Health care providers’ knowledge, attitude and perceived stigma regarding tuberculosis in a pastoralist community in Ethiopia: a cross-sectional study

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Abstract

Background: Tuberculosis (TB) remains the prime killer disease among infectious diseases. TB control depends on early case detection and treatment in a directly observed treatment short course (DOTS) programme. The success of DOTS depends on the ability of the health care system to identify and properly manage TB cases. The present study aims to assess healthcare provider (HCP) knowledge, attitude and perceived stigma regarding TB and perception about traditional healers.

Methods: A descriptive cross-sectional study was conducted among 108 HCPs using a semi-structured, self-administered questionnaire from September 2014 to January 2015. The study district has a high TB burden area with one district hospital, 4 health centres, and 18 health posts. All health facilities and HCPs available during the study period in the district were included in the study. Statistical software for social science (SPSS) version 22 and STATA version 14 were used to enter and analyse data, respectively.

Results: The majority (64%) of the HCPs had poor overall knowledge regarding TB, and 67.6 and 57.6% had poor knowledge regarding TB diagnosis and nature of the disease, respectively. Moreover, most 66.7 and 55.6% of the HCPs had an unfavourable attitude towards TB and TB control systems, respectively. Slightly under half (49.1%) of the HCPs had a favourable attitude towards TB patients, and the majority (88.9%) had low perceived stigma. The majority (87.0%) of the HCPs indicated the importance of community involvement in TB control activity. Moreover, most (60.2%) of the HCPs showed willingness to collaborate with traditional healers (THs) on TB management.

Conclusions: Healthcare workers’ knowledge gap and unfavourable attitude towards TB control systems reported in this study may cause poor TB care delivery. HCPs’ perception of the importance of community involvement in TB control and willingness to collaborate with THs on TB management could be an opportunity to strengthen the World Health Organization’s (WHO’s) component of End TB strategy through community engagement. Training and workshops could be used to address the knowledge gap and the unfavourable attitude regarding TB among HCPs.

Keywords: Attitude, Control, Health care workers, Kereyu, Knowledge, Pastoralists, Stigma tuberculosis
Background

Tuberculosis (TB) is the leading cause of death and results in ill health for approximately 10 million people each year from a single infectious agent, ranking above human immunodeficiency virus/acquired immune deficiency syndrome (HIV/AIDS) [1]. Ethiopia ranks among the 30 highest TB burden countries, with estimated incidence of 200,000 TB per 100,000 populations in 2015. It has fully integrated the World Health Organization (WHO) End TB strategy into the national TB prevention and care plan [2]. The WHO reported that more than 3 million people with TB are not accurately diagnosed by the health care system every year [3], and healthcare workers (HCWs) have been reported to play a major role contributing to the success of TB treatment and management [4].

In Ethiopia, TB treatment is provided free of charge at primary, secondary and tertiary levels of public health facilities. Primary health care is the main mode of health care delivery, and the first point of medical contact for most rural residents in the country and is delivered through health centres and health posts. The success of directly observed treatment short course (DOTS) depends on the ability of the health care system to identify and properly manage TB cases. This requires active involvement of the HCPs in TB diagnosis and management [5, 6]. TB treatment should include counselling regarding disease progress and the importance of adherence to treatment. Failure to do so may result in the spread of TB and development of multi-drug resistant bacteria [7].

However, some studies reported misconceptions and lack of knowledge about TB among HCWs. For instance, a study in Iraq showed that only 12.6% of HCWs believe that TB is caused by bacteria, and another study in South Africa showed 21% of HCWs believe in prayer as treatment for TB [8, 9].

In pastoralist communities in Ethiopia, in addition to poor knowledge and poor healthcare-seeking behaviour [10–12], poor access to modern health care facility and quality of care has been a great challenge in the TB control activity [13–15]. Delays in the diagnosis and treatment of TB have also been reported [16–18]. Moreover, the Ethiopian national health care system has identified health extension workers (HEWs) as the first contact point in rural settings, which is difficult to implement in pastoralist communities due to their different lifestyle compared to non-pastoralists [19].

