

THE IMPACT OF PATIENTS' KNOWLEDGE ON USING COMMUNITY-BASED TUBERCULOSIS CARE IN THE LOBATSE DISTRICT OF BOTSWANA

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ABSTRACT

Tuberculosis (TB), though declining, continues to be a global health problem fuelled by Human Immuno Deficiency Virus (HIV) infections. The dual TB/HIV epidemic in sub-Saharan Africa (SSA) has necessitated a rethinking of economically viable TB control methods, including community-based TB care (CTBC). This study attempted to identify factors affecting patients' utilisation of CTBC in one district of Botswana in order to recommend ways to enhance the uptake of CTBC. Individual structured interviews were conducted with 101 TB patients in the Lobatse District of Botswana to identify their demographic characteristics, TB-related knowledge,



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attitudes concerning CTBC, support structures, factors influencing the adoption of a specific directly observed treatment (DOT) option as these factors could influence TB patients' participation in the CTBC programme from January 2011 to August 2013. Univariate logistic regression models were used. Participation in CTBC was used as an outcome. The main predictors for participation in CTBC included knowledge about and attitudes towards CTBC ($p=0.0003$), perceived barriers and enablers ($p=0.0279$), and patients' satisfaction ($p=0.0315$) with the CTBC services. Identified barriers should be addressed and enablers strengthened to enhance TB patients' utilisation of CTBC services.

Keywords: Botswana National Tuberculosis Programme, community-based tuberculosis care, directly observed treatment (DOT), experiences of tuberculosis patients, tuberculosis

INTRODUCTION

The World Health Organization (WHO) estimated that 8.7 million tuberculosis (TB) cases occurred in 2011 and 13.0% of these patients were infected with the human immunodeficiency virus (HIV), thus suffering from dual TB and HIV infections. In the same year, 1.4 million TB deaths occurred (WHO 2012a:1) globally, despite the availability of high quality and effective TB treatment. Tuberculosis is primarily a lung disease caused by the tubercle bacillus, known as *Mycobacterium Tuberculosis*, transmitted from 'human-to-human' (Ministry of Health (MOH), 2011a:9). This demands concerted efforts to reach all TB patients, even those who might be difficult to reach, through early diagnosis and treatment. The TB *Mycobacteria* require oxygen for metabolism (an aerobe) and takes time to grow, thriving better in oxygen-rich environments of the body. This explains why approximately 80% of TB occurs in patients 'oxygen rich' lungs, called pulmonary TB. Extra-pulmonary TB can occur in almost any other body tissues (MOH, 2011a:9, WHO, 2012b:3). Community-based TB care (CTBC) has the potential for improving treatment outcomes, but it requires a well-established reporting system, diagnostic services and secure drug supplies (Sukumani, Lebeso, Khoza & Risenga, 2012; WHO, 2010:76).

During 2011, sub-Saharan Africa (SSA) reported TB incident cases exceeding the 260 cases per 100 000 population (WHO, 2013a:2). The TB burden in SSA is aggravated by HIV and poverty. Out of the reported 1.1 million global cases, who were both HIV positive and incident TB cases, 79% were from the SSA region (WHO, 2013b). Botswana's incident TB cases were estimated by the WHO to be 455 per 100 000 population in 2011 (MOH, 2013a:2), which 'is unacceptably high for an upper middle-income economy' (MOH, 2013b:3).

The dual epidemic in SSA requires the re-conceptualisation of economically viable methods for TB treatment, such as CTBC (MOH 2011b:6). Botswana has embraced CTBC but it has a low rate of uptake and faces challenges, the major ones being lack of

awareness of the programme by TB patients, high attrition rates of volunteers and health care workers' negative attitudes (MOH, 2011b:7–8; Masisi, 2011; MOH, 2013a:12). These challenges fall into groups of factors classified as patient, sociocultural, economic, structural or health care system-related. The CTBC does not meet Botswana's target of enrolling 75% of TB patients into this programme (MOH, 2013b:3, 12).

