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The Impact of Tuberculosis on Zambia and the Zambian Nursing Workforce

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Abstract

In Zambia, the incidence of tuberculosis (TB) has greatly increased in the last 10 years. This article describes Zambia and highlights the country's use of the United Nations Millennium Development Goals as a framework to guide TB treatment programmes. An overview of TB in Zambia is provided. Data related to TB cases at the county's main referral hospital, the University Teaching Hospital (UTH), is discussed. Treatment policies and barriers are described. Zambian nurses have been greatly affected by the rise in the morbidity and mortality of nurses with TB. This article explains the impact of TB on the Zambian nursing workforce. Review of Zambian government programmes designed to address this health crisis and targeted interventions to reduce TB among nurses are offered.

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From a global perspective, Tuberculosis (TB) remains a health crisis. The World Health Organization (WHO) notes that one third of the world's population is currently infected with

the TB bacillus and every second of every day someone in the world is newly infected. In 2003, an estimated 1.75 million persons died due to tuberculosis. (WHO, 2005).

This article briefly describes the developing country of Zambia, and highlights the United Nations Millennium Development Goals (UN MDGs) to improve health and the efforts Zambia is making to achieve these goals. An overview of TB in Zambia discusses the situation at the county's main referral hospital, University Teaching Hospital (UTH). Treatment policies, and barriers to these complex protocols, are described.

The World Health Organization notes that one third of the world's population is currently infected with the TB bacillus and every second of every day, someone is newly infected.

Zambian nurses have been greatly affected by the rise in the morbidity and mortality of nurses with TB. This article explains the impact of TB on the Zambian nursing workforce. Zambian government programmes designed to address the TB health crisis are reviewed. The authors suggest strategies and interventions to help decrease TB in Zambia and other developing countries.

Zambia

Zambia is an African country located in the Sub-Saharan region. The country became independent from Great Britain in 1964. Zambia has enjoyed a relatively stable political environment, is rich in natural beauty and big game wildlife. Despite its tropical location, Zambia has a pleasant climate. It is, geographically, about the size of Texas, covering an area of 752,614 square kilometers. The present population is estimated at 9, 872,000, of which 51% are male and 49% are female. Forty percent of Zambians live in urban areas (CIA World Fact Book, 2005). However, the majority of the population (60%) lives in rural areas. The national literacy rate is estimated at 63% for males and 50% for females. The country is divided into nine provinces with 72 Districts (Central Statistics Office, 2000).

The government of Zambia uses the Millennium Development Goals in Africa...as part of the guiding framework for its long term national development.

Zambia has abundant water resources, mostly in the Northern part of the country. Although the climate favors agriculture, the country also has untapped mineral wealth. The economy is largely based on copper mining but also includes tourism, energy, and industry. Eighty-five percent of the labor force is employed in agriculture, 9% in service occupations and 6% in industry. However, Zambia is currently one of the world's lower income countries as a result of the collapse of world copper prices in 1975, which has had long term effects on this country. Even today, the unemployment rate is 50%, while the economic growth rate is less than 5%. Average life expectancy in Zambia is just 39.7 years. (Annan, December, 8th 2005, United Nations;

Central Statistics Office, 2000)

The government of Zambia uses the Millennium Development Goals (MDGs) in Africa, developed at the United Nations Millennium Summit in 2000, as part of the guiding framework for its long term national development. The MDGs are similar to the U.S. government-created Healthy People 2010 goals. Prerequisites for the attainment of the MDGs include economic growth, good governance, peace, and security. These are key activities the

government strives for in the development of Zambia. The MDGs target year for attainment is 2015 and the goals focus on three main areas of human development: reduction of hunger and disease, promotion of education, and socio-economic development. These three main goals are briefly discussed below.

MDG Target 1: Reduction of Hunger and Disease

The government's target focuses on reducing by half both the proportion of people who suffer from hunger and those who live on less than a dollar a day. This goal can be achieved by promotion of economic growth; income generating activities in the private sector; and promotion of agriculture and measures which will increase sales of agricultural produce, such as establishment of a good road network in rural areas. This increase in income will empower parents to better feed their children, help to reduce preventable childhood diseases, and ultimately decrease the current high child mortality rate.

Sub goals are to reduce child mortality in the under-five age group by two-thirds and maternal mortality by three-quarters. Child mortality is decreasing through expanded programmes of immunization. The Reaching Every Child in Every District (RED Strategy) Programme, WHO, United Nations Children's Fund (UNICEF), Japan International Cooperation Agency (JICA), Global Alliance for Vaccine Immunization and Vaccine Fund (GAVI and VF) are programmes that help to increase immunization against vaccine preventable diseases, including Diphtheria, Pertussis, Tetanus, Hepatitis B, and Haemophilus Influenza Bacteria vaccine (DPT- HEP B -HIB). (Zambia Immunization Vision and Strategy, 2006-2010). Maternal mortality can be reduced by addressing reproductive health services, including improvements in family planning, financial resources, communication systems, training, and response to obstetrical emergencies.

Another MDG sub goal focuses on halting the burden of disease and reversing the spread of communicable diseases such as TB, HIV/AIDS, and malaria. This can be achieved by strengthening the implementation of the government-sponsored Basic Health Care package instituted by the Central Board of Health. (CBOH, 2002)

MDG Target 2: Promotion of Education

The government targets the MDG of Promotion of Education in several ways. Free universal basic education ensures that all boys and girls complete primary education. Africa has adopted the United Nations Affirmative Action for the Girl-Child to ensure gender equality and empowerment of women by elimination of gender disparity in primary and secondary education.