Studies have suggested that TB knowledge, attitude and stigma could be improved through training for HCWs and HCPs [20–22]. However, to our knowledge, there are no published reports on the knowledge, attitude and practice, and stigma towards TB among HCPs of pastoralist communities in Ethiopia, where access to health care is limited [23] and cultural differences between HCPs and the community are reported to be a challenge in the primary health care delivery system [24]. Therefore, this study aims to assess HCPs’ knowledge, attitude and perceived stigma regarding TB and perception regarding collaboration with traditional healers (THs) on TB control in the Kereyu pastoralist community in Ethiopia.

Methods

Study area and population

Study area

This study was conducted in Fentalle (Kereyu pastoralist) Wereda (equivalent to district), located in the east Shoa zone of Oromia, in the southern part of the northern rift valley of Ethiopia. The area falls within an altitude range of 800–1100 masl. The total land area is 1170 km² with a total population of 76,367; it is located 200 km east of the capital city, Addis Ababa. Metehara is the capital and administrative centre of the district. A detailed description of the study area is given elsewhere [10].

There are four health centres and 18 health posts for the entire population of the Kereyu District. There is one referral hospital in Metehara Sugar Corporation called Merti Hospital. There was a total of 65 HEWs and 46 other health professionals (clinical nurses, midwives, environmental health workers, and pharmacy technicians and laboratory technicians) in the district, excluding the HCWs working at Merti Hospital, which is not the administrative unit of the district health office but does provide services to the pastoralist community. The number of HEWs reported at the district health office includes those training for upskilling, travelling for workshops, not available due to maternity or sick leave as well as those in the process of transfer to other districts. We included all available HEWs at the health posts during the study period.

Study design and sampling

We conducted a facility-based cross sectional study from September 2014 to January 2015.

Before the actual data collection, we identified all the health facilities in the district with the help of HEWs and identified the TB focal person responsible for coordinating the district’s TB prevention and care activities. We included all HCPs and HEWs in the district in the study. Those who were available during the study period were given a self-administered questionnaire to complete and return. If the HCPs reported insufficient time to return the questionnaire the same day, they were allowed to return it the next day.
Measurements
Data were collected using semi-structured and self-administered questionnaires prepared in English as in previous similar studies [20, 21, 25] and translated to Amharic (the federal working language). We gave training to three experienced local coordinators and involved them in the facilitation of the data collection process with the principal investigator.

The survey contained 71 questions, with sections on sociodemographic characteristics, TB knowledge, attitude, perceived stigma regarding TB and perception of collaboration with traditional healers. The tools were pre-tested before the actual data collection to assess the comprehensibility of the questionnaire.

Knowledge
Knowledge is defined as the fact or condition of knowing something with familiarity gained through experience or association [22]. The knowledge section had 24 questions and was divided into three sections: TB diagnosis (10 questions about signs and symptoms of susceptible TB, active TB and relapse TB), nature of the disease (12 questions about transmission, cause, factors in the spread of TB) and treatment duration (2 questions, one for intensive phase and one for the whole duration of TB treatment required). The correct (yes) response to each question was scored as one for a positive response, and incorrect (no/I don’t know) response was scored as zero for a negative response. The scores were added together to generate a knowledge score from 0 to 24 (including each sign and symptom mentioned and factors for the exposure of TB), and the overall score was dichotomized using a median of 18 as a cut-off value. Those who scored 18 and above were coded “1” for good overall TB knowledge, and those below 18 coded “0” for poor overall TB knowledge. Likewise, scores were generated for the two sub-scales of knowledge regarding TB (TB diagnosis and nature of the disease), and the sub-scale of knowledge was categorized as poor and good levels of knowledge.

The term ‘nature of the disease’ is used to summarize the response of the HCPs about the organ affected most by TB, transmission, cause, factors for the spread of TB and the public importance of TB in the community.