Community-based tuberculosis care (CTBC) implementation in Botswana

Botswana's CTBC programme is based on the 'Stop TB Strategy'. The patient is supervised taking every dose of anti-TB drugs to ensure that the patient adheres to the right drugs, the right doses and the right times during TB treatment (MOH, 2011a:30). In Botswana, TB patients can opt for the DOT point of their choice (health facility-based or community-based DOT) within two weeks of initiating TB treatment.

A Tanzanian study acknowledged that 'Adherence to TB therapy under home-based directly observed treatment can be ensured in programmatic settings' (Mkopi, Range, Lwilla, Egwaga, Schulze, Geubbels & Van Leth, 2012:e51828).

STATEMENT OF THE RESEARCH PROBLEM

It is important to understand factors affecting the uptake of CTBC in Lobatse so that existing gaps in the implementation of the programme could be bridged as Lobatse did not manage to treat 'unreachable patients' through diagnosis and treatment. It is not clear why some patients continue to die during treatment in the presence of free TB therapy and free anti-retroviral treatment (ART) in Lobatse. The smear positive (most infectious) proportion of the total number of cases of pulmonary TB (PTB) was 77.2% in 2010, 64.1% in 2011 and 65.3% in 2012. The 2008–2012 national strategic plan, as well as the global target, aimed to achieve 70% of all TB patients (MOH 2012:2; Lobatse Electronic TB register (ETR), 2013) and provides evidence for the need to improve finding patients suffering from TB, diagnosing and treating them, referred to as 'case finding' in the local TB services. The treatment success (cured and completed) rate for the cohort was 76.1% in 2010, 86.4% in 2011 and 71.2% in 2012 in Lobatse compared with the national and international targets of 85% during the periods under review (Lobatse DHMT, 2013:2; Lobatse ETR, 2013). As long as patients who suffer from TB are not traced, diagnosed and treated effectively, they will continue to spread TB to other persons in their communities, increasing the number of TB sufferers in these communities. Studies conducted in Africa, SSA and Botswana have revealed factors affecting the uptake of CTBC as patient-related, socio-cultural, economic, structural and health care system-related (MOH, 2012:23; MOH, 2013a:4; Mugisha, Semo, Ledikwe, Ncube, Firth, Achoki, Lere, Machao, Mwangemi, Makadzange, Mabreaden, Katholo & Nkomo, 2013:S93; Uwimana, Zarowsky, Hausler & Jackson, 2012:233; WHO,

2012a:2). Studies have shown that CTBC has better treatment outcomes compared with facility-based TB care, but there is a need for intensified TB case finding and reduction of stigma (Mugisha *et al.*, 2013:S93). Adequate knowledge of patients about the benefits of CTBC and adequate support for the programme could enhance its utilisation as well as its treatment outcomes. TB-related stigma could be reduced and TB-related deaths could decline. Patients' knowledge about, support for and involvement in Lobatse's CTBC programme had not been documented. This study aimed to address the knowledge gap about CTBC among TB patients in Lobatse, which could have impacted negatively on their utilisation of CTBC services.

Purpose of the study

The purpose of the study was to assess how patients' knowledge affected their utilisation of CTBC services in the Lobatse District of Botswana. Based on these findings, recommendations could be made to enhance the utilisation of CTBC services and thereby to enhance TB treatment outcomes in this district.

Research objectives

The objectives of the study were to identify:

- Respondents' demographic characteristics
- Patients' TB-related knowledge
- Patients' knowledge about and attitudes concerning CTBC
- Factors influencing TB patients' participation in the CTBC programme

RESEARCH METHODOLOGY

A quantitative descriptive cross-sectional study design was adopted to identify whether TB patients' knowledge about CTBC affected their utilisation of CTBC services in Lobatse. Individual structured interviews were conducted with 101 patients.

