Knowledge, Attitudes and Practices of health care workers’ towards tuberculosis contact tracing in a TB/HIV Prevalent setting

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ABSTRACT
BACKGROUND: Botswana has one of the world’s highest burdens of tuberculosis (TB) per capita with a TB notification rate currently placing Botswana as 10th highest worldwide. Despite this, contact tracing rates in the district are very low. Objective: We assess the knowledge, attitudes and practices of health care workers’ (HCW) towards implementation of TB contact tracing (CT) in a high TB burden district of Botswana. MATERIALS AND METHODS: Design: A self-administered written questionnaire was sent to Health care workers (HCW) to assess TB contact tracing knowledge, attitudes and practices. Descriptive statistics were used to summarize results and the chi-square statistic was used to compare responses of between health care worker cadres. RESULTS: One hundred and four HCWs completed questionnaires. Of these, 63 were nurses, 16 were health education assistants, 2 TB coordinator, 2 community health nurses, 6 medical officers and 15 TB focal persons and others. Factors that influenced HCW TB contact tracing were their knowledge, attitudes and practices. Knowledge deficiency of the steps required for contact tracing was revealed in 45/103 (44%) of subjects. For attitude, 97/98 (99%) considered CT important. Thirty four out of eighty nine HCWs (38%) reported having never done CT. CONCLUSION: Knowledge, attitudes and practices of health care workers lead to poor TB contact tracing in this resource poor setting. Further training and assessment of the training method on TB contact tracing should be implemented.

Keywords: Knowledge, attitudes and practices of health care workers lead to poor TB contact tracing in this resource poor setting.

INTRODUCTION: Health care worker, Tuberculosis, HIV, Contact tracing, KAP

INTRODUCTION
In 1993 the World Health Organisation (WHO) declared TB a global emergency in recognition of its increasing importance as a public health problem worldwide1. A third of the world’s population or approximately two billion people globally, are infected with TB1. Botswana has one of the world’s highest burdens of TB per capita with a TB notification rate currently placing Botswana as 10th highest worldwide1. The current TB notification rate in Botswana is 505 per 100,000 population per year2. TB contact tracing is one of the ways of determining secondary TB cases. Although previous studies have evaluated aspects of guideline implementation3, other aspects that are likely crucial in developing country settings have not been adequately explored. These include knowledge, attitudes and practices of health workers towards TB contact tracing. Several studies have assessed the knowledge, attitudes and practices of health care workers towards TB contact tracing. In 2008 to 2009 the South African National Tuberculosis (TB) program (NTP) implemented a national pilot, the TB tracer project, aiming to decrease default rates and improve patient outcomes4. The aim of the study was to describe the knowledge, attitudes and practices of TB program personnel involved in tracing activities4. Overall the study participants demonstrated high level of knowledge on core questions4. There was similar level of knowledge shown between the tracer and non-tracer facilities4. The limitations of this study was that the response rate to questionnaires was very low and if the was a significant difference between the study participant and those that declined to participate this may have led to bias in the result. Recall bias as mentioned by the authors could have also been a potential limitation because the questionnaires were sent retrospectively4. This study also does not describe the tracer and non-tracer teams in details and this is important to know if they are similar in characteristics to those in other resource poor settings.

A study conducted in southeast Nigeria was aimed at ascertaining the level of knowledge of the tuberculosis patient about the disease control and practice of contact tracing11. The authors assessed the knowledge, attitudes and practices of health care workers towards TB contact tracing.

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concluded that TB patients accessing health services in Southeast Nigeria had low knowledge of TB and poor practices of contact tracing. A nested case control study conducted in Vietnam has shown that the knowledge, attitudes and practices influence their participation in contact tracing. The aim of the study was to characterise the knowledge about TB and perceived barriers to participation in contact investigation among household contacts of adult patients with pulmonary TB managed within the Vietnam National Tuberculosis Program. These studies were focused in assessing knowledge and practices of patients which is not the same interest as this which its main focus is the health care deliverers. Our objective was to assess the knowledge, attitudes and practices of health care (HCW) towards TB CT in this high TB-HIV prevalent setting. Analysis of these data will inform interventions to improve rates of CT

