

# The role of mass media exposure on Tuberculosis knowledge and attitude among migrant and seasonal farmworkers in Northwest Ethiopia

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## Research article

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# Abstract

Background Globally, tuberculosis (TB) is the 9<sup>th</sup> leading cause of death. Despite no country achieved its target, the world health organization (WHO) proposed a 90-90-90 approach to fastening the end TB strategy. Improvement and progression of TB control need good knowledge and a favorable attitude towards the disease. However, interventions designed don't take migrants and seasonal farmworkers into account. Therefore, this study aimed at estimating the level of knowledge and attitude on Tuberculosis among migrant and seasonal farmworkers in northwest Ethiopia. Methods Community-based cross-sectional study was conducted in the West Gondar zone from October to November 2018. A two-stage cluster sampling was used to select 949 migrant and seasonal farmworkers. Both bivariate and multivariable logistic regression analyses were performed. A p-value of <0.05 was used to declare statistical significance. The goodness of fit was checked using Hosmer and Lemeshow test. Results In this study, (41.8%), (95% CI: 38.73, 45.01) and (50.5%), (95% CI: 47.29, 53.65) of migrants and seasonal farmworkers had good knowledge and a favorable attitude, respectively. The odds of good knowledge among mass media exposed migrants were AOR=1.42, 95% CI: (1.02, 2.01). Moreover, urban residence and having good knowledge increase the odds of favorable attitude by 1.66, (AOR=1.7; 95% CI: 1.05, 2.62) and 4.3 (AOR=4.3, 95%CI: 3.26, 5.75), respectively. Conclusion In this study, the overall knowledge and attitude of migrant and seasonal farmworkers on TB were low. Family size and mass media exposure significantly affect knowledge of the migrants on TB. On the other hand, the attitude was affected by urban residence, health information, and having good knowledge. Health promotion interventions, focused on TB cause, mode of transmission, prevention, and treatment are important to migrant and seasonal farmworkers to improve the knowledge and attitude of migrants and seasonal farmworkers.

## Background

Tuberculosis (TB) is caused by mycobacterium species and mainly affects the lungs, which is treatable and curable (1). According to the World Health Organization (WHO) 2017 report, TB resulted in 1.674 million deaths and stands as the 9<sup>th</sup> leading cause of death, ranking above HIV/AIDS. Ethiopia is among the 30 TB high burden and 27 high Multi-Drug Resistance (MDR) TB burden countries globally. There was a decline in the rate of TB since 2010 in nine countries including Ethiopia, Kenya, Lesotho, Namibia, the Russian Federation, the United Republic of Tanzania, Zambia and Zimbabwe (1). However, according to a global plan to end-TB between 2016 and 2020 no country across the globe achieved a 90-90-90 target (2).

A systematic review and meta-analysis showed that the prevalence of MDR-TB in Ethiopia was 1.4% (3). Ethiopia has implemented several TB control efforts including TB program capacity strengthening at the central and regional level, the involvement of private sectors in TB diagnosis and treatment, expansion of culture, and introduction of Gene-expert for diagnosis, and expansion of MDR treatment centers. As a result, the mortality rate declined from 73% to 32%, treatment success rate improved from 79% to 90%, and the case detection rate increase from 33% to 62% in the year 2005 to 2014 (4).

Further improvements and progression of TB control need a good understanding of the cause, mode of transmission, prevention and treatment, and favorable attitude. Addressing knowledge gaps in TB prevention has a great role in eliminating TB (5). Literacy (6, 7), gender (6), mass media (8-10), being a TB patient (11), professional occupation (7, 12), health education (13), culture myths (14, 15), knowledge (16), wealth index (17), age (18), and residence (19) were some of the factors affecting knowledge and attitude. Since knowledge is a precursor of a TB control strategy, determining knowledge of migrants and seasonal farm workers is very crucial in enabling and fastening controlling TB strategies (20).

Despite significant improvement in TB control and prevention in the country, the evidence on the current knowledge, attitude and associated factors towards TB in Ethiopia among migrant and seasonal farm workers is limited. Hence, estimating their knowledge and attitude has a vital role in undertaking measures to fasten the motto of the end TB strategy.