Attitude
Attitude is defined as how people feel about certain subjects or issues [21]. The attitude section contained 10 questions addressing two sub sections: attitude towards TB patients (3 questions) and attitude towards TB control (7 questions). A 5-point Likert scale was used to obtain responses to these questions and was treated as a continuous interval variable for analysis. The overall score for attitude regarding TB, attitude towards TB patients and TB control system was obtained by computing the included items using the SPSS syntax Compute by summing included items and multiplying the sum by 5 (number of Likert points). The attitude score was not normally distributed, therefore, overall attitude score was dichotomized using the median score of 37 as a cut-off value; those who had a mean score of 37 and above were coded “1” for a favourable attitude regarding TB and below 37 coded “0”, indicating an unfavourable attitude regarding TB.

Perceived stigma
Perceived stigma refers to the fear of discrimination or, in general, to the awareness of negative attitude and/or practices related to a particular condition [26]. The perceived stigma section had three sections: feeling about a person with TB, perceived community feelings towards TB patients and feelings about being near a person with TB. The first section had five items and was summed to

| Table 1 | Socio-demographic characteristics of HCP in the Kereyu pastoralist district, Ethiopia |
|---------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Variables | Frequency (n=108) | Percent % |
| Age | | |
| < 30 | 68 | 63.0 |
| 30–40 | 26 | 24.1 |
| > 40 | 14 | 13.0 |
| Sex | | |
| Male | 63 | 58.3 |
| Female | 45 | 41.7 |
| Profession | | |
| Medical doctor | 3 | 2.8 |
| BSc Nurses | 53 | 49.1 |
| Health officers | 27 | 25.0 |
| Pharmacists | 1 | 0.9 |
| HEWs | 24 | 22.2 |
| Work duration | | |
| < 2 years | 35 | 32.4 |
| 3–5 years | 27 | 25.0 |
| 6 to 10 years | 28 | 25.9 |
| > 10 years | 18 | 16.7 |
| Work at the DOTS unit | | |
| < 6 months | 15 | 13.9 |
| > 6 months | 70 | 64.8 |
| Never | 23 | 21.3 |
| Attended DOTS/TB training | | |
| Yes | 40 | 37.0 |
| No | 68 | 63.0 |
| Provide health education on TB | | |
| Yes | 55 | 50.9 |
create a perceived stigma score towards TB patients for analysis. Each item was coded as a "yes" or "no" response where 'yes' indicated the absence of perceived stigma and 'no' indicated the presence of perceived stigma. Negatively stated questions were reverse coded to obtain the correct scoring. The responses consistent with "lack of stigma" were scored one and the rest scored zero. The sum of the responses to (1) I feel compassion and desire to help; (2) I feel compassion but tend to stay away from TB patients; (3) It is their problem, and I cannot get TB; (4) I feel fear because they might infect me; and (5) I have no particular feelings were used to generate stigma score from 0 to 5. The overall score was dichotomized using the median as a cut-off point. Since the stigma scores were not normally distributed, the median score (median 1, IQR = 1) was used to classify the HCPs as having high or low perceived stigma towards TB patients. Those who have a score above 1 were coded as one, showing high perceived stigma towards TB patients, and those who scored 1 or lower were coded as zero, showing low perceived stigma towards TB patients (Additional file 1).

Perception about THs
Perception is man’s primary form of cognitive contact with the world around him [27]. In this study, we assessed the HCPs’ perception for possible future collaboration of the conventional health system with THs on TB control. Perception of the HCPs regarding collaboration with THs and their willingness to collaborate on TB prevention and care was assessed using 17 items. The questions had multiple choice and ‘yes’ or ‘no’ responses. The proportion of responses to some of the items used and relationship to the conclusion of this paper is reported.

