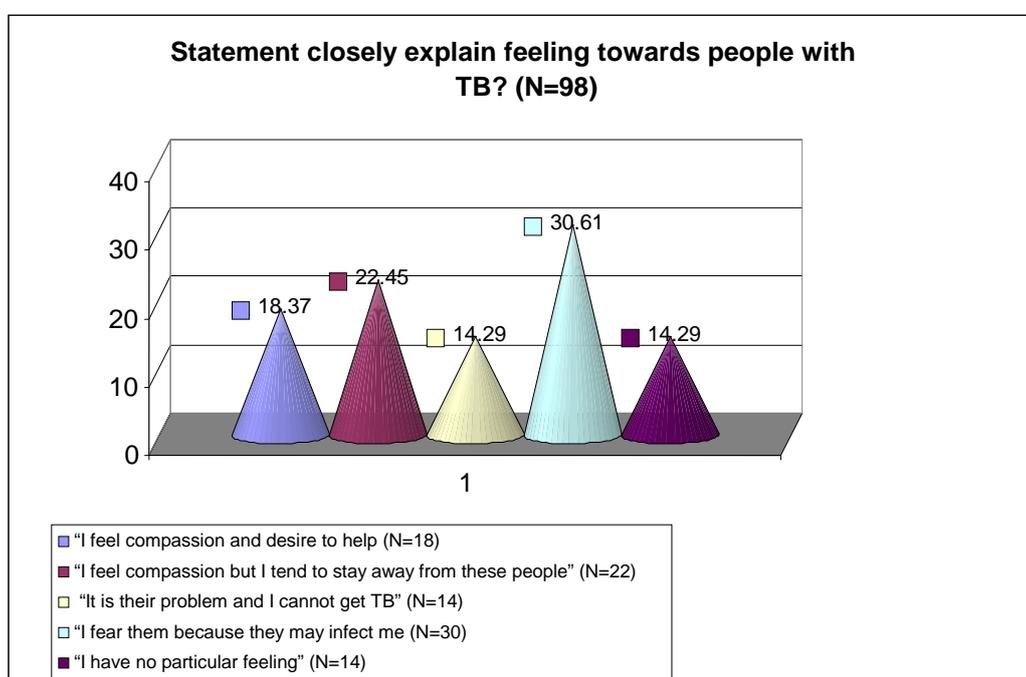


Figure 5.14 Respondents' feelings about people with TB (N=98)

New research funded by the Department for International Development in Zambia (2006), reveals that a new disease stigma, 'Tuberculosis (TB)-HIV stigma' is unfolding because of the growing link between TB and HIV. The research, carried out over three years in Zambian communities, shows that TB-HIV stigma has severe implications for the treatment of TB patients.

TB-HIV stigma leads people to either hide their TB diagnosis, delay seeking treatment or refrain altogether from getting help out of fear that people will think they have HIV

(Connors 2006:15). In a country where up to 70% of TB patients are also co-infected with HIV, many people question whether TB itself is still curable. The high death rate from TB due to AIDS has resulted in the illness being labeled 'Satan's disease', by traditional healers in Zambia, where the number of TB cases reported every year has increased 12-fold since 1985.

5.3.2.17 In your community how is a person who has TB usually regarded/treated

The respondents were asked how the community usually treated/regarded people with TB (see figure 5.15). Of the respondents, 37% (n=78) indicated that most people were friendly, but generally tried to avoid the affected; 34% (n=72) indicated that the community mostly supported and helped them, and 29% (n=62) indicated that most rejected them.

These responses supported those of the 22.45% (n=) who felt compassionate but tended to stay away from them and 18.3% (n=) who felt compassion for and wanted to help them (see figure 5.14). At the same time, the responses emphasise the general fear that people feel about TB.

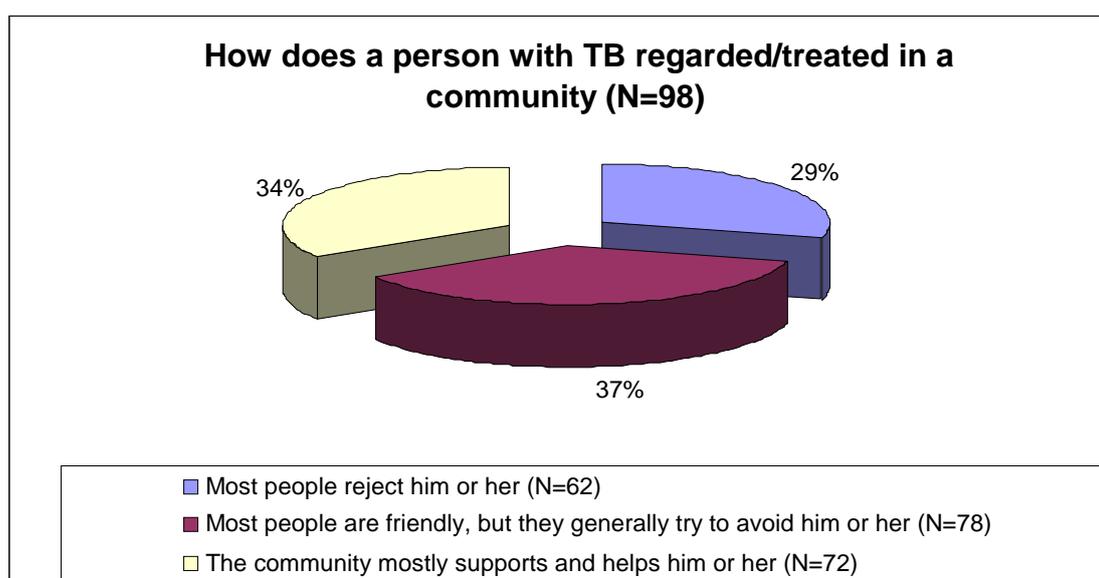


Figure 5.15 Respondents' knowledge of how the community usually regarded/treated people who had TB (N=98)

Baral, Karki and Newell (2007:211) discuss stigma and discrimination associated with

TB sufferers and state that this impacts not only on the individual, but also on the community, the workplace and the family. The obvious cause is the fear of being infected. Stigma result in prejudice and can be split into two categories. Firstly, the perceived risk of infection by the community and secondly, the perceived discrimination by the TB sufferer him/herself. The latter may be reflected as feelings of guilt, unworthy, and lack of self confidence. In this case the person may experience depression, and isolate him/herself from the family and the community.

5.3.2.18 Do you feel well informed about TB

Regarding being well informed about TB, 71.45% of the respondents maintained they were well informed, while 27.93% did not (see figure 5.17). This is attributed to radio campaigns around Lake Zone and company education and promotional activities within the mine and surrounding communities.

Guild et al (2001:179) state that intervention through health education should be a comprehensive strategy and that the role of peer educators and community interventions are part of these comprehensive programmes in the mining industry today.

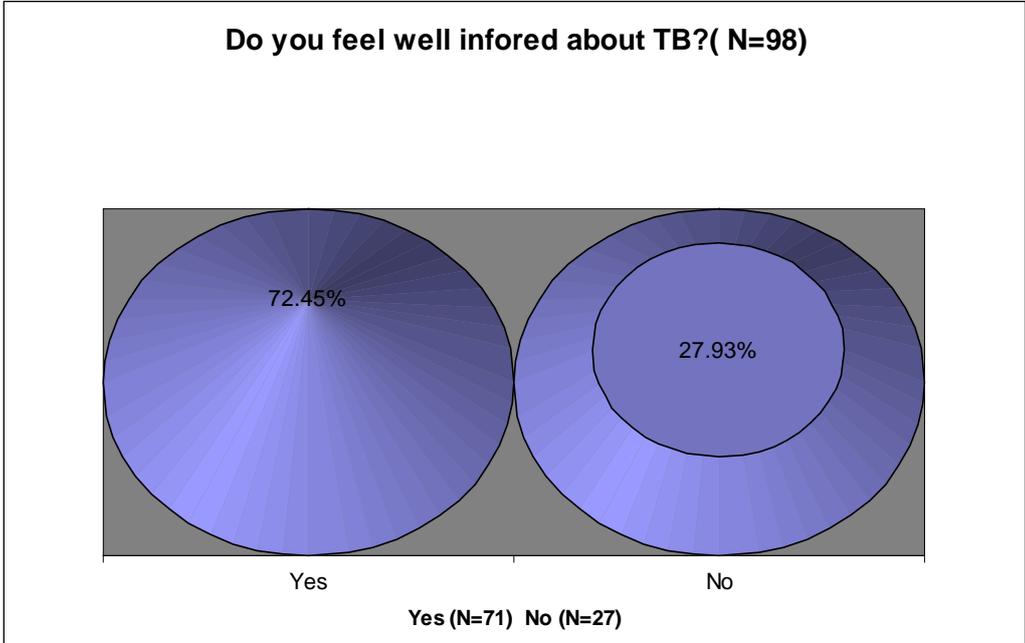


Figure 5.16 Respondents’ feeling well informed about TB (N=98)

5.3.2.19 Do you wish you could get more information about TB

The respondents were asked whether they desired more information about TB (see figure 5.18). Of the respondents, 61.22% wished to have more information, and 38.78% did not. The Tanzania Ministry of Health and Social Welfare (2003:39) found a generally low knowledge and awareness of TB among the population, namely 23%.

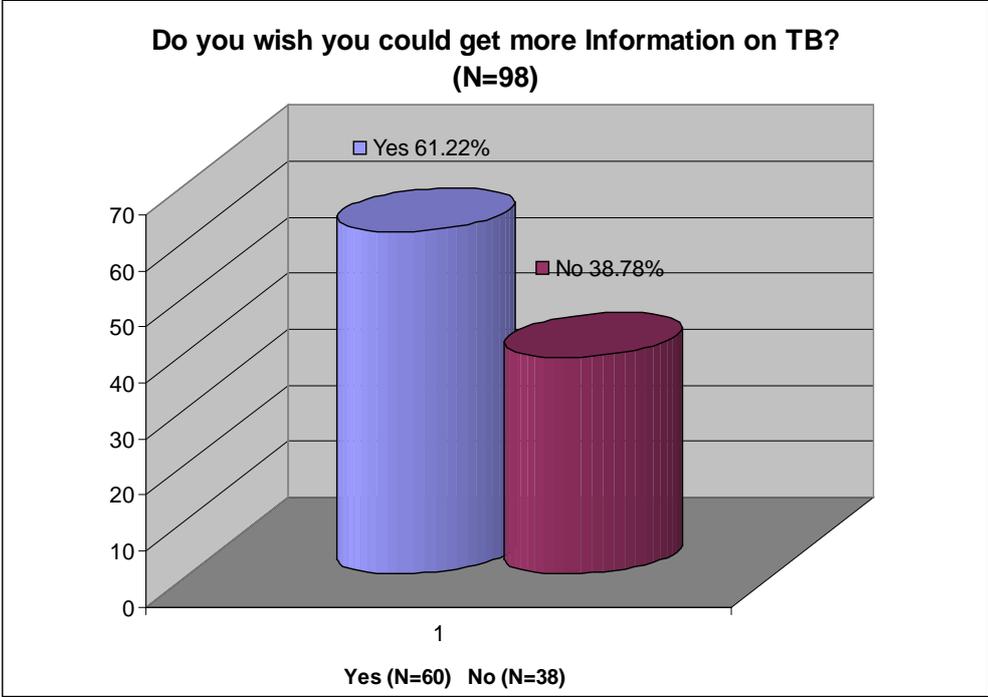


Figure 5.17 Do you wish you could get more information about TB (N=98)

An individual’s knowledge, attitudes, and perceptions with respect to health in general and with a specific illness, such as TB, influence his/her behaviour. Specifically, these factors can influence health seeking, understanding of the diagnosis, understanding of treatment, treatment initiation, treatment adherence, and general interactions with health care providers (National Centre for HIV/AIDS, Viral hepatitis, STD, and TB Prevention 2009)..

