

ORIGINAL RESEARCH

# Barriers to Smoking Cessation Among Drug-Resistant Tuberculosis Patients in South Africa



Zifkile Phindile Shangase, MSc, Joyce Mahlako Tsoka-Gwegweni, PhD, Catherine O. Egbe, PhD  
*Durban, South Africa; and San Francisco, CA*

## Abstract

**BACKGROUND** Drug-resistant tuberculosis (DR-TB) remains a significant cause of morbidity and mortality. The long-term health effects of smoking and the risk of adverse TB outcomes, including increased periods of infectiousness, have been reported among DR-TB patients in South Africa.

**OBJECTIVES** This study aimed to identify the barriers to smoking cessation among DR-TB inpatients at a hospital in Durban, South Africa.

**METHODS** A qualitative design using in-depth interviews with a purposive sample of 20 DR-TB inpatients was employed. The sample included 15 men and 5 women aged 18-70 years who self-identified as smokers. Open-ended questions were used to explore barriers militating against smoking cessation among this sample. Data were analyzed with the aid of the software QSR NVivo10.

**FINDINGS** Personal and structural-level barriers (factors) to smoking cessation were identified. Personal factors included addiction and non-addiction-related barriers. Addiction-related barriers included smoking history, cravings for a cigarette, smoking as part of a daily routine, and failed quit attempts. Non-addiction-related barriers included lack of knowledge about quit strategies, psychosocial stress, lack of the willpower to quit smoking, and the influence of peers. Structural barriers included ineffective health education programs, lack of extramural activities when on admission in hospital leading to a lot of spare time, lack of smoking cessation interventions, and access to cigarettes within and around the hospital environment. Patients expressed interest in smoking cessation and conveyed their frustration at the lack of appropriate support to do so.

**CONCLUSIONS** The findings reiterate the need for smoking cessation intervention to be incorporated as an integral component of DR-TB management in South Africa. Many patients expressed an interest in pharmacological aids and psychological support to help them to quit smoking. Additionally, offering extramural activities and enforcing smoke-free policies in hospital facilities will help to reduce patients' access to cigarettes while at the hospital.

**KEY WORDS** drug-resistant tuberculosis, smoking cessation, barriers, South Africa

The authors declare no conflict of interest.

The study was funded by a grant received by the first author from the College of Health Sciences, University of KwaZulu-Natal, South Africa. The third author is currently supported by grant number CA 87472 from the US National Cancer Institute. The content is solely the responsibility of the authors and does not necessarily represent the official views of the NIH or the Food and Drug Administration.

From the School of Built Environment and Development Studies, Howard College, University of KwaZulu-Natal, Durban, South Africa (ZPS); School of Nursing & Public Health, College of Health Sciences, Howard College, University of KwaZulu-Natal, Durban, South Africa (JMT-G); Center for Tobacco Control Research and Education, University of California, San Francisco, CA (COE). Address correspondence to Z.P.S. ([Shangasep@ukzn.ac.za](mailto:Shangasep@ukzn.ac.za)).

## INTRODUCTION

Among the 12 million recorded cases of tuberculosis (TB) in 2011, there were an estimated 630,000 cases of multidrug-resistant TB (MDR-TB) and extensively drug-resistant TB (XDR-TB) globally.<sup>1</sup> As of 2015, TB was among the top 10 causes of death globally with an estimated 1.4 million deaths.<sup>2</sup> Among infectious diseases, TB ranks above HIV as the leading cause of death.<sup>2</sup> In 2011 sub-Saharan Africa reported the greatest proportion of new cases of TB per population, with more than 260 cases per 100,000 population.<sup>1</sup> According to World Health Organization (WHO) reports, in 2010 African countries accounted for 24% of the global TB burden, of which one-quarter were from South Africa.<sup>3</sup>

Drug-resistant tuberculosis (DR-TB) has become a major public health problem that threatens the progress made in TB care and control worldwide and is increasing at an alarming rate.<sup>4</sup> MDR-TB is resistant to at least 2 of the best anti-TB drugs—isoniazid and rifampin.<sup>3</sup> XDR-TB is a rare type of MDR-TB that involves resistance not only to isoniazid and rifampin but also to any fluoroquinolone and at least 1 of 3 injectable second-line drugs for treating TB.<sup>3</sup> Therefore these 2 types of drug-resistant TB are extremely hard to treat.<sup>3</sup>

South Africa is 1 of 7 countries that reported lower rates of treatment success, with the province of KwaZulu-Natal (KZN) reporting the highest mortality from DR-TB since 2006.<sup>5</sup> High prevalence of TB in KZN is also exacerbated by its relationship with HIV infection, which is one of the factors that compromise drug-resistant TB patients.