Data analysis
Quantitative data
The data were entered and analysed using statistical software for social science (SPSS) version 22 and STATA version 14. We applied descriptive statistics to summarize the socio-demographic status of the HCPs, describe their knowledge and attitude and perceived stigma regarding TB and their perception about collaboration with THs on TB diagnosis and treatment. A Chi-square test was used in bivariate analysis to determine the association between the outcome variables and selected covariates. Univariate logistic regression was used to assess the strength of the association. The statistical significance of the differences was evaluated using p value < 0.05 and a 95% confidence interval.

| Variable                        | Median (Q1,Q3) | Knowledge Level |
|---------------------------------|----------------|-----------------|
| Knowledge category              |                |                 |
| Towards nature of the disease   | 6 (6,7)        | 62 (57.6)       |
| Towards TB diagnosis            | 10 (6,11)      | 73 (67.6)       |
| Overall TB knowledge            | 18 (14,19)     | 69 (63.9)       |
| Attending TB training           | COR 2.45       | Poor NO. (%)    |
| Yes                             | 22 (30.0)      | Good NO. (%)    |
| No                              | 51 (69.9)      | 17 (48.6)       |
| Duration of work at DOTS unit   | COR 5.39       | Poor NO. (%)    |
| < 6 months                      | 6 (9.7)        | Good NO. (%)    |
| > 6 months                      | 38 (61.3)      | 9 (19.6)        |
| Never                           | Ref. 3.05      | 18 (29.0)       |
| Overall Knowledge regarding TB  | COR 4.3        | Poor NO. (%)    |
| < 2 years                       | 20 (29.0)      | Good NO. (%)    |
| 3–5 years                       | 23 (33.3)      | 15 (38.5)       |
| 6–10 years                      | 4.3            | 4 (10.3)        |
| > 10 years                      | Ref. 4.6       | 16 (23.2)       |
| Overall Knowledge regarding TB  | COR 4.3        | Poor NO. (%)    |
| < 2 years                       | 20 (29.0)      | Good NO. (%)    |
| 3–5 years                       | 23 (33.3)      | 15 (38.5)       |
| 6–10 years                      | 4.3            | 4 (10.3)        |
| > 10 years                      | Ref. 4.6       | 16 (23.2)       |

*COR – crude odds ratio
*Q1 and Q3 – quartile 1 and 3

Table 2 Knowledge level and factors associated with knowledge regarding TB among HCPs in Kereyu pastoralist district, Ethiopia
**Table 3** HCPs’ Knowledge regarding TB in *Kereyu pastoralist* district, Ethiopia