5.3.2.20 What, if anything, can a person do to avoid getting TB (N=54)

This was an open-ended question that allowed the respondents to give their own answers. Of the respondents, 98.15% (n=53) said living in a good well-ventilated house would prevent TB; 74.07% (n=40) stressed periodic health checkups; 62.96% (n=34) indicated eating well (healthy diet), and 46.30% (n=25) indicated exercise.

5.3.2.21 Do you think TB can be cured

Of the respondents, 66.31% (n=64) said TB was curable, 22.45% (n=22) said it was not and 12.24% (n=12) did not know. This highlighted the need for on-going education about TB and its treatment, especially early diagnosis and adherence to treatment.

Murray (2004:1181) states that today TB is relatively easy to diagnose when the right combination of medication is made available **AND** taken by the infected person, the disease can be cured more than 95% of the time. In certain targeted populations, the manifestations of the disease can be attenuated by vaccination and chemotherapy. However, despite the remarkable achievements, the estimated number of new cases of TB in the world has been steadily increasing (Piersimoni, Olivieri, Benacchio & Scarparo 2006:20).

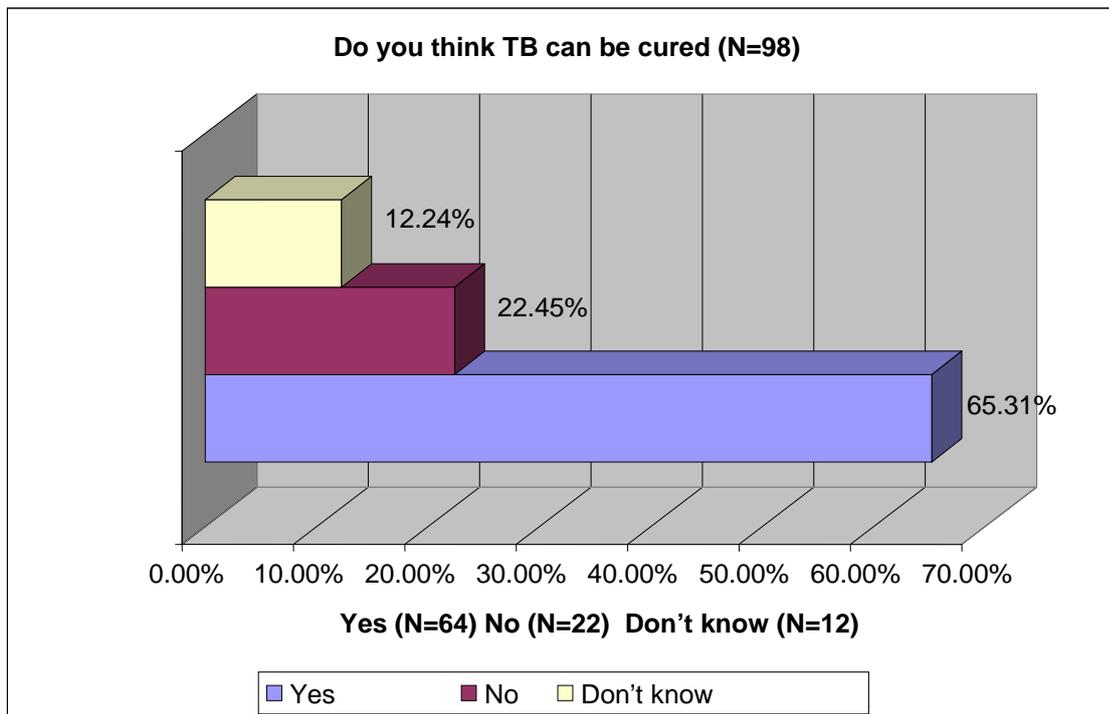


Figure 5.18 Respondents' perception of curability of TB (N=98)

5.3.2.22 How TB can be cured

The respondents were asked how TB could be cured (see figure 5.19). Of the respondents, 46.94% (n=46) said people should go to a hospital/clinic or doctor; 18.37% (n=18) said avoid contact with the infected; while 16.33% (n=16) said by living and eating healthy, 14.29% (n=14) said taking medication, and 4.08% (n=4) did not know.

5.3.2.22 How can TB be cured

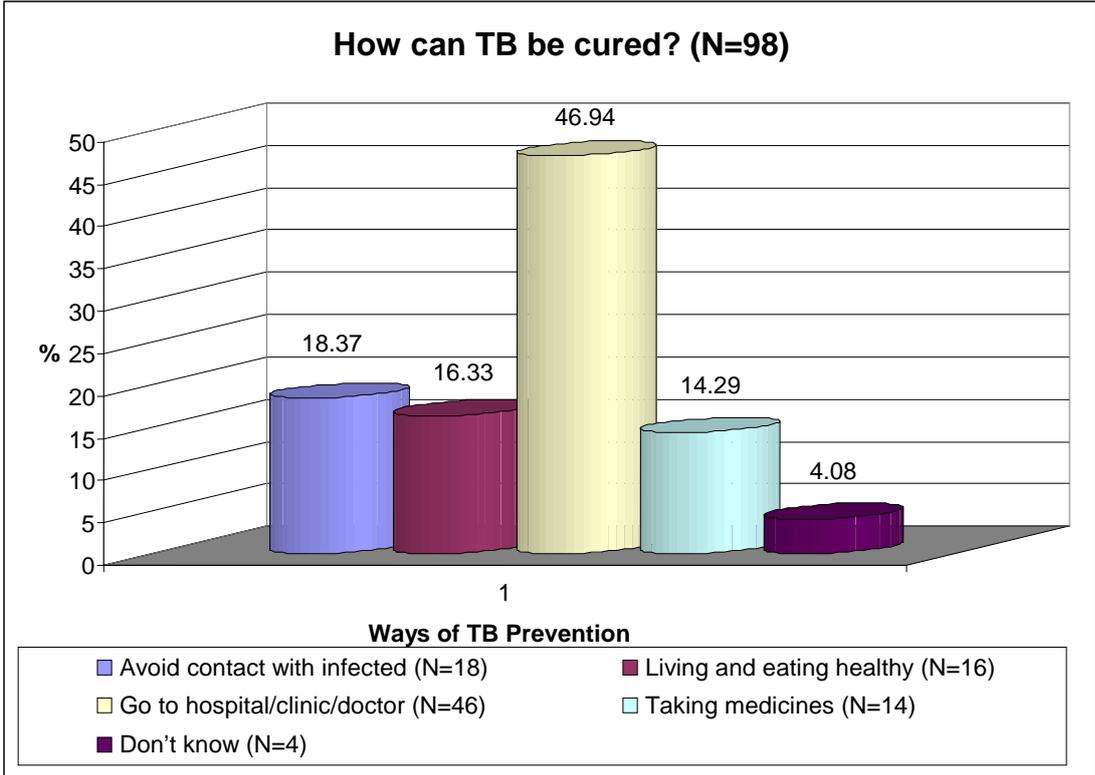


Figure 5.19 How can TB be cured (N=98)

Brewer and Heyman (2004:822) state that "... for 10 years the WHO has had a single answer to the deadly threat of TB – provide treatment to smear positive patients and watch them take it". In contrast with this confidentiality statement about how global TB would be brought under control, when DOTS was introduced, TB remains a problem and is continuing to rise. Brwewer and Heyman (2004:825) also state that in a critical review of recent epidemiological data, and computer models, it has shown that the present international strategy of concentrating on providing treatment to smear positive TB patients, the DOTS and the more recently introduced DOTS-Plus programmes is likely to have only a modest impact on population-based TB control and that effective

control will require strategies that go beyond relying on treatment of people with the active disease.

5.3.2.23 What sources of information do you think can most effectively reach people like you with information on TB?

Regarding the most effective sources of information to reach people, 21.22% (n=80) of the respondents indicated the radio, while only 3.98% (n=15) indicated billboards (see table 5.9).

Table 5.9 Effective sources of TB information (N=98)

Effective TB information source	Frequency	Percentage
Newspapers and magazines	40	10.61
Radio	80	21.22
TV	16	4.24
Billboards	15	3.98
Brochures, posters and other printed materials	28	7.43
Health workers	66	17.51
Family, friends, neighbours and colleagues	28	7.43
Religious leaders	40	10.61
Teachers	64	16.98

*Multiple-response question, sum not equal to 100%

5.3.2.24 What worries you the most when you think about TB? (N=81)

This open-ended question allowed the respondents to express their worries when they thought about TB. The respondents worried about the following:

- Weight loss common in people with TB 69.14% (n=)
- Stigmatisation 49.38% (n=40)
- It is associated with HIV 37.04% (n=30)
- Cost to the family 33.33% (n=27)
- Death 25.93% (n=21)

- Isolation 24.69% (n=20)
- Long-term treatment 22.22% (n=18)
- Fear of infecting others 17.28% (n=14)
- Being away from work 14.81% (n=12)
- To be enrolled in TB programme 12.35% (n=10)
- Poverty 8.64% (n=7)
- To stop smoking 6.17% (n=5)
- Infertility as a result of TB 2.47% (n=2)

The “stop smoking” programme is a relatively new programme on site that assists employees to quit smoking. The programme has raised awareness with regard to TB and smoking among gold mine workers.

5.3.2.25 Do you personally know people who are living with TB?

The respondents were asked whether they knew people living with TB (see figure 5.20). Of the respondents, 76.53% (n=75) knew people living with TB while 23.47% (n=23) did not.

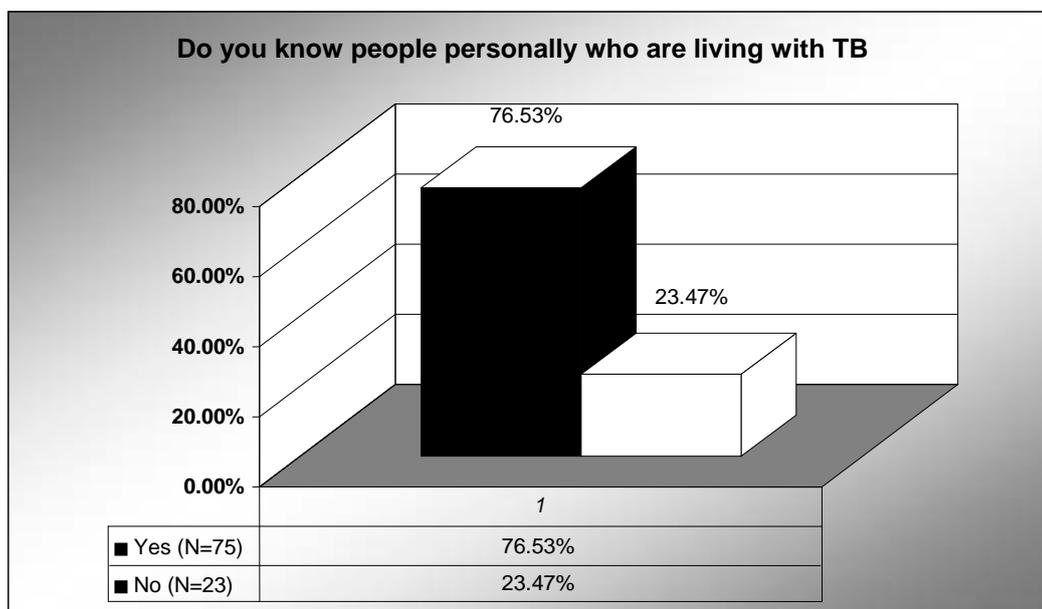


Figure 5.20 Do you know people personally who are living with TB (N=98)

In a study by Chivonivoni (2007), the researcher states that “the influence of patients' interpretation of illness and treatment may influence the completion of TB treatment. Some patients who felt worse than before treatment or saw no improvement in their

condition are more likely to interrupt treatment. The interpretation of wellness, illness and disease by the TB patients may be different from that of the health professionals. This could affect the conceptualization of the health education received by the TB patients”.

