

## Factors that Influence Health Care Workers' Implementation of Ineffective Tuberculosis Control Measures at Rural Public Hospitals of Vhembe District, South Africa

T. G. Tshitangano

*Department of Public Health, School of Health Sciences, University of Venda,  
Thohoyandou, South Africa*

*E-mail: <takalani.tshitangano@univen.ac.za>*

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**ABSTRACT** This paper explored the factors that influence health care workers' implementation of ineffective tuberculosis control measures at rural public hospitals of Vhembe district, South Africa. A qualitative approach of an exploratory design was used to collect data from fifty-seven focus group members of maximum variation that were purposively selected from a pool of health care workers in each hospital. Necessary approvals were obtained. Ethical principles of research and participants' rights were observed. The study revealed that health care workers in rural hospitals are faced with numerous challenges such as lack tuberculosis control guidelines; inadequate tuberculosis control training; inappropriate designs of buildings; inadequate material resources; inadequate human resources; inadequate management support; incorrect tuberculosis control attitudes; and inadequate tuberculosis control knowledge. Hospital managers supported by the department of health should craft strategies to deal with these challenges with an aim of improving health care workers' working conditions.

### INTRODUCTION

Despite largely being a curable disease, in 2013 TB was the leading cause of death including multidrug resistant-tuberculosis (MDR-TB) and extensively drug-resistant tuberculosis (XDR-TB) in South Africa (SA) (Statistics South Africa 2014). According to the World Health Organization (WHO) Global TB report (2014), in 2013, 9 million people fell ill with TB and 1.5 million died from the disease. Over 95 percent of TB deaths occur in low- and middle-income countries, and it is among the top 5 causes of death for women aged 15 to 44. In 2013, an estimated 550 000 children became ill with TB and 80 000 HIV-negative children died of TB. TB is a leading killer of HIV-positive people causing one fourth of all HIV-related deaths. Globally in 2013, an estimated 480 000 people developed multi-drug resistant TB (MDR-TB). South Africa (SA) is amongst the 22 countries highly burdened by TB (WHO 2014).

Despite the availability of national and international recommended TB control measures, Dara et al. (2015) indicate that hospitals in South Africa implement inadequate infection control measures, which suggest that there is an ongoing substantial risk of TB transmissions in public hospitals. The National Department of

Health's (DOH) 2011 discovery, which indicates that more than half of all XDR-TB infections in SA were acquired in public hospitals confirm the presence of this health risk. In addition, Robinson et al. (2007) reported that TB nosocomial infection was a serious cause of morbidity and mortality in children hospitalized for the treatment of TB in Cape Town, SA. Furthermore, Singh et al. (2007) found that lack of TB infection control in institutions was a neglected yet significant factor fuelling the MDR- and XDR-TB outbreaks in KwaZulu-Natal. Similarly, Tshitangano (2014) discovered that health care workers implement ineffective TB control measures. The reasons for the adoption of ineffective TB control measures are not clear. Against this background, the study aimed to explore the factors that influence HCWs' implementation of ineffective TB control measures in rural public hospitals of Vhembe district, South Africa.

### Objectives of the Study

- ♦ Explore employee factors that influence HCWs' implementation of ineffective TB control measures in rural public hospitals.
- ♦ Explore management factors that influence HCWs' implementation of ineffective TB control measures in rural public hospitals.

## METHODOLOGY

### Study Design

In line with the purpose, this study adopted a qualitative approach using a cross-sectional exploratory design. Terre Blanche et al. (2006) advises that in situations where it is difficult to identify and measure the important variables, researchers may engage in open-ended, inductive exploration that is possible by means of qualitative research.

### Study Setting

The study was conducted at Vhembe district, in Limpopo province. Vhembe district has eight rural-based hospitals. One of these hospitals (psychiatric) does not admit tuberculosis patients. Thus, this study was conducted at seven of the eight hospitals that render TB services in Vhembe district.