| Variables                                      | Frequency (n = 108) | Percent (%) |
|------------------------------------------------|--------------------|-------------|
| **Cause of TB**                                |                    |             |
| Mycobacterium tuberculosis                     | 106                | 98.1        |
| Mycobacterium pneumonia                        | 1                  | 0.9         |
| Mycobacterium contagiosum                      | 1                  | 0.9         |
| **Organs most affected**                       |                    |             |
| Lung                                           | 97                 | 89.8        |
| Bones                                          | 8                  | 7.4         |
| Kidney                                         | 2                  | 1.9         |
| Abdominal organs                               | 1                  | 0.9         |
| **Routes of TB transmission**                  |                    |             |
| Droplets from coughing and sneezing of a person with active TB | 94 | 87 |
| Sharing cups                                   | 13                 | 12          |
| Handshaking                                    | 1                  | 0.9         |
| **Factors for the spread of TB**               |                    |             |
| Household contact                              | 98                 | 90.7        |
| Overcrowding                                   | 6                  | 5.6         |
| Humidity                                       | 10                 | 9.3         |
| Poor nutrition                                 | 6                  | 5.6         |
| **People at high risk of developing TB**       |                    |             |
| Yes                                            | Percent%           | No          | Percent% |
| HIV positive                                   | 94                 | 87          | 14        | 13        |
| People in contact with TB patient              | 46                 | 42.6        | 62        | 57.4      |
| People with chronic disease                    | 28                 | 25.9        | 80        | 74.1      |
| Pregnant women                                 | 6                  | 5.6         | 102       | 94.4      |
| **Infectious type of TB**                      |                    |             |
| Active pulmonary TB                            | 100                | 92.6        | 7.4       |
| TB in other organs/body parts                  | 8                  | 7.4         | 1.9       |
| **Symptoms suspicious for TB**                 |                    |             |
| Cough for more than three weeks                | 74                 | 68.5        | 34        | 31.5      |
| Fever                                          | 87                 | 80.6        | 21        | 19.4      |
| Haemoptysis                                    | 94                 | 87          | 14        | 13        |
| Night sweating                                 | 83                 | 76.9        | 25        | 23.1      |
| Loss of appetite                               | 78                 | 72.2        | 30        | 27.8      |
| Loss of weight                                 | 77                 | 71.3        | 31        | 28.7      |
| General weakness                               | 71                 | 65.7        | 337       | 34.3      |
| Chest pain                                     | 82                 | 75.9        | 26        | 24.1      |
| **Diagnosis of Active PTB**                    |                    |             |
| Two or three positive smear tests              | 95                 | 88.0        |           |
| One positive smear and positive X-ray          | 13                 | 12.0        |           |
| **Relapse TB**                                 |                    |             |
| Completed treatment. Cured and returned with positive smear | 84 | 77.8 |
| Under treatment & sputum remains positive after 5 months | 10 | 9.3 |
| Interrupted treatment for 3 months and returned with positive smear | 14 | 13 |
| **Duration of active PTB treatment**           |                    |             |
| 6 months                                       | 102                | 94.4        |
Results
In total, 108 HCPs participated in the study. Fifty-eight percent were male with most (63%) less than 30 years old (mean age 29). A large proportion of the study participants were nurses followed by health officers, accounting for 49.1 and 25.0%, respectively, while 22% were HEWs. Sixty-three percent of the HCPs do not have TB-related training, while 65% of the respondents had worked in the TB unit for more than 6 months (Table 1).

Knowledge regarding TB
Table 2 shows the overall knowledge of the HCPs regarding TB and factors associated with this knowledge. Approximately 64% of HCPs had a poor level of knowledge about TB. Most of the HCWs also had poor knowledge of the nature of the disease (57.6%) and aspects of TB diagnosis (67.6%). HCWs who had worked for < 2 years, 6–10 years and > 10 years had better overall knowledge regarding TB by 4.3 and 4.6 points, respectively compared with HCWs with working duration of 3–5 years ($p = 0.02$, $p = 0.03$ and $p = 0.03$, respectively).

Attending TB training was associated with a 2.45-point increase in knowledge score about TB diagnosis compared with those who had never attended TB training ($p = 0.03$). Working at the DOTS units increased knowledge about the nature of TB (for less than 6 months yielded a 5.39-point increase and greater than 6 months with a 3.05-point increase, respectively) compared with those who had never worked at the DOTS unit ($p = 0.02$ and $p = 0.047$, respectively) (Table 2).

Regarding HCPs’ knowledge of the body organs most affected by TB (Table 3), the majority (89.7%) answered that TB affects the lungs, while 7.4, 1.9 and 0.9% reported that it affects the bones, kidney and abdominal organs, respectively.

| Table 3 | HCPs’ Knowledge regarding TB in Kereyu pastoralist district, Ethiopia (Continued) |
|---------|----------------------------------------------------------------------------------|
| Variables | Frequency (n = 108) | Percent (%) |
| 9 months | 3 | 2.8 |
| 2–5 months | 1 | 0.9 |
| Do not know | 1 | 0.9 |
| Duration of intensive TB treatment phase | | |
| 2 months | 94 | 87.0 |
| 6 months | 11 | 10.2 |
| 9 months | 1 | 0.9 |
| 12 months | 2 | 1.9 |
| MDR-TB | | |
| When the bacilli is resistant to all currently available drugs of TB | 32 | 29.6 |
| When the bacilli is resistant to at least isoniazid and pyrazinamide | 49 | 45.4 |
| When the bacilli is very aggressive and you need at least 8 to 12 months of treatment | 23 | 21.3 |
| Others | 4 | 3.7 |