MDG Target 3: Socio-Economic Development

Several actions are designed to promote socio-economic development. The government has embarked on Environmental Development and Natural Resources Management to achieve environmental sustainability. Goals include reversing the loss of environmental resources, improving sustainable access to safe drinking water to half the population, and improving the socio-economic status of most slum dwellers by the year 2020.

...reduction of hunger and disease, promotion of education, and socio-economic development would all impact the challenge of decreasing TB in Zambia.

To achieve socio-economic development, the government also seeks to: develop a global partnership for development; improve information technology and access to essential drugs from international companies; achieve debt cancellation and secure favourable repayment terms; assure good governance based on the rule of law; create favourable export conditions; and expand work opportunities for youth and underemployed adults. This would foster socio-economic development among these populations.

In summary, progress in the three main areas of human development targeted by the MDGs will require intentional measures by the government to promote economic growth, good governance, peace, and security. However, reduction of hunger and disease, promotion of education, and socio-economic development would all impact the challenge of decreasing TB in Zambia. The next section describes how TB has affected Zambia and discusses treatment regimens and barriers.

Tuberculosis in Zambia

The impact of TB in Zambia can be demonstrated by first reviewing the prevalence and incidence of this disease. Other important factors to consider are the comorbidity with HIV/AIDS and current intervention plans to treat TB in Zambia. Each of these topics will be briefly discussed.

Prevalence

In 1964, Zambia had a TB prevalence rate (number of cases present in a specific population at a specific time, or case rate) of approximately 100 cases per 100,000 persons. That figure remained constant for the next 20 years. The first case of Human Immunodeficiency Virus/Auto Immune Deficiency Syndrome (HIV/AIDS) in Zambia was diagnosed in 1984. Between 1984 and the present, the prevalence of tuberculosis has risen dramatically. In 2004, the case rate of TB was 450 cases per 100,000 and in 2005 is approaching 500 cases per 100,000 (See [Graph](#) for case rate). The mortality rate is 88.7 per 100,000 persons. According to 2002 World Health Organization data, Zambia ranks 11th in the world in mortality rate due to TB (WHO, 2005).

Graph 1.

(Chanda, 2002)

Incidence

In Zambia, the incidence (the number of new cases during a specific time, such as a year) of TB has also greatly increased in the last 10 years. Tuberculosis now accounts for one of every six adult deaths in Zambian hospitals.

The University Teaching Hospital (UTH) in Zambia is the National Referral Hospital at the tertiary level of care. Located in the capital city of Lusaka opposite the ridgeway campus of University of Zambia, UTH is

a large structure spread over one and one-half kilometers (80 hectares) of land. There is a staff of approximately 3000 medical personnel. The stated mission of UTH is to provide affordable quality health care, function as a national referral center, train health care providers, and conduct research to find solutions to existing health problems and for development of science. There is a bed capacity of 1803, and four clinical disciplines: pediatrics and child health; obstetrics and gynecology; internal medicine; and surgery. (UTH Health Information System, 2005)

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There was a 12% increase at UTH in the number of TB patients seen between 1994 and 1998 (UTH records, 1999). In 2003, a total of 1,230 persons (605 males and 625 females) died from TB. As noted in Table 1 however, both the number of admissions for TB and the mortality rate shows a small, but steady, decline over the past five years. (UTH-TB Annual Reports from 2000-2005).

Table 1. TB Cases UTH: 2000-2004

Year	MALE			FEMALE		
	Adm	Disc	Death	Adm	Disc	Death
2000	2752	1767	995	2351	1602	749
2001	2727	1772	955	2393	1703	690
2002	2461	1702	759	2052	1514	538
2003	2020	1415	605	2213	1588	625
2004	1699	1143	556	1793	1282	511

(UTH, 2000-2005; Unpublished)

Even with this decline, TB continues to be a major cause of sickness in the workforce (professionals and non-professionals) of all hospitals and health centers in Zambia. This increased incidence in TB has increased demand for health services, such as close supervision and patient support, to ensure compliance with the long periods of treatment.

Comorbidity with HIV/AIDS

TB and HIV/AIDS have become overlapping epidemics as many TB patients are also co-infected with HIV.

Zambia is one of the countries also acutely affected by the HIV/AIDS epidemic. TB and HIV/AIDS have become overlapping epidemics as many TB patients are also co-infected with HIV (WHO, 2004). Zambia's "National HIV/AIDS/TB Intervention Strategic Plan of 2002" morbidity and mortality figures have, however, shown some decline (slight) in the recent past. Current figures estimate that 16.5% of the adult population is infected with HIV, and thus are at increased risk for TB.

TB and HIV/AIDS are thought to be a synergistically lethal combination, with each disease exacerbating effects of the other. TB is the leading cause of death in individuals who are HIV positive and is also the cause of death for 13% of patients with AIDS (WHO, 2005).

Plan for Intervention: TB Treatment Regimens

Prior to the mid 20th century there were no medications to effectively prevent, treat, and/or cure TB. Currently, effective prevention, treatment, and cure of TB can be achieved through regimens of treatment, such as the Directly Observed Treatment Short Course (DOTS) program recommended by the WHO. The DOTS Course is explained in more depth later in the article in the section "Current Government Programmes." The WHO is committed to achieving major progress in global public health. Goals for tuberculosis include a case detection rate of 70% and a world wide cure rate of 85% by 2005.