### Population, Sample and Sampling Procedure

All HCWs in participating hospitals who took part in TB management constituted the target population of this study. The participating hospitals differed in size, in terms of number of beds and wards. Thus, there were only three wards in some hospitals and a maximum of nine in others. Hence, the researcher included one representative from each of the wards per study hospital. As a result, 57 HCWs participated in this study. Purposive sampling of a maximum variation type was used to select representative focus group participants believed to have the necessary knowledge needed for this study. The sample size for the focus group discussions (FDGs) was one focus group per participating hospital, making up seven focus groups, each comprising 5-10 members.

### Ethical Consideration

The Limpopo Provincial Department of Health approved the study (Project No 4/2/2), and ethical clearance was issued by the University of Venda, Research Ethics Committee (Project No SHS/10/PDC/02). Permission to access the seven hospitals was obtained from each hospital manager. The participants signed informed consent, and in addition, hospitals where

data were collected were allocated codes (A, B, C, D, E, F and G) to ensure that participants' rights to privacy, anonymity and confidentiality were respected.

### Data Collection Tool

A focus group discussion guide was developed comprised of one central question namely, "What do you think are the reasons for HCWs' adoption of ineffective measures of TB control in this hospital?" This was followed by probing questions that were dependent on participants' responses.

### Pilot Study

Data collection at the first hospital afforded the researcher a pilot study opportunity to pre-test the FGD guide to determine whether or not the wording and construct was clear, and to check the feasibility of the entire study. Thereafter, the FGD guide was re-adjusted accordingly. However, data collected from the pilot study formed part of the empirical data for this study to prevent loss of the latter.

### Data Collection

Data were collected in 2013 June-2014 March. The focus group discussions were conducted in English. Focus group discussions took place in boardrooms at each hospital during office hours. The researcher facilitated the focus group discussions. Data was recorded as field notes.

### Data Analysis

Analysis of the data was guided by Tesch's (1984) open-coding method, as discussed in Creswell (2009) whereby the researcher read through all of the field notes from the FDGs, and interpreted them carefully in order to obtain an overall sense of the notes. The interpretations were written as themes. Similar themes were clustered together and eventually arranged into one major theme with sub-themes.

### Measures to Ensure Trustworthiness of the Study Findings

Trustworthiness of the results was ensured through the use of Lincoln and Guba's (1985) criteria, as outlined in Creswell (2009) namely

credibility, transferability, confirm ability and dependability. Credibility was ensured through prolonged engagement with the participants, which lasted from 1.5-2 hours. Transferability was ensured through the provision of a complete description of the research method and interpretation of the research findings in the study report. The neutral colleague from the same university examined the running account of the process of inquiry as well as the findings and recommendations; and attested that the findings are supported by data; and that the study is internally coherent (Babbie 2010).

## RESULTS

Focus groups from hospitals were coded 1, 2, 3, 4, 5, 6 and 7 based on the sequence of focus group discussions. The results are presented in the form of a theme and sub-themes developed on the basis of the purpose of the study. The theme that emerged from the data is “dynamics faced by HCWs in rural hospitals. The sub-themes are Lack of clear directing TB IC guidelines; Inadequate TB infection control training with insufficient content; Inappropriate designs of buildings; Inadequate material resources; Inadequate human resources; Inadequate management support; Incorrect attitudes towards good TB control practices; and Inadequate knowledge regarding of good TB control practices. The summary of these results are showcased in Table 1.

**Table 1: Summary of the study findings**

Theme	Sub-themes
Dynamics faced by HCWs in rural hospitals.	Lack of clear directing TB IC guidelines; Inadequate TB infection control training with insufficient content; Inappropriate designs of buildings; Inadequate material resources; Inadequate human resources; Inadequate management support; Incorrect attitudes towards good TB control practices; and Inadequate knowledge regarding of good TB control practices.

### Lack of Clear Directing TB IC Guidelines

Guided by the probing question that asked “what does your hospital TB control plan en-

tail”? Data collected revealed that more than three quarter of focus group members were not aware of what TB control plan was. Few focus group members, who thought they knew what the researcher was asking about, misquoted the dates of the TB policies and programme guidelines. According to participants,

*“The hospital does not have a TB infection control plan, which I am aware of” (participant 1: focus group 3). “HCWs in the TB ward are guided by the National TB Control Programme (NTCP1996)” (Participant 4: Focus Group 3). “I only know the National Infection Control Policy (NICP 2005), which is still a draft. Universal standard precautions are the only control measures I know of.” (Participant 4: Focus Group 6). “What I know are these universal standard precautions posters that are hanging on the walls” (Participant 3: Focus Group 7).*

The researcher concluded that hospitals do not have TB infection control guidelines.