*MDR-TB – Multi-drug resistant TB

Table 4 Attitude Score towards TB and factors associated with overall attitude towards TB

| Variable | Median score (Q1, Q3) | Attitude | Favourable | Unfavourable NO. (%) |
|----------|-----------------------|----------|------------|----------------------|
| Towards TB control | 26 (23,30) | 48 (44.4) | 60 (55.6) |
| Towards TB patient | 12 (10,13) | 36 (33.3) | 72 (66.7) |
| Overall Attitude | 37 (34,42) | 53 (49.1) | 55 (50.9) |
| Overall Attitude towards TB | | | |
| COR | People with HIV are most affected by TB Yes No | P |
| Favourable No. % No. % | 4.1 | 50 (53.2) | 3 (21.4) * | 0.027 |
| Unfavourable Ref. | 44 (46.8) | 11 (78.6) |

COR – crude odds ratio
Q1 and Q3 - quartile 1 and 3
*Reference
organs, respectively. Moreover, 90.7% of the HCPs mentioned that the main risk factor for the spread of TB infection is close household contact with an active TB patient, while 5.6, 9.3 and 5.6% said that overcrowding, humidity and poor nutrition, respectively, was the risk factor for the spread of TB. In addition, 77.8% of the HCPs knew the correct definition of relapse TB (patient cured/completed treatment and return with smear positive sputum). Concerning the duration of TB treatment for new diagnosed active anti-pulmonary TB, 94.4% answered correctly (6 months) (Table 3).

Attitude towards TB

Table 4 shows that 53.7% of the HCPs had an unfavourable attitude towards TB. A large proportion (55.6%) had an unfavourable attitude towards TB control systems. A large proportion (66.7%) of the HCPs had an unfavourable attitude towards TB patients. Those who believed that people with HIV are most affected by TB had approximately a 4 times more favourable attitude towards TB compared with those who did not mention people with HIV as a high risk group for TB ($p = 0.027$).

Eighty-seven percent of the respondents strongly agreed with the statement that community engagement is essential for TB control, and a substantial proportion (44.4%) of the HCPs also strongly agreed that the service they provide is accepted in the community (Table 5).

Perceived stigma towards TB patients

Regarding the perceived stigma of HCPs towards TB patients, the majority (88.9%) had low perceived stigma and few (11.1%) had high perceived stigma towards TB patients. Table 6 shows that overall knowledge of the HCPs towards TB is significantly associated with the perceived stigma of the HCPs towards TB patients ($p < 0.001$).

The majority of the HCPs (75.9%) mentioned feeling compassion and a desire to help; 56.5% indicated that the community mostly supports TB patients (Table 7).

Perception of HCPs towards collaboration with THs

Table 8 shows that the majority (60.2%) of HCPs are willing to work in collaboration with THs. Referral of potential TB patients by THs (29.8%) and cross visiting (29.9%) were among the possible methods of collaboration on TB prevention and care mentioned by HCPs.

Discussion

The current study assessed the knowledge, attitude and perceived stigma of HCPs regarding TB and perception of THs. The results show that the majority of the HCPs had poor overall knowledge regarding TB, with particularly...

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**Table 5** HCPs’ attitude towards TB in Kereyu pastoralist district in Ethiopia