TB Treatment Policy in Zambia

To understand the impact and challenges of TB on the population of Zambia, and specifically the health care workforce, it is important to review the current treatment policy and consider the many barriers to treatment. This section provides a brief overview of current treatment for TB, per Zambian government policy, and reflects on several substantial barriers to treatment.

Overview of Treatment Policies

In Zambia the National Tuberculosis and Leprosy Control unit (Ministry of Health, 2001) stipulated, per the Ministry of Health, that all patients with confirmed TB should receive free anti-tuberculosis treatment. Also, TB is a notifiable disease. The goal of treatment is to control TB symptoms and to prevent transmission to other people. In a recent (January 2006) TB workshop attended by the author (Chanda), it was noted that the country's detection rate for TB stands at 81% and the cure rate is at 75%. Several recent policy changes that incorporate current trends in TB treatment and management are being incorporated into training curricula.

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To that end, the Ministry of Health adopted the DOTS Course as a TB treatment strategy. The description of the TB treatment strategy below reflects the current trends. A combination of anti-tuberculosis drugs is recommended for use in the treatment regimen. This combination is designed to avoid the development of resistant strains of the *tuberculosis bacilli*. The duration of treatment has been shortened from 18 months to 8 months, hence it is now referred to as the DOTS Short Course. The DOTS Course has five pillars, as briefly listed below:

- Pillar 1: Political Will
- Pillar 2: Diagnosis of TB by sputum smear
- Pillar 3: Available TB drugs at all times
- Pillar 4: Record and Report
- Pillar 5: Directly Observed Therapy (DOT)

Components of these five pillars are included at all levels of health care delivery and are impacted by policy decisions. For example, the government must be willing to seek financing

for the DOTS Course TB treatment program. The availability of laboratory facilities and sufficient drugs for treatment is essential.

Rationale for Current TB Treatment Policy

Due to the current increase in the number of patients diagnosed with TB, patients are treated on an ambulatory basis, especially in urban areas of the country. This makes it more convenient for TB patients, and reduces congestion at health centers, including the potential exposure of other patients and nurses to active TB.

Effective TB treatment requires that the patient take prescribed combined doses at the right time and for the recommended duration.

Such an approach is also consistent with WHO and International Union Against Tuberculosis and Lung Disease (IUATLD) recommendations on treatment of TB in high HIV seroprevalence countries, which includes Zambia. Also among these recommendations is the uninterrupted provision of supervised chemotherapy, the reduction of health workers' workload, and elimination of risks associated with parenteral therapy (e.g., prevention of adverse reactions).

There are two possible classifications of TB: pulmonary (affects lungs) and extrapulmonary (affects bones, joints, meninges, pleura, intestines, the genitourinary tract, or lymph nodes). Patients are classified by involvement of TB. If diagnosed with both pulmonary and extrapulmonary TB, the policy is to treat the patient according to the pulmonary TB guidelines.

Effective TB treatment requires the patient to take prescribed combined doses at the right time and for the recommended duration. The success of this treatment requires prompt tracing of treatment defaulters, accurate records of patient information and clinic attendance, and an adequate supply of drugs. More specific information about the TB treatment regimen is provided below.

The TB Treatment Regimen

Six drugs are available for treatment of TB, namely:

- Ethambutal (E)
- Pyrazinamide (Z)
- Isoniazid (H)
- Rifampicin®(R)
- Rifinah (R)
- Streptomycin (S)

A TB treatment regimen is complex, requires the patient to take multiple doses of more than one oral medication on a daily basis, and may include daily IM injections of Streptomycin. Depending upon disease classification (discussed below), patients are assigned to the appropriate short course chemotherapy.

Phases and Categories of TB Treatment

The treatment of TB is divided into two phases:

- The Initial/Intensive Phase
- The Continuation Phase

During the intensive phase, patients need to take at least three combined drugs. Two drugs are usually sufficient during the continuation phase. Treatment management is determined according to a three stage category scheme, briefly discussed as follows. NOTE: This information is intended to provide the reader with an overview of current TB treatment strategies and not intended as a treatment resource.

Category 1. Category 1 patients have smear positive sputum tests for *acid fast bacilli* (AFB). These patients are very contagious. They are newly diagnosed, with no previous treatment or have taken TB drugs for less than one month. Treatment protocol is known as 2HRZE/6EH. The initial course of treatment for new cases of smear positive pulmonary tuberculosis and other newly diagnosed patients with severe forms of tuberculosis (including TB meningitis, miliary and/or spinal TB) is 2 months of intensive, supervised treatment. After 2 months, if sputum is negative for AFB, the patient begins a 6 month drug regimen (with TB meningitis, the period is 10 months). If sputum specimens remain positive after treatment, the intensive phase continues for another month and specimens are sent to the Chest Diseases Laboratory for culture and sensitivity. Category 1 treatment is intended mainly for adult clients (over age 12).