### Inadequate TB Control Training with Insufficient Content

In response to the probing question that said: “How do you describe TB control training conducted in this hospital?,” Data revealed that hospitals used workshops, in-service education, TB awareness campaigns, teachable moments and TB infection control rounds as methods of providing TB training. Participants said,

*“For two years now, there was only one TB education or awareness session held at the kitchen hall. HCWs do not attend such sessions. Teaching programmes are not done at unit level” (All Participants: Focus Group 3). “TB infection control workshops for HCWs are held on a yearly basis, where HCWs are educated about what TB is, its causes and primary management” (Participant 6: Focus Group 1). “Several general infection control meetings are held once a month, where Mr Zakes Molewa (not his real name) educates HCWs about TB and how to control it” (All Participants: Focus Group 4). “There is an infection control round done by the infection control team on a weekly basis. HCWs are reminded on the spot about adherence to proper infection control measures” (All Participants: Focus Group 5).*

In response to additional probing question that needed clarity regarding the content cov-

ered by such trainings, participants indicated that HCWs' training only covered aspects such as mode of spread of TB; signs and symptoms of TB; TB management; how to put on N95 respirators; the use of protective gowns; and how to register patients on TB suspect register. According to participants,

*"Employees are educated about TB as a whole, mode of spread, signs and symptoms; and management. Furthermore, HCWs are instructed to put on N95 mask upon entering a TB ward. The use of protective gowns is also talked about"* (All Participants: Focus Group 2). *"HCWs are reminded on the spot about adherence to proper infection control measures"* (All Participants: Focus Group 5). *"The TB focal point nurse visits every ward once or twice a week teaching HCWs important information about TB. For example, in January 2009, she visited wards teaching them about how to register patients on TB suspect register"* (All Participants: Focus Group 6).

The researcher concluded that the TB control training conducted at these hospitals is inadequate.

### Inappropriate Design of Building

Data collected through researcher observation revealed that most participating hospitals of Vhembe district had windows that flipped inwards, not permitting maximum air entry into the wards. In addition, some windows were not opening to the environment, but to other wards. Figure 1 depicts the windows.



Fig. 1. Windows of hospital ward flipping inward

The researcher concluded that the structural designs of wards where TB patients are cared for in rural hospitals are not appropriate.

### Inadequate Material Resources

Data from focus group discussions revealed that the majority (4) hospitals did not have TB wards. Of the 3 hospitals that possessed this structure, one utilizes the ward only to care for patients on streptomycin, whilst all TB patients are cared for in the medical ward. Furthermore, in response to a probing question that asked "how do you use various masks in this hospital?" Participants indicated shortage of masks especially N95 respirators. According to participants,

*"Sometimes masks are out of stock"* (participants 4 and 5: focus group 4). *"N95 masks are re-used if not wet because they are sometimes out of stock"* (Participants 2 and 3: Focus Group 2). *"Surgical masks are used when N95 is out of stock"* (Participant 8 and 9: Focus Group 6). *"In TB ward, nurses put on N95 masks, which are not always available"* (Participant 2, 3 and 4: Focus Group 3).

The researcher concluded that TB control material resources in rural hospitals are inadequate.

### Inadequate Human Resources

Data collected from focus group discussions revealed that hospitals lacked functional TB control committee; persons designated as TB control officer; persons assigned the responsibility of identifying and fast tracking TB suspect persons; dedicated TB control team; and persons charged with the responsibility of conducting TB control trainings. Thus, in response to a probing question that asked, "Who is responsible for TB control in this hospital?" Participants said,

*"The Occupational Health and Safety nurse is responsible for infection control in the hospital"* (Participants from Focus Groups 1, 2, 3 and 4 Hospital). *"The quality assurance nurse in this hospital is assigned the responsibility of managing infection control in the hospital"* (Participant 1: Focus Group 7 and Participant 3: Focus Group 4). *"There is no infection control nurse in this hospital"* (Participant 7: Focus Group 5).