5.3.2.26 Did you personally know people who died of TB

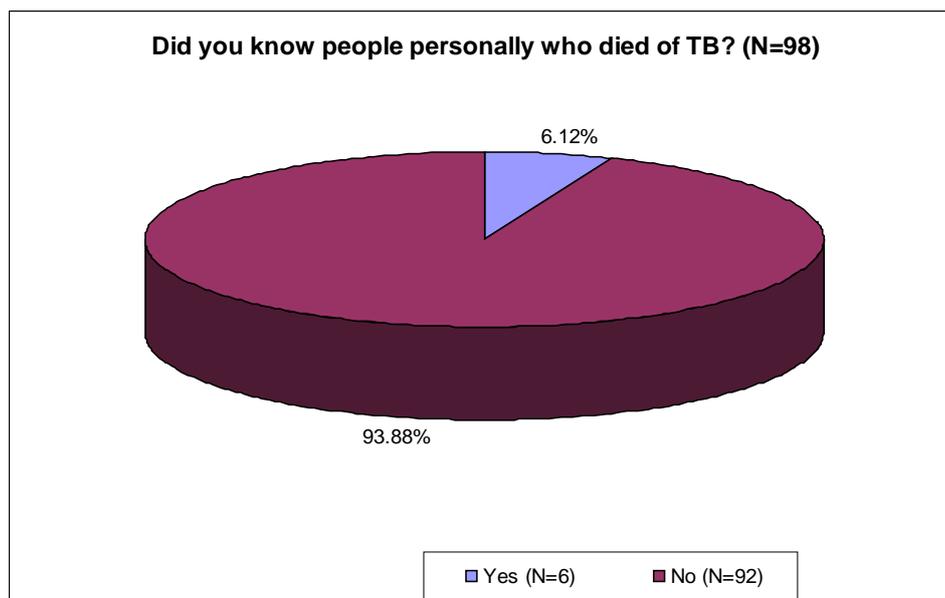


Figure 5.21 Respondents' knowledge of people who died of TB (N=98)

Of the respondents, 93.88% (n=92) did not personally know anyone who had died from TB, but 6.12% (n=6) did.

Individual perceptions of TB patients could influence the utilisation or non-utilisation of services that provide DOTS. Treatment interruption was also reportedly related to perceptions about TB as a disease; some patients did not believe that they have TB, only wanted a cure for the symptoms and ceased treatment once the symptoms lessened (Salla et al 2007:25). This could result in the spread of TB and the development of MDR-TB which takes long to cure and is complex. One study in China on adherence to DOTS reported that non-adherent patients had little information on TB and its consequences as a disease, but the participants were aware of the adverse effects caused by the treatment (Salla et al 2007:25). Adequate information on TB and

the importance of completing treatment could help reduce TB in the community and hence in the whole country (Chivonivoni 2007).

5.3.2.27 Do you know whether you are infected with TB or not?

The respondents were asked whether they knew whether they were infected or not (see figure 5.22).

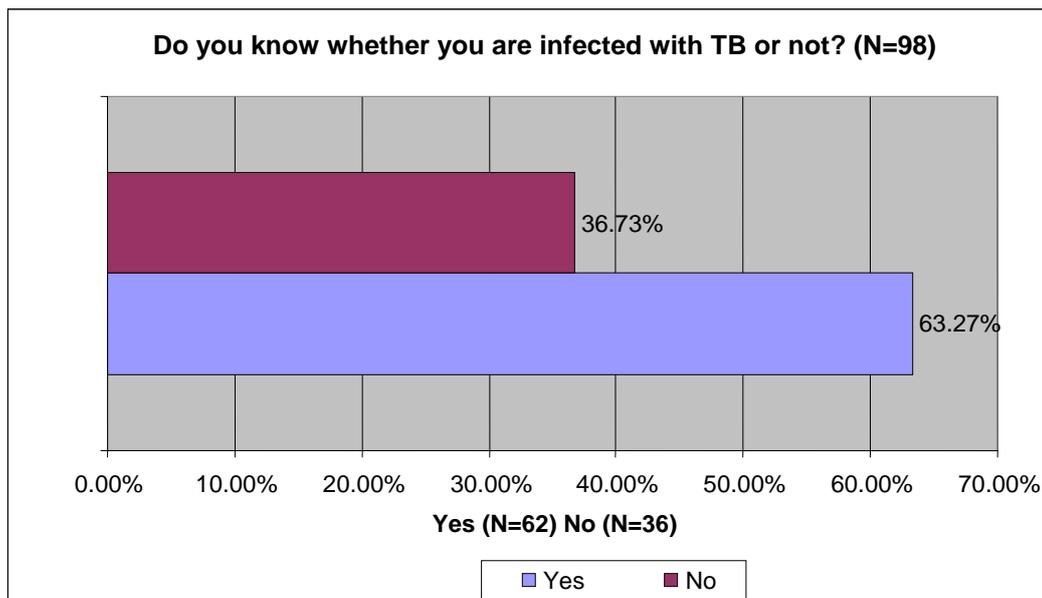


Figure 5.22 Respondents' infection status (N=98)

Of the respondents, 63% (n=62) they knew whether they were infected or not, while 37% (n=36) did not know. Ignorance of TB status is a major cause of treatment delay and negatively impacts on treatment outcome.

Within the framework of many African cultures, illness always has a reason which is the most important aspect of the disease, more important than any exposition of the illness itself (Chivonivoni 2008). The whole African belief is so fundamental that any form of healing process that ignores these beliefs might be psychologically unsatisfactory (Goercke 2004: 16). It follows therefore, that a detailed biomedical explanation based on the germ theory might be foreign and irrelevant to many African people's concepts of illness. Among many cultures, traditional treatment is considered to offer a valid alternative to modern treatment, and is believed to be as effective and of shorter

duration than the Western medical treatment of TB. Traditional healers in Zimbabwe also serve as medical practitioners within their respective villages, providing advice and herbal treatment to those seeking to remedy an illness (Goercke 2004:17). Only if symptoms persist and/ or the suspect's health deteriorates, are modern health services consulted.

5.3.2.28 What do you think your chances are of being infected with TB

The respondents were asked how they perceived their chances of being infected with TB (see figure 5.23). Understanding how individuals experience or perceive their illness may shed light on factors affecting voluntary presentations and adherence, and improve the outcome of TB control efforts. Experiences and perceptions of African people living with TB was carried out. Some of the participants did not believe that they had TB and hence denied the diagnosis. Some of the participants agreed to have heard about TB but were convinced that the disease would ever come near them (Nnoaham, Pool, Bothamley & Grant 2006:1013). This affects early diagnosis and treatment so as to limit transmission to the community.

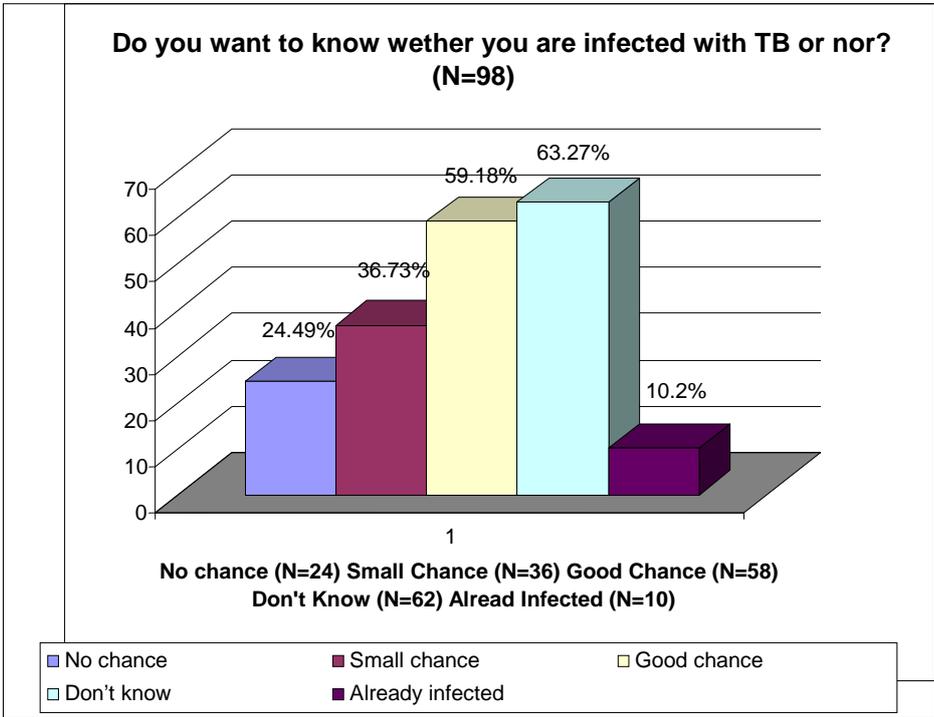


Figure 5.23 Respondents' chances of being infected with TB (N=98)

Regarding their chances of being infected, 63.27% (n=62) of the respondents did not know what their chances were; 59.18% (n=58) indicated there was a good chance of being infected; 36.73% (n=36) indicated a small chance; 24.49% (n=24) indicated that there was no chance, and 10.2% (n=10) indicated they were already infected.

According to Salla et al (2007:25), treatment interruption is often related to perceptions about TB as a disease. The TB patients, who do not believe that they had TB, only wants a cure for the symptoms and ceased treatment once these lessened. Some patients continue to take medication after the necessary period of six months, and some patients would continue with treatment despite not having any symptoms, because they believed that the “roots” of the disease needed to be removed. This demonstrated little knowledge on TB as a disease and the treatment of TB. Equipping TB patients with knowledge on TB and DOTS is necessary so that they seek medical treatment early.

5.3.2.29 If you worried that you are infected with TB, where you would go

The respondents were asked where they would go if they were worried about TB infection (see table 5.10).

Table 5.10 Where respondents would go if worried about TB infection (N=98)

Where would go if worried about TB infection	Frequency	Percentage
Hospital/clinic/doctor	84	85.71
Contact my regular partner	44	44.90
Family members	56	57.14
Friend or colleague	56	57.14
TB peer educator	66	67.35

*Multiple-response question, sum not equal to 100%

Of the respondents, 85.71% (n=84) would go to a hospital/clinic/doctor if they were infected, while 44.90% (n=44) indicated that they would contact their regular partner.

In southern Thailand, delays in the diagnosis of TB led to a higher risk of mortality among patients and transmission of the disease in the community (Rojpibulstit,

Kanjanakiritamrong & Chongsuvivatwong 2006:422). Early detection and effective treatment are the two key factors in successful TB control.

5.3.3 Section 3: Respondents' understanding of the TB programme

This section examined the respondents' understanding of the TB programme.

5.3.3.1 *Where did you first learn about the National TB programme?*

The respondents were asked to indicate their first source of information on the National TB programme (see table 5.11).

Table 5.11 Respondents' first source about the NTP (N=98)

Where did you first learn about the NTP?	Frequency	Percentage
Newspapers and magazines	36	36.73
Radio	80	81.63
TV	40	40.82
Billboards	22	22.45
Brochures, posters and other printed materials	34	34.69
Health workers	40	40.82
Family, friends, neighbours and colleagues	28	28.57
Religious leaders	32	32.65
Teachers	58	59.18

*Multiple-response question, sum not equal to 100%

Of the respondents, 81.63% (n=80) indicated the radio; 59.18 % (n=58) indicated teachers; 40.82% (n=40) indicated health care workers; 34.69% (n=34) indicated brochures, posters and other printer matter; 32.65% (n=32) from their pastors/clergy, and 22.45% (n=22) indicated billboards. Tanzania covers a vast geographical area with few billboards in any given area, especially rural areas.