Category 2. Category 2 patients are classified as TB relapses (patient was treated and cured, but has recurrence) and TB treatment failures and TB defaulters. Sputum tests are positive for *mycobacterium tuberculosis* germs. These patients are treated on a priority basis because of suspected drug resistance (easily transmissible and very difficult to treat). A pre-treatment sputum specimen is taken for culture and sensitivity. Treatment protocol is known as 2HRZES/1HRZE/5HRE (see drugs noted above), with 3 months of intensive treatment followed by a 5 month continuation phase. Full supervision is required during the 3 month treatment or until sputum tests are negative. When sensitivity shows resistance to drugs, there is still a good chance of cure if patients take the drugs under full supervision until treatment ends.

Category 3. Category 3 patients include children below age 12 and patients with smear-negative pulmonary disease, pleural effusion, effusion and pulmonary smear negative TB, and extrapulmonary TB. *Children with TB are almost always smear-negative.* There is a separate protocol for paediatric patients.

Category 4. Category 4 consists of patients with chronic TB (e.g., multi drug resistant TB). There is no scheduled TB treatment protocol for this group. Sputum tests are repeated for culture and sensitivity and the medical officer individualizes the treatment according to drug sensitivity results and patient response.

To confirm that sputum conversion has taken place, sputum specimens for AFB should be taken at 2, 5, and 8 months after start of treatment. This facilitates tracking and determination of cure rates to monitor the degree of achievement of the world-wide targeted cure rate of 85%.

Once a decision is made to treat as TB, it is the responsibility of the medical doctor or clinician to ensure that the patient is notified and completes TB treatment. In Zambia, the DOTS Course strategy remains the current treatment. However, a new protocol called the

Fixed Drug Combination (FDC) is under consideration for future use. The FDC is a combined dose of Rifampicin, Isoniazid, Pyrazinamide, and Ethambutol. The advantage of this drug combination is that the pill burden is less. The disadvantage is that it is not easy to identify the exact drug to which a patient may have an allergy (TBTimes, 2001).

Barriers to Treatment

Without treatment, each person actively infected with TB bacilli will annually infect 10 to 15 other people (WHO, 2005).

Currently there exists the means to effectively prevent, treat, and cure TB, however, factors such as poverty, over population, lack of proper sanitary conditions, and cultural beliefs and traditions pose great challenges to success. This is particularly true in low income regions of the world, including South-East Asia and Sub-Saharan Africa. This section discusses several major barriers to treatment of TB in Zambia.

Without treatment, each person actively infected with TB bacilli will annually infect 10 to 15 other people.

Economics and environment. Tuberculosis has placed an ever increasing economic burden on the country of Zambia. Due to the high morbidity and mortality rates, there is an acute loss of workforce manpower, both in days of work time lost and in the decreased numbers of available employees.

In addition, treatment costs, though seemingly minimal, are often far beyond the means of many families in a country where half the population is unemployed. Economic burdens resulting from low income and related treatment costs, such as x-rays, nutritional needs, and travel to the health center, pose further barriers to treatment.

The WHO DOTS course has demonstrated an improved cure rate for those infected with TB and inhibited by severe economic and environmental conditions.

Living conditions are often less than adequate with densely congested space, communal sharing of lavatory facilities, and lack of access to safe water in the shanty compounds of Zambia and in most rural areas. Some areas in the western province of Zambia encounter very serious geographical barriers to treatment

due to flooding during the rainy season when they are unable to travel to health centers. In other regions, hilly terrain makes travel difficult. The WHO DOTS Course has demonstrated an improved cure rate for those infected with TB and inhibited by severe economic and environmental conditions (CBOH, 2002)

Culture and education. Cultural and educational deprivation are barriers to the treatment of TB. Patients with little or no education often believe that they have been bewitched. Anecdotal reports exist of patients who opt for traditional home remedies, instead of modern treatment for TB, especially when relatives are of the same mindset. The effect of education, or lack thereof, is a barrier to treatment, according to Munthali (2004) who notes that high education may make it easier for TB patients' relatives to understand information about TB, its treatment, and prevention of drug resistance. Relatives with low educational attainment are not as likely to encourage their family members to comply with the medication regimen.

Religion. Some born again Christians believe that their faith can cure them of any disease. Anecdotal reports exist of some clients and nurses who refuse treatment citing religious

beliefs, and wait to be healed through divine intervention. If these clients happen to be nurses, they do not pose any added danger to clients as they are put on sick leave once diagnosed with TB.

Social stigma. People relate TB with HIV/AIDS and an associated social stigma results. In the Munthali (2004) study, HIV/AIDS was found to be closely linked with TB. Munthali reported that some members of the community considered every TB patient to also have HIV/AIDS. Family members caring for a TB patient may hold a silent belief that the patient also has HIV/AIDS. The strength of this belief may even lead caregivers (often relatives) to condemn the patient for having TB. Thus, the TB patient may develop low self esteem, a negative attitude towards him or herself and the disease, and may end up non compliant with treatment.

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Chronicity and family roles. Family roles are often disturbed due to the chronicity of tuberculosis. Prolonged care and treatment is frequently needed, which causes extended periods of incapacitation, loss of productivity, and poor participation in community and family duties. Social support is very important if the TB patient is to respond favorably to the treatment. The family may offer this social support system. It may also be offered by the church, home-based care givers, and other Non Governmental Organizations (NGOs). Although able family members are encouraged to look after sick relatives, the chronic nature of the disease and prolonged treatment protocol can be barriers to effective treatment, even with family support (Munthali, 2004).