All six public health care facilities, providing both facility-based and CTBC options in Lobatse, participated in the current study. Only two public health care facilities were excluded from the study, namely the referral hospital and the prisons hospital as they did not provide CTBC services. Out of the 27 health districts in Botswana, Lobatse was chosen because free TB treatment and services, including CTBC, are available. Nevertheless, the cumulative TB-related death rate was 11% between January 2011 and August 2013. By August 2012 the uptake of CTBC in Lobatse was 63.5%, lower than the Botswana target of 75%. The target population comprised 377 persons who were registered for DOT at these six health facilities from January 2011 to August 2013. As 154 patients did not meet the inclusion criteria, a total of 223 persons (377-

154=223) comprised the accessible population of eligible TB patients aged 21–64 and on TB treatment in the Lobatse district during the data collection phase of the study. Each respondent had a chance to be selected at predetermined intervals (Polit & Beck, 2012:282–283). The sampling interval (k) was determined by dividing N by n , hence $K = 1.5486$. Therefore, every second TB patient in the accessible population was selected, starting at patient number three on the list, and selecting all odd numbers such as 3, 5, and 7. This sampling interval implied that 111 respondents were selected from the sampling frame. In order to obtain the required sample size of 144 patients, determined according to Yamane's formula, thereafter even numbers such as 2, 4 and 6 were used to select 33 additional patients. The trained research assistants contacted each selected respondent to make an appointment for an interview if the patient was willing to be interviewed. Each patient was requested to identify a suitable date, time and place for the interview. Cognitively impaired, very ill and elderly persons were excluded from the study. Only 101 TB patients, meeting the selection criteria, could be interviewed on a face-to-face basis.

A structured interview schedule, based on the study's objectives and informed by an in-depth literature review was compiled in English and translated into Setswana. The different sections of the questionnaire attempted to identify respondents' biographical information, their TB-related knowledge, their knowledge and attitudes about CTBC, and factors influencing their decision to utilise CTBC services, or not to do so. Four bilingual research assistants agreed that the English-Setswana translations conveyed the same meaning for every question. A Setswana-English translator verified that the meaning of each item was the same in both languages.

The tool was pre-tested at a clinic in Gaborone on nine patients who met the study's inclusion criteria and who were willing to be interviewed. These patients were excluded from participation in the actual study. Each research assistant conducted two interviews and the principal investigator conducted one interview. The pre-test helped to check the relevance of the questions, to estimate the time required for interviews, to check the consistency of the responses and also to estimate that the time required to conduct each interview would be approximately 30 minutes.

A statistician compiled the Cronbach alpha coefficient (which was 0.89), indicating internal consistency of the instrument. The inter-rater reliability coefficient of the four research assistants could not be determined because the same patient was never interviewed more than once. However, the statistician did not identify any major discrepancies in the information obtained by the four interviewers during the pre-test nor during the actual data analysis.

A content validity index (CVI) was compiled by requesting five experts in the TB field to determine to what extent they considered every item to be directly relevant to the TB policy implemented at their clinic on a 5-point scale. In each case, 1 indicated no relevance and 5 indicated total relevance. No item was discarded because no item scored a CVI below 4 or 80.0%. The overall instrument's CVI was 97.6%, indicating

that the instrument accurately reflected concepts relevant to CTBC (LoBiondo-Wood & Haber, 2010:289).

Four research assistants, comprising two nurse lecturers, and one sociology lecturer from the Institute of Health Sciences, Lobatse, and a psychology graduate, were trained to conduct interviews, to adhere to ethical principles, and to obtain informed consent (by signature or finger print) before any interview could commence. At the conclusion of each interview, the first author checked whether all questions had been answered so that the missing items could be addressed before the respondent left the interview site. No respondent was coerced to answer any specific question.

Each respondent's statements were recorded verbatim in English or Setswana as all interviewers were fully bilingual. The researcher translated the Setswana statements into English and a Setswana-English translator checked that the exact meaning was conveyed in the English translations.

Ethical clearance to conduct the study was obtained from the University of South Africa, from the Lobatse Institutional Review Board and from Botswana's Ministry of Health. No names or identifying information were indicated on any interview schedule. All respondents were assured of confidentiality and anonymity.