MATERIALS AND METHODS
Setting: Kweneng East Health District is one of the biggest districts in Botswana and is adjacent to Gaborone, the nation’s capital, and in 2010 had a high TB notification rate of 480 per 100 000 population and an HIV seroprevalence among adults of 19%. The district is home to 217 829 people which is 11% of the country’s population and covers an area of 35 890 km². It is a rural setting with 3 of its biggest villages namely Molepolole (District Head-quarters), Mogoditshane and Thamaga having the top 3 highest population respectively in the country among villages. There are three hospitals and 49 clinics and health posts in the district. In brief, the district was selected because of having a high burden of TB disease and/or high rates of treatment default. The was no information to compare how this district was performing with regards to other districts because in Botswana there is no centralized reporting system for TB contact tracing. In Botswana contact tracing is generally done by nurses and health education assistants. When a new case of PTB is diagnosed by a medical officer or nurse, the TB focal person at the facility or the community TB care volunteer must identify all close contacts and screen them for TB symptoms. The target group was all HCWs working with TB patients: those at clinics, health posts, the primary hospital or the TB ward at the district hospital. The HCWs were nurses, medical doctors, health education assistants and TB focal persons which included two TB coordinators. Each facility has a TB focal person and there are two TB coordinators in Kweneng East District. We only report on data obtained from the questionnaire in this study.

Sampling technique and sample size
A non-probability sampling technique was employed. Study participants were recruited from 18th January 2013 until 29th May 2013. We estimated 160 potentially eligible subjects in the district. With an estimated 20% declination rate, the overall potential study cohort was 128 subjects. We anticipated that there would be a saturation of themes at or before 100 subjects and hence the target sample size was 100 participants.

Definitions
Health education assistant: A health worker with a minimum of primary school certificate and 6 months of health training, who is responsible for education and care of the community.
Medical officer: A medical doctor who has completed a general internship but has no specialty training.
TB focal person: A health worker, either a nurse or a health education assistant, who is responsible for TB activities in the village and or district. TB coordinators were included in this group.
Nurse: A health worker with a minimum of a 3 year diploma in nursing.
Contact tracing training is usually facilitated by the infection control nurse and the District TB coordinator and all the health workers are expected to attend at least one training. While TB is taught in a general fashion in all HCW curricula in Botswana, none of the above groups
receive intense training on CT as part of their tertiary education.

**Outcomes**
The primary outcomes of interest were the knowledge, attitudes and practices of HCWs towards CT. We examined the level of acceptable CT knowledge, defined as the HCW’s ability to list all the steps required to conduct CT and knowing which forms are used. The secondary outcomes were the recommendations that HCWs volunteered regarding how CT could be improved in the district.

**Analysis**
Responses to close-ended questions were summarized using summary statistics. Responses of different HCW groups were compared using parametric or non-parametric tests as per normality of the data distribution. Nurses were chosen as the reference group when analyzing by HCW. Nurses were chosen as they are the core HCW group in Botswana and each clinic has at least one nurse. To compare proportions between groups, chi square test was used. A P value less than 0.05 was deemed statistically significant. When numbers were too small a Fisher exact test was used. Data were analyzed using STATA version 12 (College Station, TX).

**Ethics**
Each participant signed an informed consent. Approval was given by the Institutional Review Boards of Botswana’s Ministry of Health, the University of Botswana and Kweneng East District Health Management Team.

**RESULTS**

**Study participants and sites**
A total of 160 questionnaires were disseminated to HCWs around Kweneng East Health District. Study enrolment yielded a total sample size of 104 HCWs. Thirty three (21%) HCWs declined to participate in the study, stating that they had no time to fill in the questionnaire. Twenty three health care workers did not complete the consent form and were not included in the analysis. Participating HCWs worked at 31 (60%) of 52 health facilities in the district. In discussions with the District TB coordinators, the coordinators commented that the TB contact tracing rate was similarly low (around 25%) in the 31 facilities sampled in this study as compared to the 21 facilities that were not sampled. This value of 25% was calculated by the TB coordinators who, although there is no national approach to assessing contact tracing in Botswana, gathered data on 2011 Kweneng District TB cases, their number of contacts and the proportion of these contacts who had contact tracing done. Each HCW completed a data collection form. Five forms missed the name of the health facility site, but they were included in the final analysis of the paper. The study health facilities were located in 11 (46%) of 24 villages and all 31 were located in rural areas. In one form, the participant did not disclose the village of origin and this form was also included in the analysis. The relative proportions of HCW groups in the study as reflected that in the district overall are shown in table 1.