Smoking prevalence has been reported to be high among TB and DR-TB patients in South Africa and elsewhere, which can affect clinical and health outcomes, thereby challenging prevalence and morbidity.<sup>6</sup> Additionally, recent evidence of high smoking prevalence was reported in a prospective cohort study of MDR-TB patients in 8 countries, including South Africa (KZN).<sup>7</sup>

Risk factors like cigarette smoking have been indicated to adversely affect the clinical outcomes of DR-TB patients.<sup>8</sup> A study conducted in MDR-TB treatment centers in 5 South Africa provinces, including KZN, recommended that interventions to reduce default from MDR-TB treatment should also center on smoking cessation.<sup>9</sup> In a study involving 146 South African men

diagnosed with pulmonary TB, 33% of participants were found to be current smokers.<sup>10</sup>

Additionally, smoking was reported as a co-exposure that contributes to the poorer survival of DR-TB patients in a retrospective cohort study conducted in South Africa, including those in the KZN province.<sup>11</sup> Smoking has been identified as an associated risk factor that reduces the effectiveness of drugs when managing DR-TB patients.<sup>12</sup> Thus, as an important risk factor, regular smoking is associated with recurrent tuberculosis disease and mortality.<sup>8</sup>

Measures to eliminate smoking have been recommended among alternative interventions that could contribute to the success of treatment program for DR-TB patients.<sup>13</sup> There is, however, limited evidence of the presence of relevant smoking cessation interventions aimed at reducing DR-TB patients in South Africa. The present study, therefore, sought to gain insight into the barriers to smoking cessation among DR-TB inpatients that would guide the development of appropriate interventions at individual and facility levels.

Although smoking cessation-related studies have been undertaken in other TB-endemic settings where smoking prevalence was noted as high, such as Pakistan,<sup>14</sup> India and Indonesia,<sup>15</sup> Malaysia,<sup>16</sup> and Egypt,<sup>17</sup> as well as in South Africa,<sup>6</sup> there is limited evidence of studies exploring barriers to smoking cessation for DR-TB inpatients.

The WHO Framework Convention on Tobacco Control (FCTC) contains supply-and-demand reduction strategies to facilitate tobacco control globally. Article 14 of the WHO-FCTC addresses demand reduction measures concerning tobacco dependence and cessation and specifically applies to this study.<sup>18</sup>

## METHODS

**Study Design and Setting.** Qualitative research design that falls within the constructivist paradigm<sup>19</sup> was adopted for the study in order to answer the research question: what are the barriers to smoking cessation among DR-TB inpatients in South Africa? Qualitative research is designed to produce information-rich data—depth rather than breadth and insight rather than generalization<sup>20</sup>—hence its use in the study. Because qualitative research is subjective, different perspectives from DR-TB inpatients were accommodated in an attempt to find out how this group of informants perceives smoking and its associated

risks. Participants also shared their experiences about the barriers to smoking cessation.

The study was conducted in 1 conveniently selected hospital in the province of KwaZulu-Natal. KwaZulu-Natal is the province with the second largest population in South Africa, estimated at 11.1 million people (19.9% of the total national population).<sup>21</sup> KwaZulu-Natal is one of the provinces with a large number of TB and DR-TB cases.<sup>22</sup> Incidence of XDR-TB in KwaZulu-Natal was reported as 3.5 cases/100,000 (776 cases) in 2011–2012, with the majority of districts experiencing a rise in incidence.<sup>23</sup>

**Study Participants and Ethical Approval.** The sample included 20 inpatients (15 men and 5 women) at the TB hospital who self-identified as smokers and had drug-resistant TB. Participants' age ranged from 18–70 years. Eighteen participants were black and 1 each was white and colored. The exclusion criteria included patients younger than 18 years of age, those with a history of posttraumatic stress disorder, and those who suffered from depression, because depression has been associated with smoking.<sup>24</sup> Inclusion criteria were DR-TB inpatients who are smokers and who voluntarily agreed to participate in the study.