DATA ANALYSIS

A statistician assisted with the data analysis using the Statistical Package for Social Sciences (SPSS) version 21. Independent t-tests were used to check whether knowledge about TB varied with gender. Pearson Chi-square tests were performed to identify relationships between enrolment in the CTBC programme and perceptions about the programme. A univariate logistic regression model was compiled about factors influencing the participation of TB patients in the CTBC programme. These variables were treated individually and their individual relationships with participation of TB patients in the CTBC programme. A significance level of 0.05 was adopted for this study's findings. Interviewees' responses to open-ended questions were recorded according to emerging themes and quantified and used to substantiate the quantitative data.

RESEARCH RESULTS

Biographic data

A total of 101 patients were interviewed. Therefore $N=101$, and n indicates any total not amounting to 101, and f indicates any frequency within N or n . Out of the 101 respondents, 55.4% ($f=56$) were females and 44.6% ($f=45$) were males.

Respondents aged 21–25 comprised 5.9% ($f=6$) of the sample, followed by 8.9% ($f=9$) aged 26–30 and 21.8% ($f=22$) aged 31–35, implying that 36.6% ($f=37$) of the sample were up to 35 years old, thus falling within Botswana's 'youth category'. Botswana's revised National Youth Policy defines youth as 'persons of ages 15–35 years' (Ministry of Youth Sports & Culture, 2010:5). Regarding other age groups of the respondents, 23.8% ($f=24$) were 36–40 years of age, 15.8% ($f=16$), were aged 41–45, 8.9% ($f=9$) aged 46–50 years old, 9.9% ($f=10$) fell within the age group of 51–55, and 5.0% ($f=5$) were 56–60 years old. These statistics show that TB affects people of different age groups including those in their economically productive ages, indicating a need for CTBC in Lobatse. Adults in the economically productive age group are globally affected by TB (WHO, 2012b:3).

Respondents' qualifications show that 46.5% ($f=47$) had secondary school education, 24.8% ($f=25$) had primary school education, 14.9% ($f=15$) had no schooling and 9.9% ($f=10$) had obtained unspecified certificates. The diploma and the degree holders comprised 2.0% each, respectively. These findings show that the minority (14.9%; $f=15$) of the respondents had no schooling. The 'universal primary education' offered in Botswana claimed a national literacy rate of 81.2% for 2003/2004 (MOH, 2011c:10), corresponding with this study's finding that 85.1% of the respondents had acquired some schooling.

Figure 1 displays the employment status of the 101 respondents, indicating that 38.6% ($f=39$) were formally employed full time, 37.6% ($f=38$) were unemployed, 11.9% ($f=12$) were self-employed, 6.9% ($f=7$) were part time formally employed, and only 5.0% ($f=5$) were employed doing 'piece jobs'. These findings show that cumulatively 62.4% ($f=63$) of the respondents had some kind of employment. This might be associated with Lobatse being an urban area where people come to seek employment or to study.

Out of 101 respondents, 52.5% ($f=53$) were single, 25.7% ($f=26$) were cohabiting, 12.9% ($f=13$) were in a committed relationship, 5.9% ($f=6$) were married and those separated, divorced and widowed comprised 1% ($f=1$). According to the current study's findings, 12.9% ($f=13$) of the respondents lived alone, while 87.1% ($f=88$) stayed with someone who could help to implement CTBC. A study conducted in China showed that having a family member as a treatment supporter yielded better cure rates as opposed to having no treatment supporter (Ai, Men, Guo, Zhang, Zhao, Sun, Zhang, He, Van Der Werf & Van Den Hof, 2010:112). However, the ages of children of respondents in this study were not determined to find out whether these children were old enough to administer treatment to their parents.

Of the 101 respondents, 90.1% ($n=91$) had PTB while 9.9% ($n=10$) had EPTB. These findings are consistent with the MOH (2011a:9) report maintaining that approximately 80% of all TB cases have PTB in Botswana.