Access. Access to services also poses barriers to TB treatment. Frequently in rural areas, people may have to walk for more than two hours to reach the nearest health center for treatment. Long hours of wait is also a barrier to TB treatment as working relatives who escort their sick relatives to the health centers may not have sufficient time to withstand the long wait. The Zambian society is close knit and social support is considered essential for the patient. TB patients need this social support to access their treatment. Most do not access clinic services in the absence of family and social support.

The pill burden. The complex treatment regimen of numerous amounts and various types of medication creates a barrier to treatment. Some patients feel overwhelmed by the number of tablets to be swallowed, coupled with the long duration of the TB treatment protocol.

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Non-response to treatment. Finally, a patient who fails to respond to the TB treatment may become discouraged. Family caregivers may lose interest in continued supervision and care for the patient.

These barriers to treatment are examples of significant challenges to reducing the disease burden of TB in Zambia. In addition, caring for a population with so many TB patients has taken a toll on the health care workforce. The next section discusses the impact of TB specifically on nurses in Zambia and considers potential contributing factors.

The Impact of Tuberculosis on Nurses in Zambia

Data from University Teaching Hospital (UTH), located in the Lusaka province of Zambia, demonstrates the dramatic rise in the number of TB cases in this country. Caring for such a high number of cases of TB impacts the health care workforce. This section of the article reviews UTH admissions for TB, explains the Stead Resistance Theory among caregivers of TB patients, and describes how the large number of TB cases specifically impacts Zambian nurses.

Hospital Admissions for TB

Hospitals have been recognized as points for the transmission of tuberculosis among both workforce and visitors (Grimes, Grimes, & Gravis, 1998; Menzies Fammomg, Yuan, & Fitzgerald, 1995). As shown in Table 2, UTH data between 1986 and 1998 reveal consistent and dramatic increases in the number of admissions and deaths due to tuberculosis. In 1986, there were 1682 patients admitted with a primary diagnosis of tuberculosis. In 1998, that number had risen to 7441, an increase of 342%. During that same period the number of deaths at UTH due to tuberculosis increased from 230 to 2083, an approximate increase of 906% (UTH Health Information, 1999).

Table 2. TB Cases UTH: 1986-1998.

YEAR	IN-PATIENTS			OUTPATIENT ATTENDANCE
	Admissions	Discharge	Deaths	Outpatient
1986	1682	1452	230	418
1987	2010	1730	280	1007
1988	2255	1908	347	1227
1989	2632	2069	563	1117
1990	2945	2250	695	912
1991	2994	2281	713	1127
1992	4139	3065	1074	569
1993	3704	2829	875	983
1994	3982	2849	1133	1934
1995	4886	3553	1333	2291
1996	5532	3904	1628	2583
1997	5782	4114	1668	3219
1998	7441	5358	2083	1802

(UTH, 1999; unpublished)

As demonstrated by Table 3, in 1994, TB was the fifth most common cause for admission to UTH. In just four years (1994 to 1998) it had become the second most common cause for admission.

Table 3. Number of Patients with Pulmonary TB

1994	Fifth common cause of admissions	3982
1995	Fifth common cause of admissions.	4886
1996	Fourth common cause of admissions.	5532
1997	Third common cause of admissions.	5782
1998	Second common cause of admissions.	7441

(UTH. 1999; unpublished)

Table 3 reflects the increase in TB cases at UTH between 1994 and 1998. The increased patient admissions due to TB reflects the dramatic rise in TB in all of Zambia during that time because it is estimated that between 20% to 25% of nationally notified tuberculosis patients converge in either the UTH chest clinic or inpatient wards.

Even with the progressive decline in the number of admissions, discharges, and deaths in both male and female TB patients noted in Table 1, TB remains a threat to health care workers in Zambia. Between 1982 and 1984 only 8 nurses (0.8%) of the 1045 nurses employed at the UTH were diagnosed with TB; all of these nurses were successfully treated. In contrast, between 1990 and 1996, a total of 114 nurses died from pulmonary tuberculosis, as depicted in Table 4 below. NOTE: In Zambia, employed nurses include both registered nurses and enrolled nurses (similar to a Licensed Practical/Vocational Nurse).

Table 4. TB Mortality among UTH Nurses: 1990 - 1996

Year	Population of nurses	Enrolled nurses	Registered nurses	Total	Percentage
1990-91	914	18	05	23	2.5%
1993	891	19	06	25	2.8%
1994	866	13	06	19	2.1%
1995	847	13	07	20	2.3%
1996	827	18	09	27	3.2%

(UTH. 1998; unpublished)

More recently, the highest morbidity among nurses occurred in 1999, and again in 2003. (See Table 5) The number of nurses at UTH in 1999 who were documented to be on anti tuberculosis treatment totaled 20. The group mostly affected was the Enrolled Nurses, who numbered 15. These nurses have the most contact with patients, as they are bedside caregivers.

Table 5. TB Morbidity among UTH Nurses: 1999 -2005

Year	Population of Nurses	Enrolled	Registered	Total	Percentage
1999	686	15	5	20	2.9%
2000	686	12	4	16	2.3%
2001	686	05	5	10	1.5%
2002	586	11	5	16	2.7%
2003	569	10	7	17	3.0%
2004	552	09	6	15	2.7%
2005	541	06	4	10	1.8%

(UTH, 2005; unpublished)

Tables 4 and 6 (also noted by Mbewe, 2005) reveal that the deaths of nurses with TB have been considerably reduced between 2002 and 2005 in comparison to the period between 1990 and 1996. This reduction is hopefully due to a strong focus on possible contributing factors as well as effective treatment regimens.