**Table 1: Profession of subjects who participated in the study as compared to the health care work force in the district overall**

<table>
<thead>
<tr>
<th>Occupation</th>
<th>No. in study (% of total in study)</th>
<th>No. in Kweneng East district (% of HCW in district)</th>
<th>Proportion of cadre sampled in the study (study n/total N in the district)</th>
<th>Comparison of proportion of those in study vs total in the district P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nurses</td>
<td>65 (63%)</td>
<td>145 (61%)</td>
<td>45%</td>
<td>0.78</td>
</tr>
<tr>
<td>Health Education Assistants</td>
<td>16 (15%)</td>
<td>41 (17%)</td>
<td>39%</td>
<td>0.67</td>
</tr>
<tr>
<td>TB focal persons</td>
<td>17 (16%)</td>
<td>37 (15%)</td>
<td>46%</td>
<td>0.85</td>
</tr>
<tr>
<td>Medical officers</td>
<td>6 (6%)</td>
<td>15 (6%)</td>
<td>40%</td>
<td>0.85</td>
</tr>
<tr>
<td>Total</td>
<td>104 (100%)</td>
<td>238 (100%)</td>
<td>44%</td>
<td>-</td>
</tr>
</tbody>
</table>

**Participant demographics**
The highest proportion of the population was recorded for post graduate level at 41%, this was followed by those who did not fill out their educational background, undergraduates, senior secondary and junior secondary school leavers at 18%, 17%, 13% and 11% respectively (figure 2).

**Knowledge, Attitudes and practices of health care workers**
When comparing HCW cadres (health education assistants, TB focal persons and doctors) for knowledge, there was a wide range (17_69%) of HCWs with acceptable knowledge but the knowledge levels did not differ by group when compared to nurses (Table 2).
Figure 2: Educational background of the HCWs who participated in the study

Figure 3: Knowledge and training of HCW on contact tracing

Figure 4: Summary of knowledge and training on TB contact tracing
Figure 5: Description of the importance of TB contact tracing, awareness of the rates set by BNTP and awareness of facilities achieving these targets

With regard to training in CT, health education assistants reported the highest proportion (93%) of training as compared with other groups (50 to 60%).

Majority of HCW indicated that they had heard of TB contact tracing, and 60% of HCW indicated that they had received training on TB contact tracing (figure 3). About 62% of HCW indicated that they required further training on TB contact tracing.

Table 2: Knowledge of and training in TB contact tracing by occupation

<table>
<thead>
<tr>
<th>Occupation</th>
<th>Proportion working with acceptable knowledge of TB CT*</th>
<th>Knowledge: comparison between this group and nurses p value</th>
<th>Proportion trained to do TB contact tracing #</th>
<th>Training: comparison between this group and nurses p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nurses</td>
<td>37/64 (58%)</td>
<td>Reference</td>
<td>35/65 (54%)</td>
<td>Reference</td>
</tr>
<tr>
<td>Health Education Assistants</td>
<td>11/16 (69%)</td>
<td>0.42</td>
<td>14/15 (93%)</td>
<td>0.005</td>
</tr>
<tr>
<td>TB focal person and others##</td>
<td>9/17 (53%)</td>
<td>0.71</td>
<td>10/17 (59%)</td>
<td>0.71</td>
</tr>
<tr>
<td>Medical Officers</td>
<td>1/6 (17%)</td>
<td>0.06</td>
<td>3/6 (50%)</td>
<td>0.86</td>
</tr>
</tbody>
</table>

*Acceptable knowledge defined as knowing both the steps to complete contact tracing as well as knowing about Botswana’s National TB contact tracing forms.

# Defined as having attended at least one training session on how to do contact tracing.

## This included 2 TB coordinators, 2 health education technicians, 4 health education assistants and 9 nurses.

Table 3: Practices of health care workers when conducting tuberculosis contact tracing