| Variables | Strongly agree | Agree | Neutral | Disagree | Strongly disagree |
|-----------|----------------|--------|---------|----------|------------------|
| New cases of TB are major challenges for TB control | 38 (35.2%) | 33 (30.6%) | 13 (12.0%) | 15 (13.9%) | 9 (8.3%) |
| Community involvement is important in TB prevention and control | 94 (87.0%) | 13 (12.0%) | 1 (0.9%) | 0 | 0 |
| TB patients do not understand why they should take the medication after starting to feel better | 36 (33.3%) | 51 (47.2%) | 9 (8.3%) | 10 (9.3%) | 2 (1.9%) |
| MDR-TB is a major public health problem in your community | 58 (53.7%) | 29 (26.9%) | 5 (4.6%) | 14 (13.0%) | 2 (1.9%) |
| Using DOTS makes a difference in treatment compliance | 25 (23.1%) | 34 (31.5%) | 22 (20.4%) | 22 (20.4%) | 5 (4.6%) |
| A person with TB faces stigma and shame in your community | 27 (25.0%) | 26 (24.1%) | 18 (16.7%) | 33 (30.6%) | 4 (3.7%) |
| DOTS implementation should take individual circumstances in to consideration | 32 (29.6%) | 23 (21.3%) | 9 (8.3%) | 32 (29.6%) | 12 (11.1%) |
| Poor knowledge about TB makes it difficult to follow DOTS | 36 (33.3%) | 52 (48.1%) | 0 | 15 (13.9%) | 5 (4.6%) |
| TB treatment we provide is accepted by the clients | 48 (44.4%) | 40 (37.0%) | 12 (11.1%) | 3 (2.8%) | 5 (4.6%) |
| Most HCWs at this facility have adequate training for TB control activities | 17 (15.7%) | 23 (21.3%) | 9 (8.3%) | 44 (40.7%) | 15 (13.9%) |

The majority of the HCPs mentioned feeling compassion and a desire to help; 56.5% indicated that the community mostly supports TB patients.

**Table 6** Factors associated with perceived stigma towards TB patients in Kereyu pastoralist district, Ethiopia

| Variables | Perceived stigma level | Low perceived stigma | High perceived stigma |
|-----------|------------------------|----------------------|----------------------|
|            |                       | No. (%)              | No. (%)              |
| Overall knowledge towards TB |               |                      |                      |
| Good knowledge | 39 (40.6) | 0 (0.0) | 0.001 |
| Poor knowledge | 57 (59.4) | 12 (100.0) |

Perceived stigma level categorized as high and low using median and interquartile range.
poor knowledge about the nature of the disease and aspects of diagnosis. In addition, most of the HCPs had an unfavourable attitude towards TB and TB patients as well as the TB control system. Interestingly, most HCPs in this study had low perceived stigma towards TB patients.

The low level of knowledge regarding TB among HCPs in this study is in line with other studies examining communities with similar high TB burden and rural settings in African countries [28, 29] and other settings [30]. These results also indicated that attending TB training increased HCPs’ knowledge regarding TB diagnosis more than two-fold compared with those who did not have TB training. In addition, a longer duration of work and working for less than 2 years at the healthcare facility and experience working at the DOTS unit are significantly associated with increased knowledge regarding TB. This might indicate a lack of training and updating the HCPs with new and current national TB control guidelines in the district. HCPs’ knowledge regarding diagnosis and management of TB is crucial for TB control through proper case management, and it has a direct impact on the effectiveness and quality of the health care provided [7, 31, 32].

The majority of the HCPs in this study knew that bacteria cause TB. This is in contrast to studies in Iraq and South Africa, where misconceptions about TB among health care workers were more frequent. For instance, a study in Iraq [20] showed that only 12.6% of HCWs believed TB is caused by bacteria, and another study in South Africa showed 21% of HCWs believe in prayer as a treatment for TB [8].

In the present study, most HCPs had an unfavourable attitude towards TB, and most also demonstrated an unfavourable attitude towards TB patents and TB control system. Studies reported that the negative attitude of providers towards TB patients and the existing treatment system has led to a high treatment dropout rate, while home visits by providers and supportive and caring staff resulted in high treatment compliance and positive experience with DOTS [4, 30].

In the present study, the majority of the HCPs acknowledged the importance of community involvement in TB control activities and expressed their willingness to collaborate with THs on TB control activities. In this regard, many studies have reported positive contributions by THs to TB management through collaboration with modern medicine in resource-poor settings [25, 33].

Knowledge, attitude and perceived stigma of the HCPs regarding TB were not significantly associated with age, sex or profession of the HCPs. The low scores might also be because the questionnaires were administered to all HCPs in spite of their engagement at the DOTS clinic during the study period.