Table 6. TB Mortality among Nurses: 2002-2005

Year	Population	Enrolled Nurses	Registered Nurses	Total	Percentage
2002	586	11	6	17	2.9%
2003	569	02	15	17	3.0%
2004	552	07	04	11	2.0%
2005	541	01	02	03	0.6%

(UTH, 2000-2005; unpublished)

Contributing Factors

A study by Chanda (2002) examined possible hospital management-related factors that have impacted the nurses' TB rate. The study, discussed briefly below, demonstrated that contributing factors included inadequate isolation precautions and prolonged, sustained contact and exposure to TB patients by nurses who worked in medical wards. Also, inadequate rest may well have been another contributing factor since, these nurses often worked 14 hour night shifts for several consecutive days at a time. The International Council of Nurses (ICN) recommends a 40 hour work week for nurses (ICN, 2005). At Zambia's

University Teaching Hospital, and many other places, nurses are often required to work 7 continuous night shifts of 14 hours each, (98 hours per week). Due to staff shortages, it is not unusual for nurses to work 2 weeks of night rotations per month, for a total of 196 hours of night shift in 4 weeks.

...contributing factors [to TB in nurses] included inadequate isolation precautions and prolonged, sustained contact and exposure to TB...

Stead's Resistance Theory

Stead (1967) noted that a strong immune system helps to develop resistance and is able to protect nurses from acquiring active tuberculosis. Despite Stead's "resistance theory" among caregivers of TB patients, nurses in Zambia continue to acquire and die from this disease. The question then becomes: does this acquisition result from repeated contact and exposure to the mycobacterium tuberculosis in the hospital environment or are there other factors associated with the high incidence of morbidity and mortality among nurses?

In more developed countries, studies have demonstrated support for the theory of increased contact and exposure as evidenced by a resulting greater number of tuberculin skin test conversion rates among respiratory therapy staff (22%), medical ward staff (27%), and HIV ward staff (50%) (Zurlo, 1996). Chanda (2002) noted that [as quoted by Stead, 1995] "Israel and colleagues reported that in the 1930s, 48% of student nurses at Philadelphia General Hospital became infected within the first year of working at the hospital, 86% within 2 years, and 100% within 3 years. Tuberculosis developed in 62 (9.7%) of these nurses within 3 years" (p. 906).

UTH Study of Nurses and TB

Few studies have been done in developed countries to examine the incidence, prevalence, and/or exposure-associated rates of infection or the effects of specific recommended interventions for maintaining caregivers' health. (Sepkowitz, 1996). Due to the high morbidity and mortality observed in nurses at Zambia's University Teaching Hospital, Chanda and colleagues (2002) examined the extent to which service and community factors were contributing to the prevalence of tuberculosis among nurses employed at UTH. The setting for the cross-sectional study was the medical and surgical wards at the UTH in Lusaka. The study found a prevalence rate of TB of 11.4% in both registered and enrolled nurse employees. Age, length of employment at UTH, and shift worked were all found to be statistically significant variables that affected whether or not nurses acquired TB. Nurses who were older, worked night shift, and worked in medical wards were found to be more predisposed to acquiring tuberculosis. Also, *mycobacterium tuberculosis* was isolated on equipment with AFB cultures taken from suction machines, lockers, and pillows in the medical wards where the prevalence rate was highest, thus identifying additional exposure risk.

...it is imperative that more aggressive measures are employed for active TB prevention, early diagnosis, and treatment of nurses and all other hospital employees.

The prevalence rate of 11.4% of nurses with active TB is cause for concern. This rate is more than twice the 4% found to be acquired by nurses in Malawi (another country in Sub Saharan Africa that shares Zambia's eastern border) during a 2 year period in the mid 1990s (Harries, Maher, & Nunn, 1997). While not all nurses in the recent study may have acquired TB due to hospital exposure, there remains cause for concern given the fact that TB is so easily transmitted from one person to another. This is especially so in a hospital environment where patients are very vulnerable and, (as noted in this article), the risk to work colleagues is great.

If, as reported by the WHO (2005), each person with active TB infects 10 to 15 other persons every year, it is imperative that more aggressive measures are employed for active TB

prevention, early diagnosis, and treatment of nurses and all other hospital employees. The Zambian government has considered several barriers to treatment and has enacted programmes designed to decrease TB in both the general population and nurses, as described below.

Tuberculosis Programmes in Zambia

Correction of the problem of endemic tuberculosis in Zambia and other developing countries, and the subsequent deleterious consequences, will require an aggressive, multifaceted approach. Governmental and other organizations have a very important role to fulfill. This section of the article discusses several policy interventions at the government level that were previously enacted or are currently in progress.

History of Government Programmes

Since the time of Zambia's independence in October 1964, there has been a series of national programmes for tuberculosis. Initially, the new Zambian government established the National Tuberculosis Control Programme to monitor the incidence, prevalence, and treatment of tuberculosis in the country. In 1980, the tuberculosis and leprosy programmes merged and there were specialty inpatient institutions for the care and treatment of TB patients. Strict isolation was observed and nursing staff were given prophylactic treatment. In 1981, Zambia adopted the Primary Health Care (PHC) concept, which focuses on preventive care and health promotion. The Government of Zambia committed to improving the health of the people by setting targets in health care. These targets included the control of TB cases.