In response to another probing question that asked “is there an infection control committee in this hospital?” Participants said,

*“There is an infection control committee, which is responsible for ordering and distributing protective clothing such as masks, gowns, gloves, goggles, boots and plastic aprons”* (Participant 1: Focus Group 6). *“The infection control team is responsible for ordering and distributing protective clothing such as masks, gowns, gloves, goggles, boots and plastic aprons”* (Participant 4: Focus Group 6) *“We have an infection control committee, but it is not functional”* (Participant 2: Focus Group 3)

In response to a probing question that asked “do you have a help desk nurse in this hospital?” Participants said,

*“There is a help desk manned by an assistant nurse, who identifies a coughing patient upon entering the OPD”* (Participants From Focus Groups 2, 4 and 6). *“There is no help desk nurse in OPD who identifies coughing patients”* (Participant 2: Focus Group 5). *“There is no help desk nurse at this hospital. It is the responsibility of every nurse to identify coughing patients”* (Participant 1: Focus Group 3). *“There is no help desk nurse in OPD. No one takes the responsibility of identifying a TB suspect”* (Participant 2 and 4: Focus Groups 1 and 4). *“There is no help desk nurse in OPD. No one takes the responsibility of identifying a TB suspect”* (Participant 3: Focus Group 7).

The researcher concluded that rural hospitals do not have adequate human resources for TB control.

#### **Inadequate TB IC Management Support**

According to Von Delft et al. (2013), management functions include purchasing, finance, operations, human resource including training etc. Thus, inadequate human resources, inadequate material resources, inadequate trainings and inappropriate design of buildings revealed in this study were regarded as the manifestations of inadequate management support. The concern is that HCWs cannot adopt effective measures if they are experiencing shortage of staff; if there is not enough material resources, if they lack knowledge and if the structural design of buildings are not appropriate.

#### **Incorrect Attitudes towards TB IC Good Practices**

Data collected through focus group discussions revealed that HCWs did not go for periodic screening when they were called to do so free of charge. Furthermore, certain measures were not adopted because HCWs though patients were adult enough to take responsibility. According to participants,

*“Movements of TB patients are not restricted in this hospital because it is difficult to control movement of a patient who can walk”* (Participants 2, 3 and 4: Focus Group 3). *“So many nurses are infected by TB but do not want to be screened in this hospital”* (Participant 2: Focus Group 3).

The researcher concluded that attitude of HCWs is influencing their non-adoption of TB control measures.

#### **Inadequate TB Control Knowledge**

Participants indicated during focus group discussions at two hospitals that HCWs put on N95 masks in TB cubicles and wards, at one other hospital the same category put on surgical masks, whereas at the majority of the hospitals (4) HCWS did not put on masks at all in TB cubicles. According to participants,

*“Whenever a nurse enters one of the TB cubicles puts on N95 Mask”* (Participants 2 and 3: Focus Group 6). *“Nurses put on surgical masks in TB cubicles”* (Participants 2, 3 and 4: Focus Group 3). *“Nurses do not put on masks”* (Participants 2 and 3: Focus Group 2).

Thus, the researcher concluded that HCWs did not know which mask to use, for who and when.

## **DISCUSSION**

#### **Lack of Clear Directing TB IC Guidelines**

The paper reveals that rural hospitals of Vhembe district do not have TB control plans. TB control plans are guidelines developed by hospitals to protect HCWs and patients (Bednarsh et al. 2015). The findings of the study concur with those of Sissolack et al. (2011) who discovered that the lack of a TB control plan was one of the factors associated with potential nosocomial TB transmission in Tygerberg hospital

South Africa in 2010. This is not the case in other countries since studies report that in many developed countries, TB control plan is available in most health care facilities (WHO 2009). Similarly, in China, Jingtao (2011) found that TB infection control committees as well as TB control plans were available. Consequently, the WHO (2009) warns that health care facilities that lack a TB control plan function without a roadmap or a source of TB control information direction.