Ethical approval for conducting the study was obtained from the University of KwaZulu-Natal's Biomedical Research Committee (Reference No: BE 493/14). Permission was also obtained from the KZN Department of Health and the hospital where the study took place. Participants provided individual consent after being informed of the study and of their right to withdraw at any point if they so desired.

**Data Collection.** Data were collected between September and October 2015. In-depth interviews were used to collect data for this study, with each lasting for an average of 30 minutes. Open-ended questions were used to establish patients' current smoking behavior, knowledge of health risks, interest in quitting, barriers to quitting, and preferences for cessation support. Although an interview guide was used in this study, the researcher applied flexibility by asking new

questions that followed up interviewees' replies and to follow a line of inquiry introduced by the interviewee.

Interviews were conducted in isiZulu and English languages at the inpatient wards. The interview was taperecorded with the consent of the participants. Interviews were transcribed verbatim in the language they were recorded in and translated. Back translation was done to ensure that the process of translation did not lead to loss of data.

**Data Analysis.** Thematic analysis was used for the analysis of the data with the aid of the software QSR NVivo 10 (QSR International, Melbourne, Australia).<sup>25</sup> The researcher read and reread the transcripts, coding and noting down significant points of convergence, divergence, and repetition. The points and codes noted were organized into recurring themes relevant to the aim of this study. A research assistant was involved in the analysis of data in order to achieve a more objective interpretation of the data. Points of divergence were resolved by consulting with an independent supervisor of the project.

## RESULTS

Barriers to smoking cessation found in this study were grouped into 2 categories: (1) personal factors, which included (a) addiction-related barriers and (b) non-addiction-related barriers; and (2) structural (institutional) factors (Table 1).

**Personal Factors.** Personal factors are barriers to smoking cessation within the individual, which could be addiction related or non-addiction related.

**Addiction-Related Barriers.** Addiction-related barriers to smoking cessation are factors resulting from the addictive characteristic of smoking acquired by the smokers as a result of the nicotine contained in cigarettes. These barriers include smoking history, cravings to smoke, smoking as part of a daily routine, and failed quit attempts.

Participants mostly reported initiating smoking as teenagers, thereby leading to the development of heavy smoking habits, which made cessation particularly difficult. On average, participants in the study had smoked for 10 years (smoking years ranging from 5–36 years).

I started smoking when I was 15 years, I am 35 years old now, which means I have been smoking for 20 years. (Participant 12; Male, Aged 35)

The addictive effect of cigarette smoking was identified as a major barrier to smoking cessation

<sup>21</sup>The current classification of population by the African National Congress-led government in South Africa entails four distinctive racial groups: white, black, colored (mixed lineage), and Asian - as the best measure of previous socio-economic deprivation. In official demographic surveys some population groups still define themselves as colored, hence the use of the term in this study (Statistics South Africa 2016. Community Survey 2016, Statistical release P0301. www.statssa.gov.za)

by the participants. Some participants described their desperation to stop smoking and failed attempts as a result of their addiction to nicotine.

At times I even speak to myself, wishing I could one day totally quit smoking. I really want to stop smoking but the situation I am facing right now is very difficult, I cannot stop it. I am addicted. (Participant 9; Female, Aged 35)

Participants mentioned that because they could not quit, as a way to reduce the harmful effect of smoking they reduced the number of cigarettes they smoked daily.

Since I am now addicted to smoking it is very difficult to stop, the least I can do is minimize my smoking. (Participant 4; Male, Aged 32)

I have been smoking since 2008.... I smoke a lot less now. I used to smoke 20 a day, and now I smoke only 5 per day. (Participant 19; Male, Aged 45)

When asked about their smoking habits, participants reported smoking as part of their daily routine, and they felt that they had nothing to replace it with, as recounted by participant 3.

Most patients smoke in the morning, during the day and at night. You know, after every meal you feel like smoking. The chest would be painful by then, and you feel like smoking. (Participant 3; Male, Aged 25)

Some participants reported that they failed to quit in spite of the health education sessions that were offered in the wards.