<table>
<thead>
<tr>
<th>How would you rate TB contact tracing as an important tool to identify new cases?</th>
<th>Nurse</th>
<th>Health Education assistant</th>
<th>TB focal person and others</th>
<th>MO*</th>
<th>total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very good</td>
<td>76%</td>
<td>50%</td>
<td>40%</td>
<td>100%</td>
<td>67%</td>
</tr>
<tr>
<td>Good</td>
<td>20%</td>
<td>50%</td>
<td>60%</td>
<td>0%</td>
<td>33%</td>
</tr>
<tr>
<td>Fair</td>
<td>2%</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
<td>1%</td>
</tr>
<tr>
<td>Poor</td>
<td>2%</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
<td>1%</td>
</tr>
<tr>
<td>Very poor</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>How often do you conduct TB contact tracing?</th>
<th>Never Less than 1/year</th>
<th>About 1/month</th>
<th>About 1/week</th>
<th>More than 1/week</th>
<th>Never</th>
<th>Less than 1/year</th>
<th>About 1/month</th>
<th>About 1/week</th>
<th>More than 1/week</th>
</tr>
</thead>
<tbody>
<tr>
<td>3%</td>
<td>6%</td>
<td>19%</td>
<td>38%</td>
<td>80%</td>
<td>3%</td>
<td>6%</td>
<td>19%</td>
<td>38%</td>
<td>80%</td>
</tr>
<tr>
<td>30%</td>
<td>19%</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
<td>3%</td>
<td>6%</td>
<td>19%</td>
<td>38%</td>
<td>80%</td>
</tr>
<tr>
<td>37%</td>
<td>13%</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
<td>3%</td>
<td>6%</td>
<td>19%</td>
<td>38%</td>
<td>80%</td>
</tr>
<tr>
<td>30%</td>
<td>38%</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
<td>3%</td>
<td>6%</td>
<td>19%</td>
<td>38%</td>
<td>80%</td>
</tr>
<tr>
<td>0%</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
<td>3%</td>
<td>6%</td>
<td>19%</td>
<td>38%</td>
<td>80%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Do you think that your health facility is achieving the national TB contact tracing target?</th>
<th>Yes</th>
<th>No</th>
<th>Not sure</th>
</tr>
</thead>
<tbody>
<tr>
<td>13%</td>
<td>54%</td>
<td>33%</td>
<td>11%</td>
</tr>
<tr>
<td>31%</td>
<td>46%</td>
<td>23%</td>
<td>19%</td>
</tr>
<tr>
<td>31%</td>
<td>46%</td>
<td>23%</td>
<td>20%</td>
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<tr>
<td>31%</td>
<td>46%</td>
<td>23%</td>
<td>20%</td>
</tr>
<tr>
<td>31%</td>
<td>46%</td>
<td>23%</td>
<td>20%</td>
</tr>
</tbody>
</table>

*MO: Medical Officer

More than half of the HCW showed acceptable knowledge of TB contact tracing. Fifty six percent showed adequate knowledge to list the steps necessary to conduct TB contact tracing.
(figure 4). Ninety nine percent of the HCW indicated that they think TB contact tracing is an important tool for identifying new cases of TB, and only a third of the HCW knew the contact tracing rates set by the Botswana National TB Program and the same proportion thought their health facilities were achieving the national target (figure 5).

The majority (100%) of HCW assessed TB CT as a “good” (33%) or “very good” (67%) tool to identify new TB cases (Table 3). Frequency of conducting TB CT varied by group with health education assistants most frequent and medical officers least frequent. The majority of HCW answered that their health care facility was not achieving the national CT target.

DISCUSSION
This study shows that knowledge, attitudes and practices of health care workers play a role in low TB CT rates in a high TB-HIV prevalent health district of Botswana. More than half of the health care workers have received at least an undergraduate training. Knowledge, poor TB CT training contributed to this poor knowledge with fewer than 60 percent of all groups apart from health education assistants having been trained. This is a similar finding to White et al. who reported that only 40% of Jamaican health care workers demonstrated sufficient knowledge of TB. This knowledge gap is an important factor that likely affects guideline implementation. Additionally even among cadres with a reasonable level of contact tracing training, including the health education assistants and doctors, that knowledge was still unacceptable in a higher proportion. This suggests that the quality or technique of training may be suboptimal or that knowledge retention may be insufficient. This is an area that needs further investigation to elicit factors contributing to this to inform remediation.

HCW attitudes were interesting. Nearly all HCWs thought that TB CT was an important tool to identify secondary TB cases. This is encouraging as HCW clearly understood the importance of TB CT. However, only 42 percent of HCW responded that they were aware of the national guidelines. Despite this more than a third of all HCW reported that poor policies and guidelines were a contributing factor. This again highlighted the need for optimal guideline implementation including effective dissemination and buy-in by HCW.

More than sixty percent of health care workers conduct contact less frequently (never or less than once a year). This also highlights their attitudes and practices toward TB contact tracing. Majority also highlighted that their health facilities or catchment area do not achieve the contact tracing rate as set by the national tuberculosis program.

Although our study design may have some limitations, the design affords the opportunity to generate hypotheses for future analytical and experimental studies. Our study was confined to one district in Botswana and hence, due to many inter-district differences, our findings cannot be generalized to the whole country. Only 62% percent of the health facilities and 44% of the HCW were sampled in the survey. This could lead to some selection bias given that convenience sampling was used to approach potential subjects. The other potential limitation is incomplete data reporting but we had few incomplete forms. There was likely minimal recall bias as the questions in the questionnaire rarely asked about recalling distant events.

CONCLUSION
In conclusion, despite health care workers knowing the importance of TB CT for the prevention and control of TB their knowledge, attitudes and practices contribute to low contact tracing rates. However, the extent to which any individual factor played a role was not measured in this cross sectional study. There is need for on-going TB staff education. Monitoring and evaluation of the training materials as well as policies should be reviewed to ensure that they are aligned with the current situation. A refresher training course should also be conducted for previously trained health workers.

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