#### **Inadequate TB Control Training with Insufficient Content**

Based on the data, the paper reveals that the TB control training conducted in rural hospitals and the content covered is not sufficient enough to empower HCWs with the necessary TB control knowledge and skills required. Training and educating HCWs in TB with specific focus on prevention and transmission is one of the first order measures of TB infection control (CDC 2015). Training equips HCWs with knowledge and skills to critically assess and choose appropriate measures for the control of TB infection (Akinsola 2006). A study to investigate factors that contribute to TB control in PHC services at Mutale sub-district of Vhembe by Tshitangano et al. (2010) confirms that HCWs lack sufficient knowledge needed to help them choose and implement appropriate TB control measures.

Sissolak et al. (2011) identified inadequate TB training for staff and patients as a factor associated with potential nosocomial transmission in South Africa. Similarly, Jarand et al. (2010) states that knowledge level of TB infection control among HCWs may influence the prevalence of nosocomial TB infection. Thus, Akinsola's (2006) empowerment model indicates that lack of health training leads to lack of knowledge, skills and the right attitude necessary to ensure effective TB infection control.

Woith et al. (2010) maintain that each person working in a high-risk TB environment should have a high level of TB awareness and knowledge. Menzies et al. (2007) point out, that most TB control activities require minimum training that can often be incorporated into routinely held staff meetings. The Department of Health (DOH) (2007) requires that each health care worker and staff member, including any lay workers, must receive job category-specific training conducted before initial assignment and continuing ed-

ucation, which should be provided to all employees and volunteers annually.

#### **Inappropriate Design of Building**

This paper reveals that the structural designs of wards are such that maximum air entry is not permitted to get into the wards. The concern is that Mirtskhulava et al. (2015) found a strong association between ventilation, air movements in buildings and the transmission of infectious diseases such as TB. According to the WHO (2014), ventilation rates lower than two air exchanges per hour are associated with higher Tuberculin Skin Test conversion amongst staff. Conversely, a higher ventilation rate is able to provide a higher dilution of airborne pathogens and consequently reduces the risk of air-borne infections. The current WHO (2009) recommendation for airborne precaution room is at least 12 air exchanges per hour. Similarly, every TB isolation room should have a minimum of 12 air exchanges per hour (CDC 2005). Mirtskhulava et al. (2015) state that mechanical ventilation delivering negative pressure and twelve air exchanges per hour is the standard of care for respiratory TB isolation. However, poorly maintained mechanical ventilation systems have been widely documented in resource-rich settings and implicated in several TB outbreaks (Mirtskhulava et al. 2015). According to the CDC (2005), simply opening windows and doors provides a median of 28 air exchanges per hour, increasing to 40 air exchanges per hour in older facilities with high ceilings and large windows.

#### **Inadequate Material Resources**

This paper reveals that rural hospitals had inadequate material resources such as a dedicated TB isolation ward. Lack of TB isolation wards means that infectious patients are placed together with non-infectious ones. These findings are similar to those of Basu et al. (2007), who revealed that in South Africa non-XDR-TB patients are frequently admitted to the wards with other patients who have a TB disease and risk super nosocomial infection. The WHO (2014) stresses that placing potentially infectious TB patients in same areas with other patients without TB, especially those who are immune-compromised (for example AIDS, diabetes or babies), poses an increased risk of transmitting TB in-

fection. Similarly, public health experts cited in Amon et al. (2009) noted that holding MDR- and XDR-TB patients in overcrowded hospitals with inadequate ventilation increases the risk of nosocomial TB transmissions. The research conducted at the Church of Scotland hospital in Tugella Ferry, Kwazulu-Natal, where an outbreak of XDR-TB claimed 50 lives in 2006, found that most cases of drug-resistant TB were attributable to airborne infections often contracted within the hospitals (SAFAIDS 2012). The WHO (1999) therefore advises that the difficulty of ensuring effective separation of patients necessitates the need to avoid hospital admission, or rapidly discharging patients with suspected or confirmed TB, which is sometimes difficult as it is dependent on the seriousness of the patient's condition.