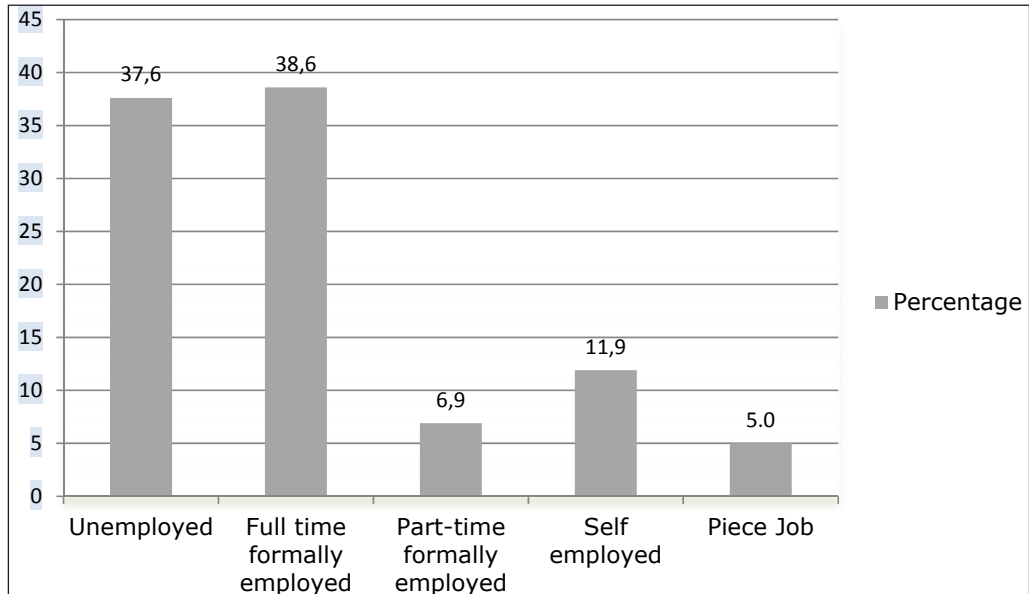


Figure 1: Employment status of respondents (N=101)

Respondents' knowledge about TB

Table 1 presents respondents' knowledge scores indicating their average scores (means) about TB-related issues.

Average scores at or above 50% of the total possible score were accepted as indicating that the respondents were knowledgeable and those with a below average score were considered to indicate a lack of knowledge. The 101 respondents had mean scores that exceeded 50% of the maximum scores in all TB-related knowledge variables, indicating that the majority were knowledgeable about TB identification (6.87 out of 9), signs and symptoms of TB (3.72 out of 5), treatment (9.48 out of 10), and the TB/HIV relationship (3.84 out of 5). The overall mean score for traditional beliefs about causes of TB indicated that some respondents knew that traditional healers might be unable to cure TB (1.41 out of 3). The mean scores for knowledge about signs and symptoms of TB were higher than 50% of the maximum scores averaging for males (3.91 out of 5) and for females (3.54 out of 5) and a p value of 0.032 suggesting that men were more knowledgeable about TB signs and symptoms than women. Out of the 72 CTBC respondents, 91.7% ($f=66$) had received adequate information about TB, implying that the CTBC respondents had reportedly received more and/or better TB-related information than those patients who opted for the facility-based TB care.

Table 1: Respondents' average knowledge scores about TB-related issues

	Male	Female	P-value	Total
Knowledge about TB identification (Max= 9)	7.02	6.75	0.2650	6.87
Knowledge about signs/symptoms of TB (Max= 5)	3.91	3.54	0.032	3.72
Knowledge about TB treatment (Max= 10)	9.38	9.55	0.4720	9.48
Knowledge about TB/HIV relationship (Max=5)	3.76	3.91	0.4400	3.84
Knowledge and attitudes towards CTBC (Max= 10)	7.47	6.89	0.1620	7.15
Traditional beliefs about causes of TB (Max= 3)	1.47	1.37	0.6310	1.41
CTBC support (Max= 5)	2.91	2.79	0.578	2.84