5.3.3.2. Where did you first learn about the TB programme?

The respondents were asked where they first learned about the TB programme (see table 5.12). Of the respondents, 69.39% (n=68) learnt about the TB programme from brochures, posters and other printed matter; 65.31% (n=64) indicated health care workers; 48.98% (n=) indicated billboards; 24.49% (n=) indicated the radio; 15.31% (n=) indicated newspapers and magazines; 5.10% (n=5) indicated TV programmes. The company has invested a lot in promotion of its TB programmes in terms of distributing material and talks by health care workers at toolbox meetings.

Table 5.12 Where did you first learn about the TB programme? (N=98)

First source of learning about TB programme	Frequency	Percentage
Newspapers and magazines	15	15.31
Radio	24	24.49
TV	5	5.10
Billboards	48	48.98
Brochures, posters and other printed matter	68	69.39
Health workers	64	65.31
Family, friends, neighbours and colleagues	62	63.27
Religious leaders	32	32.65
Teachers	58	59.18

*Multiple-response question, sum not equal to 100%

TB is referred to as the worst disease in the world, people with signs and symptoms of TB may avoid seeking health care, or once the diagnosis is known, they may deny their illness (Citrin 2006:4). However, the family circle may provide information and the community plays an important role in the education and awareness regarding TB.

The WHO (2003:48-49) states that "if you do not have the support of the family, community and society, then you lose the fight". Patients without support are less likely to recover as they increasingly find themselves alone. Social support can help patients overcome structural and personal barriers and may influence their knowledge, attitudes and beliefs towards TB and DOTS. After discharge from hospital, they stop treatment,

since their families did not visit them and no health education was given to the family members (WHO 2003:51).

5.3.3.3 How serious a problem do you think TB is in the company?

The respondents were asked how serious TB was in the company (see figure 5.24). Of the respondents, 61% (n=60) thought it was a very serious problem in the company; 26% (n=25) thought it was quite serious, and 13% (n=13) thought it was not a very serious problem in the company.

It could be those opinions pertaining to the seriousness of contracting an illness or the consequences which may arise if left untreated. TB is one communicable disease for which involuntary detainment continues to be employed. This is because of factors such as the airborne mode of transmission, potential severity of the disease, the protracted disease and treatment course, and the availability of effective treatment (Chivonivoni 2008).

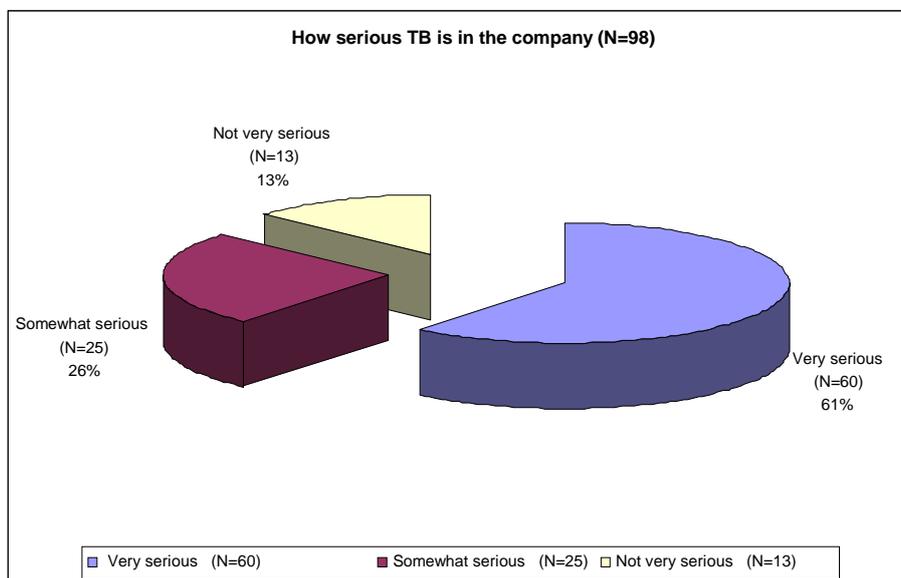


Figure 5.24 Respondents' perception of seriousness of TB problem to the company (N=98)

Munro, Lewin, Swart and Volmink (2007:104) found that perceived severity sometimes had a weak correlation with health action, and might even result in avoidance of protective action. Munro et al (2007:104) add that perceived susceptibility might be more important than perceived severity in promoting long-term medication adherence for TB and HIV/AIDS.

5.3.3.4 Is TB treatment free or paid by the company?

The respondents were asked whether TB treatment was free or paid for by the company (see figure 5.25). Of the respondents, 80% (n=) indicated that the treatment was free and 20% (n=) said it was and that the company paid for TB treatment and 20% (n=) said the treatment is not free. It is important for respondents to understand that the treatment is free paid for by the company and that DOTS treatment is provided free at clinics.

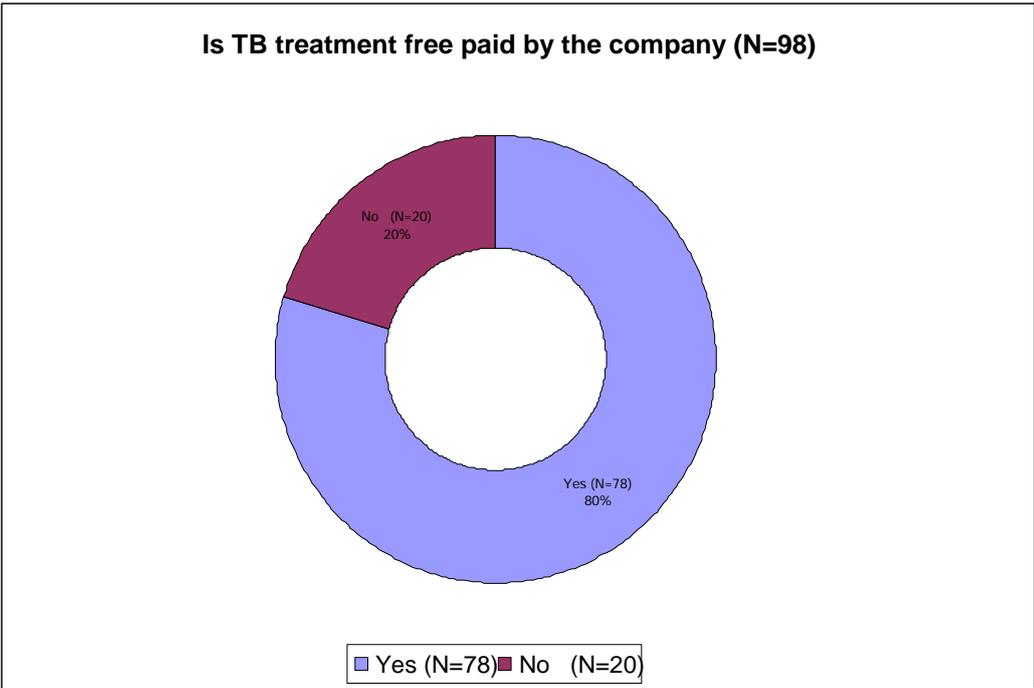


Figure 5.25 TB treatment free or paid by the company (N=98)

5.3.3.5 Do you think the TB programme is well staffed?

The respondents were asked whether the TB programme was well staffed (see figure 5.26). Of the respondents, 86% said “yes”, but 12% said “no”.

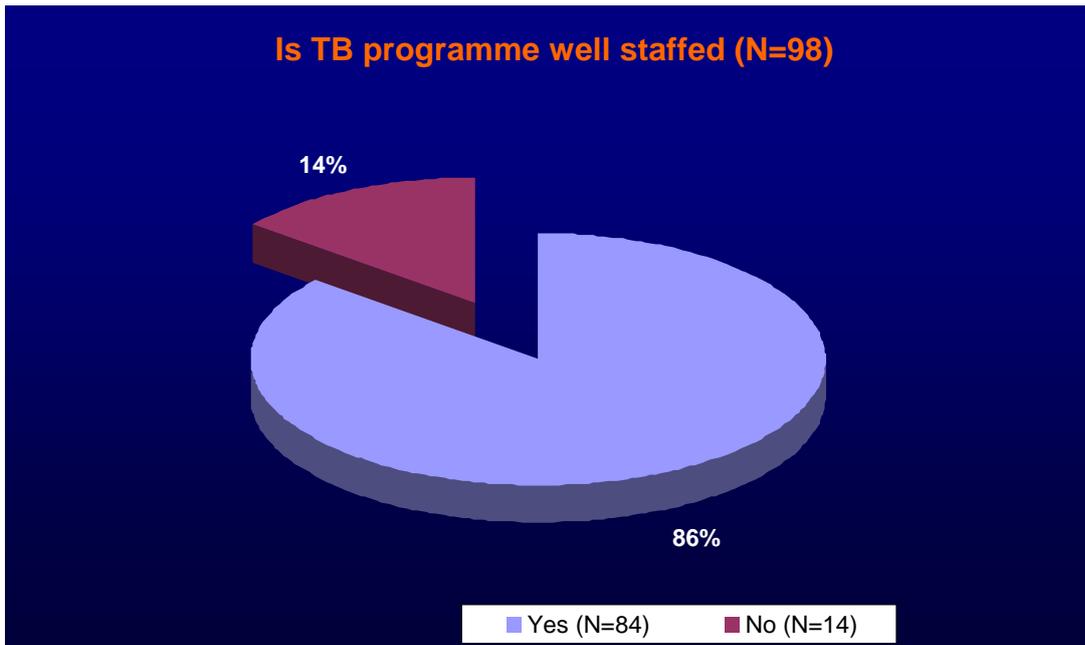


Figure 5.26 Respondents' view of TB programme staffing (N=98)

5.3.3.6 Do you think the TB programme well resourced

The respondents were asked whether the TB programme was well resourced (see figure 5.27). Of the respondents, 77.55% maintained it was, while 22.45% (n=) did not.

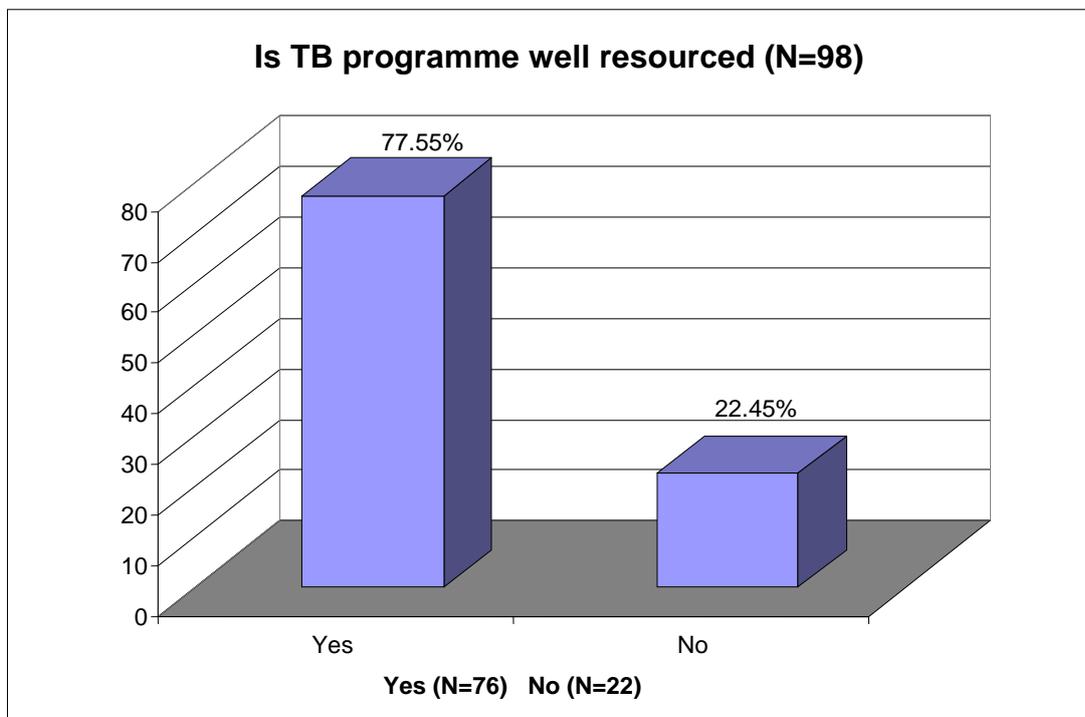


Figure 5.27 Respondents' view of the TB programme resourcing (N=98)

The political and financial commitment permitted everyone with TB regardless of financial status, to access high quality TB treatment free of charge (Chen, Zhao, Duanmu, Wan, Wang, Du & Chin 2002 :430). The DOTS strategy ensures that the person completes an adequate course of treatment, it lets the health worker monitor the patient regularly for side effects and response to treatment, it helps the health worker solve problems that might interrupt treatment, by ensuring that the patient actually takes every dose of drugs, it helps the patient become non-infectious (Farmer 2005:13).