... when I was admitted I also hid the fact that I smoke, but as time went by, I ended up admitting that I do smoke because during tea times and when meals are being served the nurses wouldn't find me so they were probably asking themselves where I was, and I would come back smelling of cigarettes so I ended up admitting that I smoke. So then they lectured me on the dangers of smoking, and I stopped for two days then I couldn't do it anymore. (Participant 5; Male, Aged 29)

Another reinfecting participant reported failed quit attempts in spite of being treated for 6 months during his first admission.

So this is the second time I have contracted TB, the first time it took six months for me to be cured and I think that was in 2009, I went back to smoking when I left the hospital, when I was feeling better. (Participant 13; Male, Aged 39)

Participants mentioned the use of various self-prescribed aids to help in their quit attempts. These aids include the use of nicotine replacement therapy (NRT) (participant 7; male, aged 28) and chewing gum (participant 3; male, aged 25).

Eighteen participants reported that the TB diagnosis motivated them to attempt to quit smoking, but they still failed in their attempt to quit smoking. Unfortunately, some other participants also did not succeed in maintaining a reduction of their daily cigarette consumption.

I minimized my smoking (after finding out about his TB status). I am sick now so I have to lower my levels of smoking. Even so, we face challenges that lead us to smoke heavily again. (Participant 15; Male, Aged 42)

**Table 1. Barriers to Smoking Cessation Among Drug-Resistant Tuberculosis Inpatients**

Factors	Barriers
<b>Personal Factors</b>	<ul style="list-style-type: none"> <li>a. Addiction-related barriers               <ul style="list-style-type: none"> <li>i. Smoking history</li> <li>ii. Cravings to smoke</li> <li>iii. Smoking as part of the daily routine</li> <li>iv. Failed quit attempts</li> </ul> </li> <li>b. Non-addiction-related barriers               <ul style="list-style-type: none"> <li>i. Lack of knowledge about quit strategies</li> <li>ii. Lack of willpower to quit</li> <li>iii. Psychosocial stress</li> <li>iv. Peer smokers' influence</li> </ul> </li> </ul>
<b>Structural (Institutional) Factors</b>	<ul style="list-style-type: none"> <li>i. Lack of impact of health education sessions</li> <li>ii. Lack of extramural activities when on hospital admission</li> <li>iii. Lack of smoking cessation interventions</li> <li>iv. Access to cigarettes within hospital premises</li> </ul>

**Non–Addiction–Related Barriers.** Non–addiction–related barriers are individual-level barriers that are not brought about as a result of the addictive nature of cigarettes. They include the lack of knowledge about quit strategies, lack of the willpower to quit, psychosocial stress, and the influence of peers.

Although motivated to quit smoking, some participants had no knowledge of the relevant quit strategies. Lack of the knowledge about quit strategies, therefore, posed a barrier to inpatients' smoking cessation.

...I do want to quit smoking, but I am not sure what kind of assistance I need to quit smoking because I am not sure of the things that I can use. (Participant 14; Male, Aged 32)

Some participants reported the lack of willpower to quit as the most important barrier to smoking cessation.

...most of what to do I know it, but what is missing is the willpower to overcome this situation, because when I came here in the hospital, my aim was to quit smoking. Unfortunately, other situation here in the hospital they force you to smoke. (Participant 13; Male, Aged 39)

Another participant who had acquired TB 3 times questioned his need to stop smoking because he was already in his elderly years and had been smoking for a long time.

I am in my 70s and had been smoking since almost 15 years old, why must I stop now? (Participant 11; Male, Aged 72)

Participants reported that smoking helps them to cope with stressful events while admitted in the hospital. Participant 4 narrated how he experiences psychosocial stress as a barrier to smoking cessation.

Today it's my 3rd month; I had that hope when I came here that I will quit, but I realise that if you can take note of the situation in the hospital, you can go mad, sometimes you need something that will take your mind away from such situations. I am not saying cigarette does that; I am saying that 2 or 3 minutes during smoking, get your mind relaxed. People whom you have seen inside have passed away, bad food, stuff..like that you know. (Participant 4; Male, Aged 32)

Furthermore, participant 7 (male, aged 28) reiterated the use of cigarettes to help him cope with his experience as an inpatient.

I cannot be relieved without a cigarette, I get irritated easily.... You see that, especially as I am here in the hospital the problem is that when I smoke, I think and refresh my mind.