Lack of masks and consequent re-using masks seem to pose risks of TB infection transmission. A study by Matuka et al. (2015) discovered that most of the HCWs (87.5%) with positive TB results had been in contact with coughing patients and had not worn respiratory masks. Block (2001) stated that live TB bacilli were found in 33.3 percent of anaesthetic masks removed from active TB patients in 1940 at a Paris hospital, which means that re-using masks poses TB transmission risk. In addition, fifteen per cent of the masks were still positive after routine washing in water and were potential sources of the spread of TB. Surprisingly, the CDC (2011) condones the re-use of respirators as long as the material is not physically damaged or soiled, since the functionality of respirators can be maintained for weeks. The WHO (2009) emphasises that although respirators are disposable, they can be re-used repeatedly for several months if they are properly stored. Consequently, respirators should be stored in a clean dry place folded in a light towel and care taken not to crush them (WHO 2009). Similarly, cloth surgical masks can be sterilized and re-used WHO (2009).

### **Inadequate Human Resources**

This paper reveals that rural hospitals have inadequate human resources in the form of cough officer, TB committees, TB control team etc. Human resource is a crucial determinant in managing TB (Rahman and Mokhtar 2015). Lack of appropriate human resources fuels TB transmissions in hospitals. Rahman and Mokhtar

(2015) state that understaffing and caseload makes the management of TB ineffective. Thus, if understaffing exists, the service given would not be conducted properly. Similarly, in India, TB diagnosis was frequently delayed due to weak suspicions as a result of understaffing (Ministry of Health and Welfare India 2010). Thus, in India, unsuspected TB cases contributed to TB transmission because they were not on treatment and were going unsuspected for days or weeks, which suggest that they were visiting multiple health care facilities or they were admitted in wards where proper TB infection control measures were not in place.

### **Incorrect Attitudes Towards TB IC Good Practices**

Based on data analysis, this paper reveals that HCWs at rural hospitals do not adopt measures of TB control sometimes due to attitude. Attitudes of HCWs towards correct TB control measures have been identified by several studies as one of the factors fuelling TB transmission in hospitals. For an example, Matuka et al. (2015) discovered that most of the HCWs (87.5%) with positive TB results had been in contact with coughing patients and had not worn respiratory masks despite training. If infectious patients are allowed to move freely, they may infect even those people they are not living in close proximity with. To confirm this claim, nurses at Port Elizabeth's Joseph Pearson TB hospital reported that MDR-TB patients were contracting XDR-TB strains at an intense rate in a situation where XDR-TB patients were in a different ward from MDR-TB patients (Amon et al. 2009). Thus, the WHO (2014) emphasizes that when an infectious TB patient is isolated, movement and transportation should be limited.

### **Inadequate TB Control Knowledge**

According to Healthcare Information for All (HIFA) (2015), gross lack of knowledge about the basics on how to manage common diseases is often associated with suboptimal, ineffective and dangerous health care practices. Oluwole (2008) found lack of information to be a barrier to the triage of people with TB symptoms in Nigeria. The WHO (2009) therefore prescribes the use of particulate respirators that meet or exceed the N95 standards set by the CDC. Simi-

larly, the CDC (2011) therefore urges HCWs to use these efficiency filters always when they enter rooms with suspected or confirmed infectious TB, when performing high-hazard procedures on suspected or confirmed TB, and when transporting individuals with suspected or confirmed TB in a closed vehicle. In addition, the WHO (2009) emphasizes that a disposable surgical mask should be placed on infectious and suspect TB patients whenever they leave the isolation areas.

### CONCLUSION

The HCWs in rural hospitals of Vhembe district are faced with numerous challenges namely, lack of TB IC guidelines; inadequate TB infection control training; inappropriate designs of buildings; inadequate material resources; inadequate human resources; inadequate management support; incorrect attitudes towards good TB control practices; and inadequate knowledge regarding of good TB control practices. These challenges seem to influence HCWs to adopt ineffective measures of TB control.

### RECOMMENDATIONS

If TB control is to be achieved in Vhembe district, hospital managers through the support offered by the department of health should craft strategies to deal with such challenges with an aim of improving health care workers' working conditions.

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