5.3.3.7 *The purpose of the TB control programme (N=66)*

The respondents were asked to explain the purpose of the TB control programme. Of the respondents, 68.18% (n=45) maintained it was intended to make sure there was a productive workforce; 53.03% (n=35) indicated that it was to prevent TB; 31.82% (n=21) said the purpose was to trace people with TB; 39.39% (n=26) said it was intended to treat people with TB and prevent them infecting others; 25.76% (n=15) indicated to keep records for national statistics; 22.73% (n=15) stated it was part of the government health care system; 18.18% (n=12) said it was to ensure that government money was used to control TB, and 16.67% (n=11) indicated it was the government's responsibility.

5.3.3.8 *Do you think you have a role to play in the TB control programme*

The respondents were asked whether they had a role in the TB control programme (see figure 5.28).

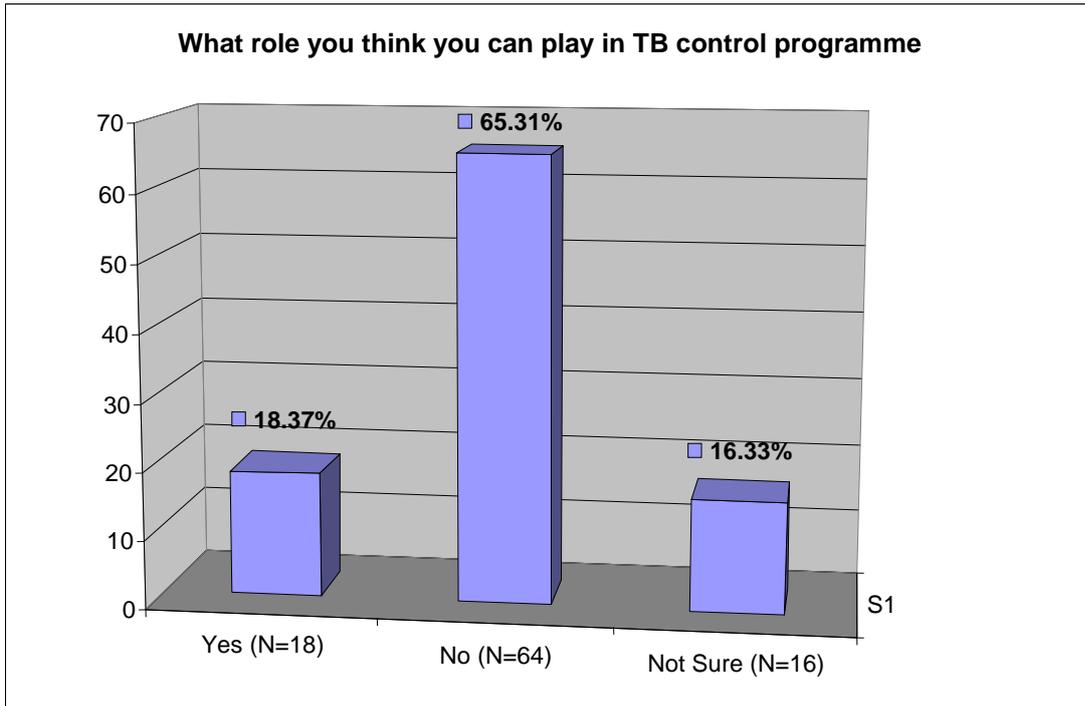


Figure 5.28 Respondents' role in the TB control programme (N=98)

Of the respondents, 65.31% indicated that they did not have a role to play in the TB control programme; 18.37% indicated that they had a role to play, and 16.33% were not sure.

5.3.4 Section 4: Respondents' perception of the TB control programme and their suggestions to improve the programme

This section covered the respondents' perceptions of the TB control programme and their suggestions to enhance TB prevention and the programme.

5.3.4.1 How well you think company TB programme performs

The respondents were asked to assess the company TB programme (see figure 5.29).

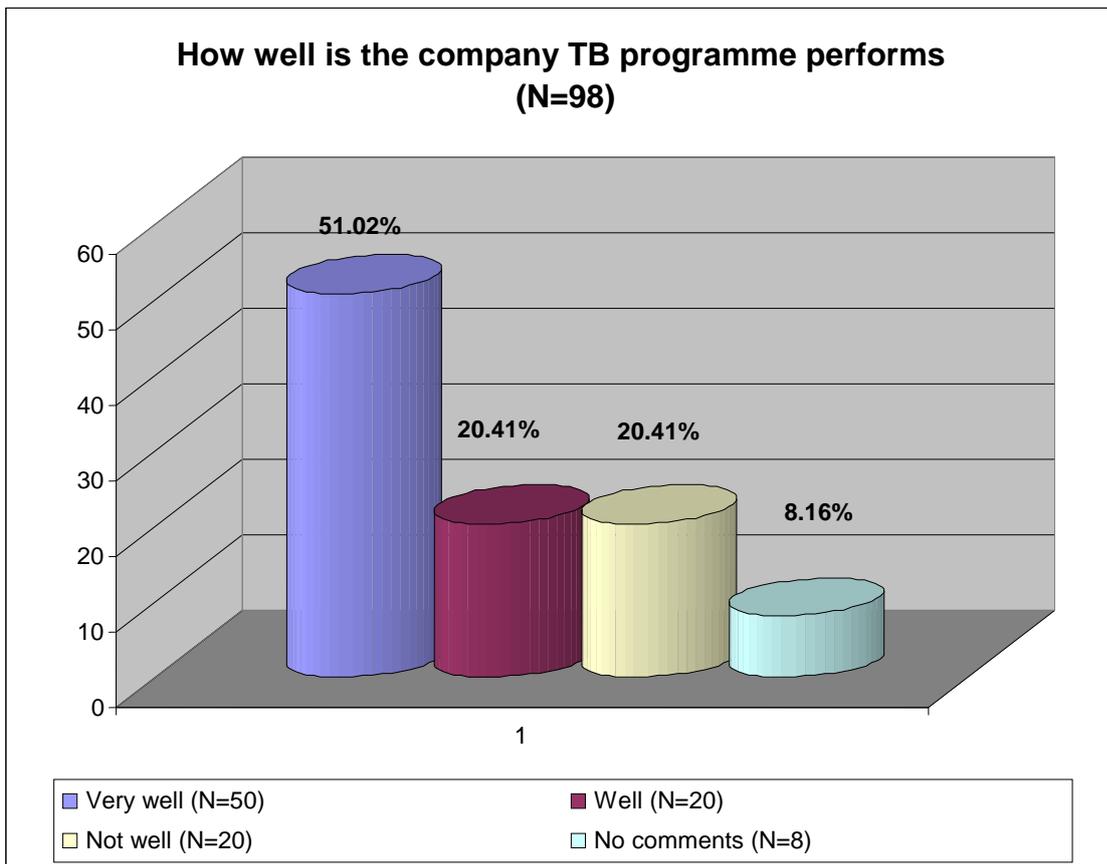


Figure 5.29 How well you think the company TB programme performs (N=98)

Of the respondents, 51.02% (n=) said the company TB programme performed very well; 20.41% (n=) said it did not, and 8.16% (n=) did not respond.

The National Centre for HIV/AIDS, Viral hepatitis, STD, and TB Prevention (2009) state that satisfaction with regard to TB services is how individuals regard the health care services or the manner in which they are delivered by health care providers as useful, effective, or beneficial. It is often based on patient expectations of care and the self-assessment of their experiences. Patient satisfaction may play a major role in a patient's behaviours. If a patient is dissatisfied with the relationship with their provider or with the clinical setting, he or she is much less likely to be adherent to medications, keeping appointments, identifying contacts, and so forth. Research has shown that patient satisfaction can be increased with effective patient-provider communication and development of a trusting relationship.

5.3.4.2 Respondents' suggestions to improve TB programme to their satisfaction (N=88)

The respondents made several suggestions in response to the question of what could be done to improve the TB programme. Of the respondents, 30.68% (n=27) said use of radio as there are a lot of FM radios around lake zone, 26.14% (n=23) indicated that more funding will improve the TB programmes in general this is at odds with the fact that the company has funded well the programme, The least response was to get expert response 2.27% (n=2) this was not very clear, however, other responses were:

- More staff 7.95% (n=7)
- Staff presentation in toolbox meetings 23.86% (n=21)
- Billboards 10.23% (n=9)
- Ease of access to staff 21.59% (n=19)
- Timely response and rapid diagnosis 4.55% (n=4)
- Follow-up communication 14.77% (n=13)
- Good laboratory services 15.91% (n=14)
- Good laboratory communication timely 15.91% (n=14)
- Effective communication with patient 17.05% (n=15)
- Effective communication with management 25.00% (n=22)
- Communication with union 14.77% (n=13)
- Availability of financial support for patient 13.64% (n=12)

Of the respondents, 23.86% (n=) also recommended health care talks in the scheduled toolbox meetings, a forum that would add value if used effectively. As indicated in figure 5.29, 51.02% (n=) of the respondents said the company TB programme performed very well; 20.41% (n=) said it did not, and 8.16% (n=) did not respond.

5.3.4.3 Ways to elicit feedback from workers about how to improve TB care

In an open question there were 73 respondents, the majority 31.51% (n=23) said all workforce should be interviewed followed by 26.03% (n=19) said family members and spouses need to be involved in exit interview although majority of respondents indicated in figure 5.3. The majority of respondents were single, namely 58% (n=57), only 42%

(n=41) were married or living with a partner or family, living with a partner or family is important in providing a support during treatment this is related to better compliance and good treatment outcome.

Other responses were as follows:

- Interview on workers on treatment 20.55% (n=15)
- Exit interview for workers on treatment 10.96% (n=8)
- Feedback from the union 19.18% (n=14)
- Suggestion boxes at various points in the mine 19.18% (n=14)
- Interview with line supervisor/manager 12.33% (n=9)

Suggestion boxes around the mine could effectively and easily be implemented.

5.3.4.4 What types of exit surveys after treatment completion should be used?

Although this was an open-ended question almost all the respondents (n=59) indicated that they preferred a face-to-face exit interview.

5.3.4.5 Can a TB sufferer who is taking TB drugs go back to work?

The respondents were asked whether a TB patient, who was taking TB drugs, could return to work (see figure 5.30). Of the respondents, 68% (n=) agreed that TB patients on medication could return to the workplace, while 24% (n=) did not.