Eight participants reported that while admitted in the hospital, they also met up with other peers who smoked, thereby maintaining their smoking behavior. They further mentioned that even if they ran out of cigarettes, their peers were always on hand to help out because they normally sit together while smoking. Influence from peer smokers, both in hospital and in the community, therefore posed a barrier to smoking cessation.

**Structural (Institutional) Factors.** Structural factors are barriers to smoking cessation situated at the institutional level and which are determined by government and facilities-based laws. These include lack of impact of health education sessions, lack of extramural activities in the hospital, lack of smoking cessation interventions, and access to cigarettes within and around hospital premises.

Participants felt that although they had been cautioned about the dangers of smoking during the health education sessions, they found the sessions ineffective to help them quit because of lack of concrete interventions to follow-up with.

They tell you to stop because there is nothing much they could do other than that, it is merely words that do not change people's behaviours. With these things [NRTs] that help people quit smoking, if they do work effectively, nurses can try to introduce those to patients. (Participant 12, Male, Aged 35)

Some participants felt that lack of extramural activities when they were on hospital admission lead to the availability of a lot of spare time during which they would either sit with their peers or on their own to smoke. The following narrative reflects the experience of participant 10 (male, aged 45).

...for instance when I am here in the hospital I have a lot of free time; I get tempted to smoke. Not necessarily because I am craving for a cigarette, it is because I am not doing anything.... If I am busy, at work, I would probably smoke only 2 or 3 cigarettes during working time.

The patients were aware of the adverse effects of smoking on their health, interested in cessation, and conveyed frustration at the lack of appropriate support. Although participants mentioned the existence of occasional health education lasting for a few minutes, they were concerned that it was not

particularly targeted at smoking cessation. Verbal warnings from nurses were also reiterated by another participant as being unhelpful.

All they do if they see you (smoking) is just to say “Hey, I see you, smoking is not allowed in the hospital,” and that is all, but they don’t really do anything. (Participant 12; Male, Aged 35)

The majority (18 of 20) of participants were unaware of any available aids to stop smoking or NRT. Despite conveying positive attitudes toward cessation, quitting was deterred by the lack of appropriate aids.

Maybe if you can give me other ways on how to quit smoking. I don’t know, as I have explained earlier on, if I can get tips on how to quit smoking, perhaps that can assist me. (Participant 10; Male, Aged 45)

Participant 2 (female, aged 42) expressed a similar challenge:

I’ve never heard of or tried any stop smoking aids, and there is no kind of support available here.

Seventeen participants indicated the desire for an intervention that will practically assist them to manage cravings because that is the strongest barrier in smoking cessation. Participant 12 (male, aged 35) described the severe effects of cravings.

Craving for a cigarette is like craving for water. There is nothing else that can make you feel good other than getting water. So it’s with a cigarette, it’s very hard. You can leave cigarette when you are sick, but if you can still smoke it’s not easy.

Availability of cigarettes within the hospital environment also deterred cessation by making it easy for participants to access cigarettes while on admission at the hospital. Participants mentioned that they easily acquired cigarettes from various sources, which made it easier for them to continue smoking. Participant 2 (female, aged 42) mentioned that her family visited often and brought her cigarettes because she had been smoking since she was a teenager. Also, as a regular smoker she mentioned that she never runs out of cigarettes because, according to her, “*you can get it at the gate...outside the gate.*”

## DISCUSSION

This study aimed to explore the smoking cessation barriers faced by drug-resistant TB inpatients.

**Personal Factors.** Under personal factors, addiction and non-addiction-related barriers to smoking

were identified. Craving for a cigarette was identified in this study as a barrier to cessation, and this is often linked to long-term smoking behavior.<sup>26</sup> It has been reported that nonspecific nicotine elements of the smoking experience have an important role in inducing cravings<sup>27</sup>; therefore greater clinical attention has been recommended for smokers.<sup>28</sup> In addition to NRTs, the inclusion of physical activity interventions has been recommended as a way to reduce tobacco craving.<sup>29</sup>

A systematic review of smoking cessation interventions for hospitalized smokers concluded that providing tobacco dependence treatments to smokers might be an effective strategy to manage cravings.<sup>30</sup> Additionally, it has been established that counseling and pharmacotherapy may be synergistic in improving smoking cessation among TB patients.<sup>31</sup> Pharmacological treatment of cigarette cravings in hospitalized smokers could potentially improve patient comfort, increase compliance with hospital no-smoking policies, and promote smoking cessation after hospital discharge.