In 1991, a new five-year plan to combat TB was developed based upon recommendations of a program team review. About this time, the impact of HIV/AIDS was becoming apparent, which resulted in the identification of two types of tuberculosis: conventional and non-conventional. Non-conventional TB is the type associated with HIV/AIDS. There was also a dramatic increase in the number of patients admitted to hospitals with tuberculosis and a corresponding shortfall in the material and human resources available to implement appropriate and effective infection prevention and control measures on hospital wards.

During this same timeframe, the Tuberculosis and Leprosy Programme merged with the National AIDS and Sexually-Transmitted Disease Programme. Programme goals were to diagnose 70% of the total estimated incidence of new smear-positive pulmonary tuberculosis cases annually and to cure 85% of them. To assist in attainment of this goal, the Ministry of Health provided technology for diagnosing TB in 12% of its health care facilities. This action greatly facilitated TB case finding and case holding (admission). A subsequent result, however, was an increased number of TB patients hospitalized at UTH and other acute care hospitals as well as an increased number of nurses acquiring TB.

In 1993, the WHO adopted DOTS Course treatment in response to a global TB emergency. The DOTS strategy was formally adopted in Zambia in 1996 and continues today. As noted earlier, the Zambian government also utilizes the Millennium Development Goals in Africa (MDG) developed in 2000 as a guideline for government programmes.

Current Government Programmes

The Ministry of Health continues to view TB as a high priority. TB is included as one of the Basic Health Care Packages (BHCP) at all levels of health care delivery. Several current TB-related government programmes are discussed below.

DOTS Course. The WHO-initiated DOTS Course programme involves direct observation of a patient as he or she swallows TB medications. The supervisor is usually a health care worker, but can also be a Community Health Worker or a trained relative. Although DOTS is known to be an effective treatment regimen, implementation is sometimes difficult in a country like Zambia, as previously discussed barriers illustrate. Munthali (2004) noted that DOTS is not a mechanical procedure of dropping medicine into a patient's mouth. Supervised swallowing requires the gradual building of a human bond between patient and supervisor at convenient times and places, in order to make the treatment course more patient-friendly. The Ministry of Health adopted the training of TB Treatment Supporters. In this system, the patient chooses the person they prefer to supervise their drug taking. In Zambia, the use of TB Treatment Supporters has effectively supplemented the DOTS Course programme.

Basic Health Care Package. The BHCP in Zambia is based on the major causes of disease burden in Zambia. This package defines affordable care for each level (community, health post, health center, 1st level hospital, 2nd level hospital and 3rd level hospital). Up to 90% of the major health threats to Zambians can be overcome through the delivery of cost-effective interventions in the following technical areas:

- Malaria
- Child health and nutrition
- Reproductive health/Family planning
- HIV/AIDS and sexually transmitted infections
- Tuberculosis
- Water and sanitation.
- Pneumonia
- Malnutrition
- Diabetes
- Hypertension
- Diarrhea (Tarimo, 1997)

Integrated Technical Guidelines written for health care workers outline key interventions for each area of the BHCP and the minimum standards of performance expected at community, health post, and health center levels. These guidelines enhance caregivers' knowledge about cost-effective interventions related to the most important health problems in Zambia. The program ensures that most health-care givers receive instruction on clinical diagnosis of tuberculosis. It also increases their capability of rendering palliative treatment in the absence of medical doctors, especially in rural areas. This is an added improvement in the prevention of tuberculosis in Zambia.

TB Council. In 2000, the TB/HIV/AIDS Council was formed to control the spread of these diseases. Merging of the TB and HIV/AIDS programmes better assures equal funding and coordination, given the relationship of these two diseases.

Non Governmental Organizations. In addition to governmental programmes, a multi-faceted approach includes numerous non-governmental organizations (NGOs). Examples of these groups include faith-based organizations, trusts, and foundations. Citizens realize that the problem of HIV/AIDS and TB can best be solved through a concerted, multi-sectoral effort, rather than depending only on the Ministry of Health. To illustrate, Catholic churches and Care International trained volunteers and relatives to supervise medication regimens of patients who live far away from a health care provider. They also trained Home Based Care Givers (HBCG). In Lusaka, TB Treatment Supporters have been trained by NGOs and the District Health Management Team (DHMT). Some TB Treatment Supporters work with the health center staff at the TB treatment corners. These are specific corners in each health center where health care workers dispense TB medication and high energy protein supplements, and provide patient education. Other Treatment Supporters operate from the Zambia TB and Leprosy Trust (ZATULET) situated in compounds (e.g., Kalingalinga) and at several interfaith centres. Such collaboration helps to reach the population infected with, and affected by, TB.

Targeted Interventions to Reduce TB in Nurses and Health Care Workers

To effectively alleviate the situation of a large number of nurses (and likely other health care providers) with active TB, targeted approaches are needed. Listed below are several suggested interventions, based on review of literature, UTH data, and research of TB in Zambian nurses (Chanda, 2002).