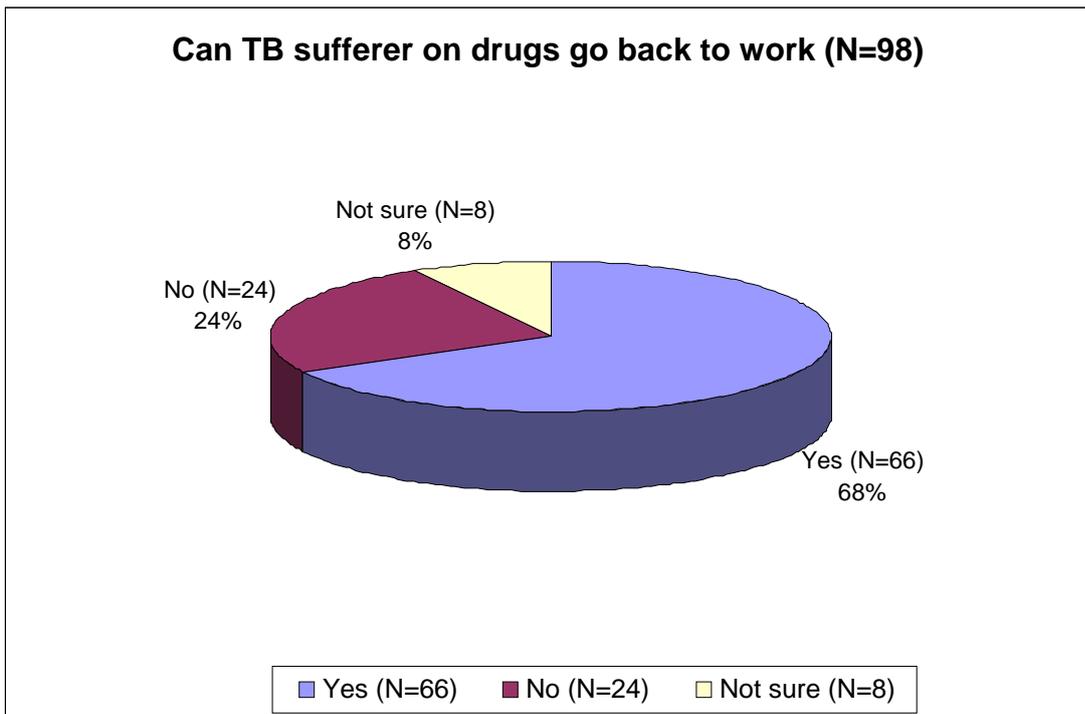


Figure 5.30 Can a TB sufferer who is taking TB drugs go back to work (N=98)

In a study in KwaZulu-Natal, (Matsha 1998:16) found that most of the participants believed that workers could return to work, and that a clinic could allocate staff to coordinate the DOTS programme in the workplace.

5.3.4.6 Do you think your employer need to know if you have TB?

The respondents were asked whether their employers needed to know if they had TB (see figure 5.31). Of the respondents, 65.31% said that their employers needed to know if they had TB; 16.33% were not sure, and 8.37% said employers did not need to know. This indicated the respondents' level of maturity and responsibility for TB prevention at the mine where they were comfortable about letting the employer know if they had TB.

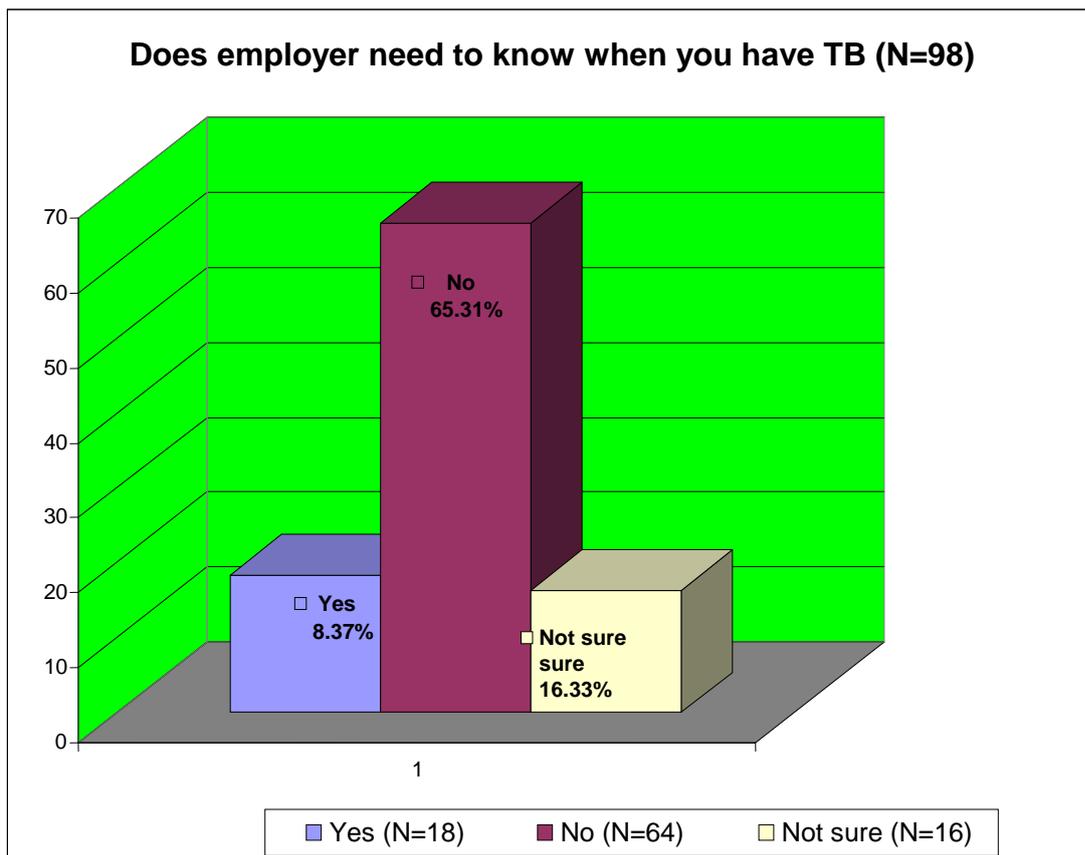


Figure 5.31 Respondents' views on whether employers need to know when people have TB (N=98)

In a study on the knowledge levels of clients on long-term tuberculosis treatment at Kwekwe General Hospital, Samkange (2005:54) found that many workers had voluntarily informed their employers that they were on TB treatment, but some did not consider it the employers' business to know about their TB status.

5.4 CONCLUSION

This chapter discussed the data analysis and interpretation of the findings with reference to the literature review. The results were presented in tables and figures.

Chapter 6 concludes the study by discussing the limitations and makes recommendations for practice and further research.

CHAPTER 6

Conclusions, limitations and recommendations

6.1 INTRODUCTION

The purpose of this study was to investigate the knowledge, awareness and practices regarding TB of workers at a selected gold mine in Tanzania in order to enhance the paucity of knowledge in this area of public health.

The mining population is considered to be at high risk of TB infection and illness. However, little data is available on their knowledge, awareness and practices. In order to acquire deeper insight into this phenomenon, the researcher used the Health Belief Model (HBM) as a theoretical framework for the study.

This chapter discusses the findings and the limitations of the study and makes recommendations for practice and further research.

6.2 FINDINGS

The findings are discussed according to the sections of the questionnaire. The questionnaire consisted of sections to achieve the objectives of the study:

Section 1: Respondents' demographical profile

Section 2: Respondents' knowledge, awareness and practices regarding TB

Section 3: Respondents' understanding of TB programmes

Section 4: Respondents' perceptions of current programmes and suggestions for enhancing TB prevention and programmes.

6.2.1 Respondents' demographical profile and knowledge, awareness and practices regarding TB

6.2.1.1 *First source of information about TB*

The respondents first learned about TB from four chief sources, namely the radio (91.84%; n=90), their teachers (61.22 %; n=60), family members (31.63%; n=31), and billboards (30.61%; n=30). These findings confirmed the significant role of the radio and educators, in particular, in disseminating information on TB.

6.2.1.2 *Perception of severity of TB*

Perceiving the severity of a disease can prompt individuals to adopt preventive behaviour and find out about the condition. The study found that of the respondents, 66.33% (n=65) viewed TB as a very serious disease while 20.41% (n=20) viewed it as "somewhat " (fairly) serious.

The HBM emphasises that perceived severity of TB infection refers to how seriously individuals view the consequences of TB infection both from a medical and social perspective. The study, then, reinforces the necessity of ongoing awareness campaigns in the media, especially over the radio, in schools, and community and public centres. The severity of the disease and its consequences need to be emphasised as well as the message that TB is both curable and preventable.

6.2.1.3 *Perceived severity of the problem of TB in the country/region*

Tanzania is among the twenty-two most heavily TB burdened counties in the world, with an annual incidence of 308 per 100 000. Of the respondents, 61.22% (n=60) viewed TB as a very serious problem in a country and region, while only 14.29% (n=14) viewed it as fairly serious. This concurred with the previous finding and further reinforced the role of education and awareness campaigns. If people generally perceive TB to be a serious problem, they will take appropriate action. So education and sensitisation of the entire population is of paramount importance in the fight against TB

6.2.1.4 Knowledge of signs and symptoms of TB

The respondents pointed out the three most common signs and symptoms of TB, namely chest pain (96.94%; n=95), cough (93.88%; n=92), and weight loss (71.43%; n=70). However, only 30.61% (n=30) indicated ongoing fatigue; 15.31% (n=15) indicated nausea, and lastly 10.20% (n=10) indicated fever without a clear cause that lasts more than 7 days.

These findings indicate that more specific education is needed. Fever as a symptom scored very low (10.20%), which is a complicating factor. This is a malaria endemic area where fever is the commonest presentation hence every fever in this area is regarded as malaria. This is a drawback in picking up and identifying other causes of fever.

6.2.1.5 Transmission of TB

Regarding TB transmission, 85.71% of the respondents knew that TB is transmitted through the air when a person with TB coughs or sneezes, but 51.02% associated it with touching items in public places, and 44.90% indicated through eating from the same plate. This finding was of concern, as it indicated a compounding of ignorance.

6.2.1.6 Prevention of TB

The study revealed that 81.63% (n=80) of the respondents said people could prevent getting TB through covering their mouth and nose when coughing or sneezing; 77.55% (n=76) indicated by avoiding shaking hands; 40.82% (n=40) indicated by praying, and 20.41% (n=20) did not know.

This finding again emphasised the need for accurate, detailed information to be given regularly and early, starting campaigns at grass-roots level in schools, church halls, clinics, and community centres.

6.2.1.7 Who can be infected with TB

The respondents were asked who could get infected with TB. Of the respondents, 97.96% said anybody could be infected with TB; 81.63% said only homeless people could be infected, and 40.82% said only drug users could get TB. This finding was of concern and indicates a need for accurate, ongoing information and education on the condition.

6.2.1.8 TB can be cured

The study revealed that 88% (n=86) of the respondents believed that TB could be cured, but 12% (n=12) thought that TB was incurable.

Health education and media efforts should focus on correct transmission and symptoms, that TB services are free, and of the necessity of adhering to treatment and regular check ups.

6.2.1.9 How TB can be cured

Regarding how TB could be cured, 86.73% (n=85) of the respondents said use of specific drugs given in the health centres; 62.24% (n=61) said DOTS; 40.8% (n=40) said praying would cure TB; 15.31% (n=15) said herbal remedies; 7.14% (n=7) said home rest without medicine was enough, and 13.27% (n=13) were not aware of any treatment model.

The number of respondents who indicated herbal remedies, prayer, rest and were not aware of treatment programmes, especially the DOTS strategy, were a cause for concern.

6.2.1.10 Susceptibility to TB

Regarding whether they were susceptible to TB, 37.04% (n=30) of the respondents said they could like anybody else; 19.75% (n=16) were not sure whether they could, and several did not appear to think they could contract TB for various reasons, including exercise (16.05%; n=13), healthy diet and living conditions (14.81%; n=12), no close contact with TB-infected individuals (7.41%; n=6), and regular medical check ups (4.94%; n=4).

6.2.1.11 Reaction if diagnosed with TB

Their reaction to being diagnosed with TB would be fear (71.43%); sadness and hopelessness (67.35%), surprise (51.02%).

6.2.1.12 Who to talk to about TB

Of the respondents, 93.08% would talk to doctors and medical workers; 87.76% would talk to their spouses; 85.71% would talk to their parents; 77.55% would talk to close friends, and 62.24% would talk to their children. However, 14.29% would talk to no one, and 8.16% did not specify whom they would talk to about it.