In South Africa, treatment of tobacco dependence (NRT, bupropion, varenicline) was reported as available only commercially and not funded by the Department of Health.<sup>32</sup> Furthermore, NRT is reported to be on the country’s essential drugs list and legally sold. This information therefore indicates an opportunity to facilitate the availability of such treatment within public hospitals in the near future.

In reaction to daily stressors, such as the death of a fellow patient on the ward and being away from family, participants used smoking as a coping mechanism. A systematic review aimed to quantify cue-provoked cravings produced by affective manipulations in the identified experimental studies reported that adverse emotional states increase craving to smoke among dependent smokers.<sup>33</sup> A study conducted in the United States with young adult current smokers aged 18–34 years reported that more than half of current smokers identified lack of ways to handle stress and cravings as barriers to cessation.<sup>34</sup>

In a South African study, behavioral counseling of varying intensity was also recommended to address psychological stressors that promote smoking behavior.<sup>6</sup> Also, the hospital environment and health care professionals need to act as enablers for cessation. Smoking policies and practices, as well as monitoring systems within public hospitals, need to be reviewed. The South Africa tobacco smoking cessation clinical practice guidelines by van Zyl-Smit et al<sup>35</sup> could also be applied. This guideline presents tobacco smoking cessation strategies that include identifying smokers and assisting them to quit. Intensive clinical

interventions are recommended by van Zyl-Smit *et al.*<sup>35</sup> as a measure of sustaining the quit attempt, and pharmacological interventions are recommended to aid smoking cessation. The need to address smoking cessation for people with active TB as part of their treatment package is mentioned as a necessary and imperative measure. This is due to improved quit rates and cessation effect on completion of TB treatment.<sup>35</sup>

**Structural (Institutional) Factors.** Findings of this study clearly indicate the need for targeted smoking cessation interventions in hospital settings. This is also in line with Article 14 of the WHO-FCTC, which calls for effective smoking cessation programs in locations like health care facilities.<sup>18</sup>

In this study, participants reported easy access to cigarettes (from various sources, including staff, peers, visitors, shops close to the hospital selling cigarettes, and the hospital café) within the hospital setting. This posed a barrier to smoking cessation. Such barriers, which stem from a lack of implementation of policies on smoking, create conditions that promote risk influences for smoking behavior.<sup>36</sup>

Current tobacco control law in South Africa allows for designated smoking areas in public places, which falls short of the recommended standard of the WHO-FCTC. It is important that health care facilities go 100% smoke-free, as should other public places, in order to protect the lives of South Africans and reduce accessibility to cigarettes. The WHO has noted that a 100% smoke-free policy is the only proven way to protect people from second-hand smoke.<sup>32</sup> This would also prevent patients in hospital from accessing cigarettes. Also, cigarette sales should not be allowed to take place within a good distance from the hospital facility. There is the need to strengthen the tobacco control policy in South Africa because hospitals, as health settings, ought to create supportive environments for smoking cessation in line with Article 14 of the FCTC. Studies on smoking behavior among hospitalized patients have also noted that easy accessibility of cigarettes within the hospital premises poses a barrier to smoking cessation.<sup>30</sup>

Lack of access to smoking cessation interventions is a key structural-level barrier highlighted in this study

because this is beyond the individual's control to foster health behaviors.<sup>37</sup> Study participants reported a lack of extramural activities within the hospital, which resulted in more time spent on smoking while they were on admission at the hospital. Extramural activities would also assist patients to spend less time worrying about the stressful events that they have reported as triggering and promoting smoking behavior. A lack of extramural activities serves as a barrier that prevents DR-TB inpatients smokers from quitting smoking. A study conducted in Greenland confirmed that the low level of smoking cessation was strongly related to spending a lot of time not having anything to do.<sup>38</sup> Therefore this finding highlights the need for a smoking cessation intervention in hospital settings that will also incorporate extramural activities for hospitalized patients.