**Limitations**

HCPs’ knowledge, attitude and perceived stigma regarding TB and their perception about THs in Kereyu pastoralist district were assessed. To the best of our knowledge, no similar study has been conducted in Kereyu pastoralist communities in Ethiopia. This could...
help to strengthen TB prevention and care activities in the district. However, this study has limitations because the report does not include TB case management/diagnosis and treatment practice of the HCPs at the TB unit. In addition, the self-reporting nature of the study and the fact that HCPs were allowed to return the completed questionnaire the next day might allow the respondents to receive external assistance in responding to the questions, affecting the results. Moreover, we were not able to include all HCPs reported to be working at the target healthcare facilities because of absence for training, workshops, leave of absence, transfer process, etc. Furthermore, the stigma questionnaire was not validated.

**Conclusions**

This study provides relevant information about the HCPs’ knowledge gap regarding TB, unfavourable attitude towards TB and TB prevention and care system. Our results showed that the HCPs had an unfavourable attitude towards the TB control system and had low

| Variables | Frequency ($n = 108$) | Percent% |
|-----------|------------------------|----------|
| Traditional medicine exist | 12 | 11.1 |
| People in this community go to TH for TB treatment | 48 | 44.4 |
| Most preferred treatment option |  |  |
| Traditional medicine | 4 | 3.7 |
| Modern medicine | 24 | 22.2 |
| Reason for traditional medicine preference | 75 | 69.4 |
| Easy accessibility | 26 | 24.1 |
| Traditionally acceptable | 61 | 56.5 |
| Less time taking | 14 | 13 |
| Others | 7 | 6.5 |
| Most Preferred to consult for health problems |  |  |
| THs | 37 | 34.3 |
| Healthcare provider | 71 | 65.7 |
| Know a patient who visited healthcare facility soon after visiting THs for TB | 30 | 27.8 |
| Treated a person with TB referred by THs | 19 | 17.6 |
| Why TH do not refer TB patients |  |  |
| TH can treat TB | 17 | 15.7 |
| THs fear losing patient trust | 66 | 61.1 |
| No collaboration mechanisms | 52 | 48.1 |
| THs fear losing money | 40 | 37.0 |
| No referral system | 26 | 24.1 |
| No trust in modern medicine | 16 | 14.8 |
| THs fear critics | 2 | 1.9 |
| Do not know | 2 | 1.9 |
| Others | 7 | 6.5 |
| Accept THs practice | 19 | 17.6 |
| Collaboration options |  |  |
| Cross visiting | 29 | 26.9 |
| TH learning about TB | 16 | 14.8 |
| Working together | 29 | 26.9 |
| THs refer patients to healthcare facility | 29 | 26.9 |
| Training THs | 2 | 1.9 |
| Joint research programme | 3 | 2.8 |
perceived stigma towards TB patients. Training and workshops could help to fill in the knowledge gap of the HCPs’ and change their attitude towards TB control system and TB patients. The HCPs' interest in involving the community and THs in TB prevention and care activity is an opportunity to implement or strengthen the WHO's End TB strategy through community engagement.

Additional file

| Additional file 1: | Questionnaires (DOCX 40 kb) |

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All data sets generated or analysed during the current study were included in this manuscript.

Authors’ contributions
BTS developed the study, prepared the questionnaire, collected and analysed and interpreted the data and wrote the manuscript. FA developed the study and critically reviewed the manuscript. TB critically revised the manuscript. All authors have read and approved the final manuscript.

Ethics approval and consent to participate
The Norwegian Social Science Data Service (NSD) and Ethical Review Committee of Jimma University, Jimma Ethiopia and Oromia Regional Health Office Ethical Review Committee, Addis Ababa, Ethiopia approved this study. The HCPs provided written consent to participate after receiving information about the study. We used codes instead of personal identifiers to maintain confidentiality and the anonymity of the interviewees.

Consent for publication
Not applicable.

Competing interests
The authors declare no competing interests.

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