Although it was encouraging that so many of the respondents would talk about their condition, they were not asked to indicate whether the information would then be kept confidential for fear of stigmatisation, loss of work, or spreading the disease. This finding therefore indicates the need for intensifying community education and involvement.

6.2.1.13 Action if suspected had symptoms of TB

The researcher considered it important to know the respondents response to suspected TB symptoms in order to assess their preventive strategies. Of the respondents, 32% would go to a health facility if they suspected they had TB symptoms; 24% would go to a pharmacy; 24% would go to traditional healers; 16% would take self-treatment options, and 4% would consider “other” options (not specified).

This finding underlined the need for continuous information and education at grass-roots level.

6.2.1.14 Cost of TB diagnosis and treatment is in Tanzania

The cost of TB diagnosis and treatment is frequently perceived as a barrier to people accessing these services. Of the respondents, 79.59% (n=78) thought it was free; 62.24% thought it was reasonably priced; 54.08% indicated moderately expensive, and 20.41% indicated very expensive.

6.2.1.15 Do you know people who have/had TB

Of the respondents, 79.59% (n=78) knew people who had TB while only 20.41% (n=20) did not. This finding was consistent with the high TB prevalence in the country. Tanzania ranked was ranked fourteenth on the list of African countries most burdened with the disease (MHSW 2003:39).

6.2.1.16 Attitude towards people with TB

TB remains a stigmatised disease. This item wished to gauge the respondents' perception of TB and the stigma attached to it. Accordingly, the respondents were asked to their feelings about and attitudes towards people with TB. Of the respondents, 30.6% feared being infected by people with TB; 22.45% felt compassionate but tended to stay away from them; 18.3% felt compassion for and wanted to help them; 14.29% said it was the affected individuals' problem and they could not get the disease, and 14.29% had no particular feeling about them.

6.2.1.17 Community attitudes towards people with TB

The respondents were asked how the community usually treated/regarded people with TB. Of the respondents, 37% (n=78) indicated that most people were friendly, but generally tried to avoid the affected; 34% (n=72) indicated that the community mostly supported and helped them, and 29% (n=62) indicated that most rejected them;

These responses supported those of the 22.45% who felt compassionate but tended to stay away from them and 18.3% who felt compassion for and wanted to help them. At the same time, the responses emphasise the general fear that people feel about TB.

6.2.1.18 Information status on TB

Regarding being well informed about TB, 71.45% of the respondents maintained they were well informed, while 27.93% did not. This was attributed to radio campaigns around the Lake Zone and company education and promotional activities in the mine and surrounding communities.

6.2.1.19 Need or desire for more information about TB

The respondents were asked whether they desired more information about TB. Of the respondents, 61.22% wished to have more information, and 38.78% did not. The Tanzanian Ministry of Health and Social Welfare found a generally low knowledge and awareness of TB among the population, namely 23%.

6.2.1.20 Actions/measures to avoid getting TB

Of the respondents, 98.15% (n=53) said living in a good well-ventilated house would prevent TB; 74.07% (n=40) stressed periodic health check ups; 62.96% (n=34) indicated eating well (healthy diet), and 46.30% (n=25) indicated exercise.

This finding indicated the need for awareness campaigns to stress periodic health check ups for prevention and protection.

6.2.1.21 TB curable

Of the respondents, 66.31% (n=64) said TB was curable, 22.45% (n=22) said it was not and 12.24% (n=12) did not know. This highlighted the need for on-going education about TB and its treatment, especially early diagnosis and adherence to treatment.

6.2.1.22 How TB could be cured

The respondents were asked how TB could be cured. Of the respondents, 46.94% (n=46) said people should go to a hospital/clinic or doctor; 18.37% (n=18) said avoid contact with the infected; 16.33% (n=16) said by healthy living and diet, 14.29% (n=14) said taking medication, and 4.08% (n=4) did not know.

6.2.1.23 Effective sources of TB information

The study found that the respondents regarded the following as the most effective sources of information on TB: radio (21.22%); health workers (17.51%); teachers (16.98%); churches (10.61%), and family, friends, neighbours and colleagues (7.43%).

This finding confirms the role of the media, particularly radio broadcasting, health workers, teachers, and the community in promoting information and education on TB.

6.2.1.24 Concerns about TB

The respondents were asked their main concerns or worries about TB. The main concerns were weight loss from TB (69.14%); stigmatisation (49.38%); its association with HIV (37.04%); cost to the family (33.33%); dying (25.93%); isolation (24.69%); long-term treatment (22.22%); infecting others (17.28%); absence from work (14.81%); enrolment in TB programme (12.35%); poverty (8.64%), and stopping smoking (6.17%).

This finding reveals the high rate of stigmatisation, because weight loss, absence from work, enrolment in the TB programme and long-term TB treatment are all visible signs of the condition and lead to stigma. The cost to the family is measurable not only in loss of income and aggravated poverty, but also physical, psychological, emotional, and social.

6.2.1.25 Personal knowledge of people living with TB

Of the respondents, 76.53% (n=75) know people living with TB and only 23.47% (n=23) did not.

This finding indicates the severity and burden of TB in the country.

6.2.1.26 Personal knowledge of people who died of TB

Of the respondents, 93.88% (n=92) did not personally know anyone who had died from TB, but 6.12% (n=6) did.

6.2.1.27 Knowledge of TB status

Not knowing their status is one of the major causes of treatment delay and negatively impacts on the treatment outcome. The study revealed that 63% (N=62) of the respondents knew their status, while 37% (n=36) did not.

6.2.1.28 Chances of being infected with TB

Regarding their chances of being infected, 63.27% (n=62) of the respondents did not know what their chances were; 59.18% (n=58) indicated there was a good chance of being infected; 36.73% (n=36) indicated a small chance; 24.49% (n=24) indicated that there was no chance, and 10.2% (n=10) indicated they were already infected.

This finding confirms the importance of ongoing education and involvement at community level in order to promote awareness and acceptance of access to and utilisation of health care facilities.

6.2.1.29 If worried about possible TB infection, where to go

Of the respondents, 85.71% (n=84) would go to a hospital/clinic/doctor if they were infected; 67.53% (n=66) would go to a TB peer educator; 57.14% (n=56) would go to family members, friends or colleagues, respectively, and 44.90% (n=44) would contact their regular partner.

This was an encouraging finding since delay in treatment of TB can result in a higher risk of mortality among patients and transmission of the disease in the community. Early detection and effective treatment are the two key factors in successful TB control.

6.2.2 Respondents' perceptions of programmes available nationally and at the mine to promote knowledge, awareness and practices regarding TB

6.2.2.1 *First source of information about national TB programme*

The respondents revealed their leading sources of information about the national TB programme as the radio (81.63%) and teachers (59.18%).

6.2.2.2 *First learn about workplace TB programme*

The respondents revealed that they learnt about the workplace TB programme on brochures, posters and other printed materials (69.39%), health care workers (65.31%), and TV programmes (5.10%). The mining company has invested in promoting its TB programme by means of printed matter and health care workers' talks at toolbox meetings.

6.2.2.3 *Severity of TB problem in the company*

Of the respondents, 61% (n=60) thought it was a very serious problem in the company; 26% (n=25) thought it was quite serious, and 13% (n=13) thought it was not a very serious problem in the company.

6.2.2.4 *TB treatment free or paid by the company*

Of the respondents, 80% indicated that the company paid for TB treatment while 20% said the treatment was not free.

This finding stresses the need for people to know that the government pays for (sponsors) the TB treatment programme and it is given free by the company.

6.2.2.5 *TB programme well staffed*

Of the respondents, 86% indicated that the TB programme was well staffed while 12% did not.

6.2.2.6 *TB programme well resourced*

Of the respondents, 77.55% indicated that the TB programme was well resourced, but 22.45% indicated that it was not.

6.2.2.7 *Purpose and nature of TB control programme*

Of the respondents, 68.18% (n=45) said it was to ensure a productive workforce; 53.03% (n=35) said it was for prevention; 39.39% (n=26) said to treat people with TB to prevent further infection and spread; 31.82% (n=21) said to trace people with TB; 25.76% (n=15) indicated to keeping records for national statistics, and 16.67% (n=11) said it was the government's responsibility.

6.2.2.8 *Role in the TB control programme*

Of the respondents, 65.31% indicated that they had no role to play in the TB control programme, and only 18.37% indicated they did. However, since they were not asked to describe or indicate the role, it is not clear what they understood by their role or the question.

6.2.3 Respondents' perceptions of the programme at the gold mine and their suggestion to improve the programme

6.2.3.1 *Company TB programme performance*

Regarding the performance of the TB programme, 51.02% of the respondents said the programme performed very well; 20.41% said it did not, and 8.16% did not respond.

6.2.3.2 *Suggestions to improve TB programme*

To the question of what could be done to improve the TB programme, 30.68% (n=27) of the respondents suggested more use of radio; 26.14% (n=23) indicated more funding; 25.00% (n= 22) said effective communication with management; 23.86% (n=21) indicated staff presentation in toolbox meetings; 17.05% (n=15) said effective communication with patients; 14.77% (n=13) said follow-up communication, and 13.64% (n=12) suggested availability of financial support for patient

6.2.3.3 *Ways to elicit feedback from workers about how to improve TB care*

In order to elicit feedback from the workers on how to improve TB care, 31.51% (n=23) of the respondents said all workforce should be interviewed; 26.3% (n=19) said family members and spouses should be involved in exit interviews; 20.5% (n=15) suggested interviews with workers on treatment; 19.8% (n=14) suggested having suggestion boxes at various points in the mine, and 12.3% (n=9) suggested interviews with line supervisor/manager.

6.2.3.4 *Types of exit surveys after treatment completion*

Only 59 respondents answered this item and all (100%; n=59) indicated that they would prefer face-to-face exit interviews.

6.2.3.5 *Return of TB sufferers on TB drugs to work*

The study found that of the respondent, 68% agreed that TB sufferers on medication could return to work, while 24% disagreed.

6.2.3.6 *Should employer know worker's TB status*

Of the respondents, 65.31% said that employers needed to know; 16.33% were not sure, and 8.37% said employers did not need to know.

6.2.4 *Develop guidelines to enhance the knowledge, awareness and practices regarding TB at the gold mine amongst workers*

The government introduced the National Tuberculosis Control Programme (NTP) to control TB in the country. The size of the TB problem in the country and its ubiquitous distribution in urban and rural areas, however, make the goal of controlling the disease extremely difficult, if not impossible with the cooperation and participation of local authorities, community leaders and members, schools, churches, businesses, and NGOs.

The stigma attached to TB and HIV/AIDS needs to be tackled. People must be made more aware of the importance of their health and the value of actively utilizing the provided facilities for the sake of their own and their families' well being.

The public and private sectors need to jointly and actively collaborate in the "social strategy" and the "technical strategy" of NTP. This requires wide-ranging discussion, active planning and close collaboration between all the parties and stakeholders. Their success will be judged by the extent of community participation in NTP.

6.3 LIMITATIONS

The study was conducted at one selected gold mine in Tanzania therefore the findings cannot be generalized. The mine is in a fairly remote area but with well local established infrastructure not common in any other rural setting in Tanzania. The study involved only 98 respondents out of a workforce of 2 000. Moreover, being a cross-sectional study, the conditions found on the days of visits might have been influenced by recent special activities or events in the mine.

However, despite these limitations the study provides important information that could help in the TB control in the county.

6.4 RECOMMENDATIONS

Based on the findings, the researcher makes the following recommendations for practice and further research.

6.4.1 Practice

According to the HBM, if people perceive TB to be a serious problem they will take appropriate action to prevent it. Education and sensitisation of the entire population is, therefore, of paramount importance in the fight against TB.

Perceived susceptibility to and severity of TB infection refers to how seriously individuals view the consequences of TB infection both from a medical and social perspective. Workers should be made aware of how serious the consequences of TB infection are and be helped to understand that TB is both curable and preventable. Service providers could help workers view TB infection seriously by showing them pictures of people suffering from TB and giving them opportunity to share and discuss the information with infected individuals.