**Study Limitations.** This study recruited participants who were inpatients and were being treated for drug-resistant tuberculosis; therefore, the generalisability of the results to outpatients is limited.

## CONCLUSIONS

This study found several barriers to smoking cessation for DR-TB inpatients in Durban, South Africa: Personal and institutional factors were identified. As a strategic recommendation for policymakers and managers, addressing these barriers will require a holistic and targeted smoking cessation intervention as an integral component of DR-TB management in South Africa. Many patients expressed an interest in nicotine replacement therapies and psychological support to aid them to quit smoking. Additionally, offering extramural activities and reducing the availability of cigarettes in and around hospital facilities may reduce cravings and the number of cigarettes consumed. Furthermore, TB hospital-based research addressing specific cessation strategies for DR-TB inpatients is required.

## ACKNOWLEDGMENT

The authors thank the staff and patients in the hospital where this study was conducted.

---

## REFERENCES

1. World Health Organization. Global tuberculosis report. *Euro Surveill* 2013;18(43).
2. World Health Organization (WHO). Global Tuberculosis Report. Geneva, Switzerland: WHO; 2016.
3. World Health Organization (WHO). World Health Report. Geneva, Switzerland: WHO; 2010.

4. World Health Organization (WHO). Global Tuberculosis Report 2014. Geneva, Switzerland: WHO; 2014.
5. Department of Health, Republic of South Africa. Management of drug resistant tuberculosis: policy guidelines. In: Ndjeka N, ed. National Tuberculosis Management Guidelines. Pretoria, South Africa: Department of Health; 2013.
6. Louwagie GMC, Ayo-Yusuf OA. Tobacco use patterns in tuberculosis patients with high rates of human immunodeficiency virus co-infection in South Africa. *BMC Public Health* 2013;13:1031.
7. Dalton T, Cegielski P, Akksilp S, et al. Prevalence of and risk factors for resistance to second-line drugs in people with multidrug-resistant tuberculosis in eight countries: a prospective cohort study. *Lancet* 2012;380:1406–17.
8. Vanden Driessche K, Patel MR, Mbonze N, et al. Effect of smoking history on outcome of patients diagnosed with TB and HIV. *Eur Respir J* 2015;45:839–42.
9. Holtz TH, Lancaster J, Laserson KF, Wells CD, Thorpe L, Weyer K. Risk factors associated with default from multidrug-resistant tuberculosis treatment, South Africa, 1999–2001. *Int J Tuberc Lung Dis* 2006;10:649–55.
10. Bronner Murrison L, Martinson N, Moloney RM, et al. Tobacco smoking and tuberculosis among men living with HIV in Johannesburg, South Africa: a case-control study. *PLoS One* 2016;11:e0167133.
11. Dheda K, Shean K, Zumla A, et al. Early treatment outcomes and HIV status of patients with extensively drug-resistant tuberculosis in South Africa: a retrospective cohort study. *Lancet* 2010;375:1798–807.
12. Skrahina A, Hurevich H, Zalutskaya A, et al. Multidrug-resistant tuberculosis in Belarus: the size of the problem and associated risk factors. *Bull World Health Organ* 2013;91:36–45.
13. Lönnroth K, Castro KG, Chakaya JM, et al. Tuberculosis control and elimination 2010–50: cure, care, and social development. *Lancet* 2010;375:1814–29.
14. Siddiqi K, Khan A, Ahmad M, et al. Action to stop smoking in suspected tuberculosis (ASSIST) in Pakistan: a cluster randomized, controlled trial. *Ann Intern Med* 2013;158:667–75.
15. Nichter M, Nichter M, Muramoto M; Project Quit Tobacco I. Project Quit Tobacco International: laying the groundwork for tobacco cessation in low- and middle-income countries. *Asia Pac J Public Health* 2010;22:181–8.
16. Awaisu A, Nik Mohamed MH, Abd Aziz N, et al. Tobacco use prevalence, knowledge, and attitudes among newly diagnosed tuberculosis patients in Penang State and Wilayah Persekutuan Kuala Lumpur, Malaysia. *Tob Induc Dis* 2010;8:3.