- Tuberculin skin testing at the time of employment (including students) and annually to detect active TB, so that early treatment can be started.
- Voluntary Counseling and Testing (VCT) centers within the hospital which will enable nurses to opt for VCT services prior to testing for HIV, so as not to violate their human rights.
- Stringent hospital policies and practices for infection prevention and control, including isolation and decontamination.
- Examination of workforce policies and practices with adoption of therapeutic staffing regimens. Such changes may be costly, but personnel losses due to sickness and death may be significantly offset by work practice reconfiguration.
- Patient and personnel education related to prevention and treatment of TB. Documents such as "TB Guidelines for Nurses in the Care and Control of Tuberculosis & Multi-drug Resistant Tuberculosis" (International Council of Nurses [ICN], 2004) outline nursing approaches for patient care aimed at improved access to treatment and quality of care. The ICN guidelines endorse the WHO DOTS Course programme and offer an overview of organizational issues which can impact TB control programmes.

Implementation of these interventions and strategies may reduce the further spread of tuberculosis in Zambia among nurses and the general population. These strategies may also be helpful to any country dealing with the challenges of TB.

Conclusion

Programmes for treatment of the infected TB population in Zambia are in place, but the challenges of prevention and treatment barriers remain. Mortality is evidencing a slight decline, but morbidity remains high, with subsequent human suffering and economic consequences. One serious concern is the loss of workforce manpower (Mbewe, 2004). Recent study (Chanda, 2002) has identified the critical impact of tuberculosis on the nursing workforce in Zambia and the potentially deleterious outcomes of severe illness and death. These outcomes, seemingly due at least in part to the hospital environment and working conditions, may be positively altered with education and policy changes. More aggressive measures for TB prevention, early diagnosis and treatment of high risk groups, and greater attention to workplace environment conditions are indicated.

Programmes for treatment of the infected TB population in Zambia are in place, but the challenges of prevention and treatment barriers remain.

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References

- Central Board of Health. (2002). *Integrated technical guidelines for frontline health workers*. Lusaka, Zambia.
- Central Board of Health Records. (1999). Lusaka, Zambia: [Unpublished].
- Central Statistics Office. (2000). Lusaka, Zambia: [Unpublished].
- Chanda D. (2002). *A study to determine the high prevalence of tuberculosis among nurses In the University Teaching Hospital*. Lusaka, Zambia: University of Zambia.
- CIA. (2005). *The world fact book. Zambia*. Retrieved December 29, 2005 from: www.cia.gov/cia/publications/factbook/geos/za.html
- Grimes R.M, Grimes DE, & Gravis E. (1996), TB control in health care workers: An algorithmic approach. *American Journal of Infection Control*, 24(2), 70-78.
- Harries, A.D., Maher, D, & Nunn, P. (1997). Practical and affordable measures for the protection of health care workers from TB in low-income countries. *Bulletin of the World Health Organization*, 75, 477-489.
- International Council of Nurses. (2004). *TB guidelines for nurses in the care and control of tuberculosis and multi-drug resistant tuberculosis*. Geneva, Switzerland: ICN.
- International Council of Nurses. (2005). *Fact sheet. Nurses and overtime*. Retrieved December 29, 2005 from: www.icn.ch/matters_overtime.htm
- Mbewe, M. (2004). *Nurses and midwives' attrition at University Teaching Hospital*. Lusaka, Zambia: UTH.
- Menzies, D., Fammomg, A., Yuan, L., & Fitzgerald, M. (1995). Tuberculosis among health care workers. *New England Journal of Medicine*, 332(2), 92-99.
- Ministry of Health/Central Board of Health. (2001). *Tuberculosis manual*. Lusaka, Zambia: National AIDS/STIs/TB/Leprosy Control Programme.
- Munthali, L.C. (2004). *A study to determine which guardian is preferred by the TB patients as a TB treatment supporter in Monze District*. Lusaka, Zambia: [Unpublished].
- Sepkowitz, K.A. (1996). Tuberculosis skin testing and the health care worker. Lessons of the prophit survey. *Tubercule & Lung Disease*, 77, 81-85
- Stead, W.W. (1967). Pathogenesis of the sporadic case of tuberculosis. *New England Journal of Medicine*, 277, 1008-1012.
- Stead, W.W. (1995). Management of health care workers after inadvertent exposure to tuberculosis: A guide for the use of preventive therapy. *Annals of Internal Medicine*, 122 (12), 906-912.

- Tarino, E. (1997). Essential health service packages: Uses, abuse and future directions. *ARA Paper*, 15, pp. 9, 14. Geneva, Switzerland: WHO.
- TB Times Southern Africa. (2001, March). *Fixed dose combination drug treatment as part of DOTS*. Retrieved December 29, 2005 from www.mrc.ac.za/publications/tbtimesmarch2001.pdf.
- UTH. (1998). *Administration records*. Lusaka, Zambia: [Unpublished].
- UTH. (1988). *Personnel records*. Lusaka, Zambia: [Unpublished].
- UTH. (1999). *Health information*. Lusaka, Zambia: [Unpublished].
- UTH. (2005). *Health information. Chest clinic*. Lusaka, Zambia: [Unpublished].
- UTH. (2000-2005). *TB Annual Reports*. Lusaka, Zambia: [Unpublished].
- UTH Board. (2004). *The University Teaching Hospital*. Lusaka, Zambia: UTH.
- World Health Organization (WHO). (2004). *TB/ HIV: A Clinical Manual*. Geneva, Switzerland: WHO.
- World Health Organization. (2005). *Media center fact sheet. Tuberculosis*. Retrieved December 29, 2005 from: www.who.int/mediacentre/factsheets/fs104/en
- Zurlo, J.J. (1996). TB control in health care workers: An algorithmic approach. *American Journal of Infection Control*, 24(2), 79-81.

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