6.4.2 Further research

Further research should be conducted on the following topics:

- Professional nurses' perceptions of community knowledge, awareness and practices regarding TB.
- A comparison of urban and rural workers' knowledge, awareness and practices regarding TB.
- An investigation into workers' understanding of the DOTS treatment programme and adherence to treatment.
- KAP study in other mining houses in the country and wide community.

6.5 CONCLUSION

Tuberculosis is a life-threatening disease that is completely avoidable with safe and clean living conditions, and treatable with proper medical treatment. This chapter concluded the study, discussed the findings and its limitations and made recommendations to improve knowledge, of TB and utilisation of and adherence to treatment. Recommendations were also made for further research.

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Annexure D

(Data collection instruments)

Annexure D

Questionnaire for study Tuberculosis Knowledge, Awareness and Practices among Gold Miners Working at Barrick Bulyanhulu Gold Mine, TANZANIA.

You are kindly requested to participate on this study by replying on the following questions. **No individual names are required since the information you are give is strictly confidential**

Participant no: _____

Date:.....

SECTION 1: SOCIAL DEMOGRAPHIC CHARACTERISTICS

Please answer all questions, indicating your responses by marking appropriate box with an X

Please tell me about your self

No	Question	Options (choose one)	Code/skip
1.1	How old are you?	Years 1. Under 30 () 2. 31-40 () 3. 41-50 () 4. Over 50 ()	1.1 <input type="checkbox"/>
1.2	What is your gender?	1. Male () 2. Female ()	1.2 <input type="checkbox"/>
1.3	What is your highest level of education?	1. No Formal education () 2. Primary education () 3. Secondary education () 4. Tertiary level ()	1.3 <input type="checkbox"/>

1.4	Are you living together with your partner/family	1.Yes () 2.No ()	<input type="checkbox"/> 1.4
1.5	How far do you live from the nearest health clinic or hospital?	0–10 kilometers () 2. 11–20 kilometers () 3. 21–30 kilometers () 4. More than 30 kilometers ()	<input type="checkbox"/> 1.5
1.6	How many years have you been working at this mine?	1.Less than a year () 2.1- 5 years () 3.5-10 years () Above 10years ()	<input type="checkbox"/> 1.7

SECTION 2: TB KNOWLEDGE AND AWARENESS.

No	Question	Option	Code/skip
2.1	Where did you first learn about TB or TB? (Check all that are mentioned.)	1.Newspapers and magazines() 2. Radio () 3. TV () 4. Billboards () 5. Brochures, posters and other printed materials 6. Health workers () 7. Family, friends, neighbours and colleagues 8. Religious leaders () 9. Teachers () 10. Other (please explain):.....	<input type="checkbox"/> 2.1
2.2	In your opinion, how serious a disease is TB?	1. Very serious () 2. Somewhat serious () 3. Not very serious ()	<input type="checkbox"/> 2.2
2.3	How serious a problem do you think TB is in your country/region?	1. Very serious () 2. Somewhat serious () 3. Not very serious ()	<input type="checkbox"/> 2.3
2.4	What are the signs and symptoms of TB? (Please check all that are mentioned.)	1. Rash () 2. Cough () 3. Cough that lasts longer than 3 weeks() 4. Coughing up blood () 5. Severe headache () 6. Nausea () 7. Weight loss () 8. Fever ()	<input type="checkbox"/>

		9. Fever without clear cause that lasts more than 7 days () 10. Chest pain () 11. Shortness of breath () 12. Ongoing fatigue () 13. Do not know () 14. Other:.....	2.4
2.5	How can a person get TB? (Please check all that are mentioned.)	1. Through handshakes () 2. Through the air when a person with TB coughs or sneezes () 3. Through sharing dishes () 4. Through eating from the same plate() 5. Through touching items in public places (doorknobs, handles in transportation, etc.) 6. Do not know () 7. Other (please explain):.....	<input type="checkbox"/> 2.5
2.6	How can a person prevent getting TB? (Please check all that are mentioned.)	1. Avoid shaking hands() 2. Covering mouth and nose when coughing or sneezing () 3. Avoid sharing dishes () 4. Washing hands after touching items in public places () 5. Closing windows at home() 6. Through good nutrition () 7. By praying () 8. Do not know () 9. Other (please explain):.....	<input type="checkbox"/> 2.6
2.7	In your opinion, who can be infected with TB? (Please check all that are mentioned.)	1. Anybody () 2. Only poor people () 3. Only homeless people () 4. Only alcoholics () 5. Only drug users () 6. Only people living with HIV/AIDS() 7. Only people who have been in prison() 8. Other (please explain):.....	<input type="checkbox"/> 2.7
2.8	Can TB be cured?	1. Yes () 2. No ()	<input type="checkbox"/> 2.8
2.9	How can someone with TB be cured? (Check all that are mentioned.)	1. Herbal remedies () 2. Home rest without medicine () 3. Praying () 4. Specific drugs given by health centre() 5. DOTS () 6. Do not know () 7. Other:	<input type="checkbox"/> 2.9

2.10	Do you think you can get TB? (Ask respondent to please explain his/her answer.)	1. Yes (explain.....) 2. No (explain.....)	2.10 <input type="checkbox"/>
2.11	What would be your reaction if you were found out that you have TB?	1. Fear () 2. Surprise () 3. Shame () 4. Embarrassment () 5. Sadness or hopelessness() 6. Other:	2.11 <input type="checkbox"/>
2.12	Who would you talk to about your illness if you had TB?	1. Doctor or other medical worker() 2. Spouse () 3. Parent () 4. Child(ren) () 5. Other family member () 6. Close friend () 7. No one () 8. Other:	2.12 <input type="checkbox"/>
2.13	What would you do if you thought you had symptoms of TB? (Check all that apply.)	1. Go to health facility () 2. Go to pharmacy () 3. Got to traditional healer () 4. Pursue other self-treatment options (herbs, etc.) () 5. Other:	2.13 <input type="checkbox"/>
2.14	How expensive do you think TB diagnosis and treatment is in this country? (Please check one.)	1. It is free of charge () 2. It is reasonably priced () 3. It is somewhat/moderately expensive() 4. It is very expensive ()	2.14 <input type="checkbox"/>
2.15	Do you know people who have/had TB?	1. Yes () 2. No ()	<input type="checkbox"/> 2.15
2.16	Which statement is closest to your feeling about people with TB disease? (Read the following choices and check one answer.)	1. Yes () 1. "I feel compassion and desire to help." () 2. "I feel compassion but I tend to stay away from these people." () 3. "It is their problem and I cannot get TB." () 4. "I fear them because they may infect me." () 5. "I have no particular feeling." () 6. Other (please explain):	2.16 <input type="checkbox"/>
2.17	In your community, how is a person who has TB usually regarded/treated?	1. Most people reject him or her() 2. Most people are friendly, but they generally try to avoid him or her() 3. The community mostly supports and helps him or her() 4. Other (please explain):	2.17 <input type="checkbox"/>

2.18	Do you feel well informed about TB?	1. Yes () 2. No ()	2.18 <input type="checkbox"/>
2.19	Do you wish you could get more information about TB?	1. Yes () 2. No ()	2.19 <input type="checkbox"/>
2.20	What, if anything, can a person do to avoid getting TB?	Explain	2.20 <input type="checkbox"/>
2.21	Do you think TB can be cured?	1. Yes () 2. No () 3. Don't know ()	2.21 <input type="checkbox"/>
2.22	How can TB be cured?	1. Avoid contact with infected () 2. Living and eating healthy () 3. Go to hospital/clinic/doctor () 4. Taking medicines () 5. Don't know () 6. Others (Specify)	2.22 <input type="checkbox"/>
2.23	What are the sources of information that you think can most effectively reach people like you with information on TB? (Please choose the three most effective sources.)	1. Newspapers and magazines () 2. Radio () 3. TV () 4. Billboards () 5. Brochures, posters and other printed materials () 6. Health workers () 7. Family, friends, neighbors and colleagues () 8. Religious leaders () 9. Teachers () 10. Other (please explain):.....	2.23 <input type="checkbox"/>
2.24	What worries you the most when you think about TB?	Explain	2.24 <input type="checkbox"/>
2.25	Do you know people personally who are living with TB?	1. Yes () 2. No ()	2.25 <input type="checkbox"/>

2.26	Did you know people personally who died of TB?	1.Yes () 2.No ()	<input type="checkbox"/> 2.26
2.27	Do you know whether you are infected with TB or not?	1.Yes () 2.No ()	<input type="checkbox"/> 2.27
2.28	What do you think is the chances that you could be infected with TB?	1.No chance () 2.Small chance () 3.Good chance () 4.Don't know () 5.Already infected ()	<input type="checkbox"/> 2.28
2.29	if you worried that, you are infected with TB, where would you go.	1.Hospital/clinic/doctor () 2.contact my regular partner () 3.family members () 4.friend or colleague () 5. TB peer educator ()	<input type="checkbox"/> 2.29

SECTION3: WORKERS UNDERSTANDING OF TB PROGRAMS

No	Question	Option	Code/skip
3.1	Where did you first learn about National TB Programmer? (Check all that are mentioned.)	1.Newspapers and magazines() 2. Radio () 3. TV () 4. Billboards () 5. Brochures, posters and other printed materials 6. Health workers () 7. Family, friends, neighbours &colleagues() 8. Religious leaders () 9. Teachers () 10. Other (please explain):.....	<input type="checkbox"/> 3.1
3.2	Where did you first learn about Company TB Programmer? (Check all that are mentioned.)	1.Newspapers and magazines() 2. Radio () 3. TV () 4. Billboards () 5. Brochures, posters and other printed materials 6. Health workers () 7. Family, friends, neighbours & colleagues() 8. Religious leaders () 9. Teachers () 10. Other (please explain):.....	<input type="checkbox"/> 3.2

3.3	How serious a problem do you think TB is the company?	1. Very serious () 2. Somewhat serious () 3. Not very serious ()	3.3 <input type="checkbox"/>
3.4	Is TB treatment free of paid by the Company?	1.Yes () 2.NO ()	3.4 <input type="checkbox"/>
3.5	Do you think the TB Programme is well staffed?	1.Yes () 2.No ()	3.5 <input type="checkbox"/>
3.6	Do you think the TB Programme well resourced?	1.Yes () 2.No ()	3.6 <input type="checkbox"/>
3.7	What TB control Programme all about?	Explain.....	3.7 <input type="checkbox"/>
3.8	Do you think you have a role to play in the TB Control Pogramme ?	1.Yes () 2.No () 3.Not sure ()	3.8 <input type="checkbox"/>

SECTION4: WORKERS PECEPTION OF TB CONTROL PROGRAMS AND THEIR SUGESTION TO IMPROVE THE PROGRAMME.

No	Question	Option	Code/skip
4.1	How well you think company TB programme performs?	1.Very well () 2.Well () 3.Not well () 4.No Comments ()	4.1 <input type="checkbox"/>
4.2	What do you think can be done to improve TB Programme to your satisfaction?	Explain.....	4.2 <input type="checkbox"/>
4.3	What are some ways to elicit feedback from workers about how to improve TB care?	Explain.....	4.3 <input type="checkbox"/>
4.4	What types of exit surveys after treatment completion should be used?	Explain.....	4.4 <input type="checkbox"/>

4.6	Can a TB Sufferer who is taking TB drugs go back to work?	1.Yes () 2.No () 3.Not sure ()	4.5 <input data-bbox="1409 226 1500 310" type="checkbox"/>
4.7	Do you think your employer need to know when you have TB?	1.Yes () 2.No () 3.Not sure ()	<input data-bbox="1409 386 1516 470" type="checkbox"/> 4.6

THANK YOU FOR YOUR TIME AND INPUT.
We will appreciate if you will respond to all questions; this
will take about 20-30 minutes.