17. Elmahallawy II, Bakr RM, Mabrouk AA, Omar RM. Treatment outcomes among patients with multidrug resistant tuberculosis in Abbassia Chest Hospital from July 2006 to June 2010. *Egypt J Chest Dis Tuberc* 2012;61:337–42.
18. World Health Organization (WHO). Framework Convention on Tobacco Control 2013. Guidelines for implementation of the WHO FCTC; Article 5.3; Article 8; Articles 9 and 10; Article 11; Article 12; Article 13; Article 14. Geneva, Switzerland: WHO; 2013.
19. Silverman D. *Doing Qualitative Research: A Practical Handbook*. London, UK: SAGE; 2010.
20. Creswell JW, Creswell JW. *Qualitative Inquiry & Research Design: Choosing Among Five Approaches*. Los Angeles, CA: SAGE Publications; 2013.
21. Statistics South Africa. Mid-year population estimates 2015. Statistics South Africa. Available at: [www.statssa.gov.za/publications/P0302/P03022016.pdf](http://www.statssa.gov.za/publications/P0302/P03022016.pdf); 2016. Accessed February 5, 2017.
22. Maharaj J, Ross A, Maharaj NR, Campbell L. Multidrug-resistant tuberculosis in KwaZulu-Natal, South Africa: an overview of patients reported knowledge and attitudes. *Afr J Prim Health Care Fam Med* 2016;8:1089.
23. Lim JR, Gandhi NR, Mthiyane T, et al. Incidence and geographic distribution of extensively drug-resistant tuberculosis in KwaZulu-Natal Province, South Africa. *PLoS One* 2015;10:e0132076.
24. Fluharty M, Taylor AE, Grabski M, Munafò MR. The association of cigarette smoking with depression and anxiety: a systematic review. *Nicotine Tob Res* 2017;19:3–13.
25. NVivo Qualitative Data Analysis Software Version 10. Melbourne, Australia: QRS International; 2012.
26. Hughes JR. Craving among long-abstinent smokers: an Internet survey. *Nicotine Tob Res* 2010;12:459–62.
27. Nuechterlein EB, Ni L, Domino EF, Zubieta J-K. Nicotine-specific and non-specific effects of cigarette smoking on endogenous opioid mechanisms. *Prog Neuropsychopharmacol Biol Psychiatry* 2016;69:69–77.
28. Sayette MA, Dimoff JD. In search of anticipatory cigarette cravings: the impact of perceived smoking opportunity and motivation to seek treatment. *Psychol Addict Behav* 2016;30:277–86.
29. Underner M, Perriot J, Peiffer G, Meurice JC. Effects of physical activity on tobacco craving for smoking cessation. *Rev Mal Respir* 2016;33:431–43.
30. Rigotti NA, Munafò MR, Stead LF. Smoking cessation interventions for hospitalized smokers: a systematic review. *Arch Intern Med* 2008;168:1950–60.
31. Rigotti NA, Clair C, Munafò MR, Stead LF. Interventions for smoking cessation in hospitalised patients. *Cochrane Database Syst Rev* 2012;(5):CD001837.
32. World Health Organization (WHO). South Africa report on tobacco cessation 2015. In: Chatora R, ed. World Health Organization Report on the Global Tobacco Epidemic. Geneva, Switzerland: WHO; 2015.
33. Heckman BW, Kovacs MA, Marquez NS, et al. Influence of affective manipulations on cigarette craving: a meta-analysis. *Addiction* 2013;108:2068–78.
34. Villanti AC, Bover Manderski MT, Gundersen DA, Steinberg MB, Delnevo CD. Reasons to quit and barriers to quitting smoking in US young adults. *Fam Pract* 2016;33:133–9.
35. van Zyl-Smit RN, Allwood B, Dheda K, et al. South African tobacco smoking cessation clinical practice guideline. *S Afr Med J* 2013;103:869–76.
36. Glass TA, McAtee MJ. Behavioral science at the crossroads in public health: extending horizons, envisioning the future. *Soc Sci Med* 2006;62:1650–71.
37. Latkin C, Weeks MR, Glasman L, Galletly C, Albarracin D. A dynamic social systems model for considering structural factors in HIV prevention and detection. *AIDS Behav* 2010;14:222–38.
38. Jensen AB, Hounsgaard L. I only smoke when I have nothing to do: a qualitative study on how smoking is part of everyday life in a Greenlandic village. *Int J Circumpolar Health* 2013;72:21657.