The overall mean score for patients' knowledge about and attitudes regarding CTBC (7.15 out of 10) indicated that the majority were knowledgeable about and had positive attitudes towards CTBC. However, there was a need to scale up CTBC-related health education in Lobatse. Some patients (12.5%; $f=9$) might not have been taught about CTBC and might not have made their own independent decisions to adopt this programme. However, there might have been valid reasons for health care workers' actions in this regard, such as the patient's previous TB treatment defaulting, hypertension, alcoholism, diabetes mellitus or HIV-positive status. These possibilities could not be refuted or confirmed on the basis of the available data.

The overall mean score of 2.84 out of 5 for the 101 respondents implied that support for the CTBC programme was slightly above average in Lobatse. However, support for the CTBC programme, provided by CTBC patients who had completed their TB treatment ($n=58$), was below average for attending TB support group meetings (12.1%; $f=7$), giving public TB-related health education (41.4%; $f=24$) and being treatment supporters (44.8%; $f=26$).

Factors influencing patients' decisions to select a specific DOT option

Based on the findings of $p=0.021$, $p=0.000$ and $p=0.047$, self-determination, adequate information about CTBC and regularly available TB diagnostic services influenced patients' choice of DOT option. The responses to open-ended questions indicated that adoption of a specific DOT option was based on patient-related factors, socio-cultural-related factors, socio-economic-related factors, structural-related factors and health system-related factors.

Findings based on the logistic regression, indicate that the main predictors for participation of the respondents in CTBC included knowledge and attitudes towards

CTBC ($p=0.0003$), perceived barriers and enablers impacting on this programme (0.0279) and patients' satisfaction levels with this programme, $p=0.0315$.

CONCLUSIONS

This study's respondents were knowledgeable about TB but CTBC respondents had slightly better TB knowledge than facility-based TB care respondents, and men were slightly more knowledgeable than women.

Most, but not all, respondents knew about CTBC and had positive attitudes about CTBC. A few respondents did not make their own independent decisions about adopting a specific DOT option.

However, 70.7% ($f=41$) of the respondents encouraged others to seek treatment and to adhere to their treatment (75.9%; $f=44$). As many as 73.6% ($f=53$) of the 72 respondents on CTBC and 75.9% ($f=22$) of respondents on FBTC were reportedly aware of TB patients' rights.

Most respondents supported the CTBC programme. Few patients, who had completed their TB treatment on the CTBC programme, attended TB support group meetings, provided TB-related health education in public or were TB treatment supporters.

Patients' selection of CTBC or facility-based TB care was influenced by the perceptions of their own self-determination, the adequacy of their information about CTBC and the availability of TB diagnostic services. However, TB patients' selection of a specific DOT option was also influenced by numerous other factors related to the patients themselves, socio-cultural aspects, socio-economic issues, structural factors and aspects related to the health system itself.

TB patients were more likely to select the CTBC DOT option if they had adequate knowledge about this programme, if their attitudes were positive towards it, if they could overcome barriers and utilise enablers to implement the CTBC option.

RECOMMENDATIONS

Not only TB patients but all community members should be informed about TB, and especially about the CTBC programme. Sustained evaluations should be conducted about TB patients' experiences of the CTBC programme and any identified shortcomings should be addressed. Patients should be assisted to identify and address barriers and enablers that might impact on their selection of the CTBC option.

More could be achieved if TB patients who completed their treatment could become treatment supporters and health educators. The WHO recommends that former TB patients should be involved in CTBC activities including supervising treatment of TB patients (WHO, 2010:78).

LIMITATIONS OF THE STUDY

The research findings might be limited to TB services offered by the Government of Botswana in the Lobatse area because the study was conducted only in health facilities implementing the BNTP guidelines about CTBC in Lobatse. The sample might not be representative of all public health facilities in Botswana that implement the same policy. Lobatse is an urban area and rural areas might encounter different challenges in implementing a CTBC programme.

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