It is, therefore, this study was aimed at estimating knowledge, attitude and associated factors on migrant and seasonal farm workers on TB in the West Gondar zone, northwest Ethiopia.

## Methods

### Study setting

The study was implemented in Amhara Regional State, northwest Ethiopia. Among 167 districts found in the region, migrants and seasonal farm workers went for work mainly in Metema and West Armachiwo districts. These districts are the two common sites of sesame production in the region where hundreds of thousands of migrants and seasonal farm workers traveled during planting, weeding, and harvesting seasons (Fig 1).

### Fig 1: Map of study area

<https://journals.plos.org/plosone/article/figure?id=10.1371/journal.pone.0143829.g001>

### Population, sample size determination, and procedure

All seasonal and migrant farm workers in the West Gondar zone from October 2018 to November 2018 were included in the study. A pilot study was conducted among 50 migrants and seasonal farm workers in Quara district, West Gondar zone to determine the minimum sample size. Then sample size was determined using a single population formula by using the following assumptions. Based on the evidence from the pilot study the proportion of good knowledge and favorable attitude were 44% and 53%, respectively. In addition, 95% CI, 5% margin of error and 10% non-response rate were used. Since the sampling technique was cluster; the design effect of 2 was also used. Therefore, a total of 796 and 804 study participants were required for knowledge and attitude, respectively. To estimate predictors, the sample size was computed using assumptions of power, 80%, 95%CI, odds ratio 1.5-1.8 for the predictors of health information, occupation, and knowledge. Finally, the largest sample size of 976 was used.

A two-stage cluster sampling technique was used. In the first stage, the farm companies were randomly selected, and then seasonal migrant workers were randomly selected.

### **Data collection tool and procedure**

A pretested and structured questionnaire was used to collect data on knowledge, attitude, and health-seeking behavior on TB. The tool was prepared first in English then translated into the local language (Amharic). Then it was re-translated to English by language experts to keep its consistency. The questionnaire consisted of 43 questions, divided into two parts. The first part addressed socio-demographic characteristics and sources of information. The second component includes TB knowledge, attitude, and health-seeking behavior. The data was collected by interviewing through 10 trained BSc nurses. Four supervisors control the overall data collection process. We had two groups of data collectors. The first group which consisted of 5 data collectors enrolled in the Metema district and other equal numbers of data collectors collect the data in the West Armacho district. Before going to actual data collection, two-day training was given to all data collectors and supervisors. Supervisors closely monitored the interviewing process on a daily base.

In this study, the outcome variables were knowledge about TB and attitude about TB. Briefly, knowledge was assessed by 23 questions that addressed the etiology, symptoms, transmission, prevention, and treatment. Respondents who answered 12 ( $\geq 50\%$ ) of these questions were defined as having good knowledge and vice versa. Furthermore, the attitude was assessed by five-item Likert scale questions and respondents who had a positive attitude towards three of the questions (60%) were classified as having a favorable attitude. The independent variables include: region, sex, age, family size, education status, occupation, residence, religion, marital status, income, number of visits, and length of stay were included. The income status of respondents was dichotomized into low and high income. Low income was defined as respondents who gain less than the median (120 birr's). Moreover, the source of information data was also collected from respondents.

### **Statistical analysis**

Epi Data version 3.1 was used for data entry and the analysis was performed using Stata version 14. Coding, recoding, computing, and data cleaning were computed. Frequencies and proportions were used to describe the data. A chi-square test was checked to assess the relationship between two categorical variables. The bivariate analysis was performed and variables that were significant at p-value  $< 0.2$  were entered in the multivariable analysis. To examine the association between independent variables and the outcome variables multivariable logistic regression analysis was performed. In the multivariable logistic regression analysis, p-value  $< 0.05$  was used to declare statistical significance association. Multi-collinearity was assessed using the variance inflation factor (VIF) and considered no multi-collinearity lower than 10. Odds ratio with 95%CI was used to measuring the strength of the association. The goodness of fit was 0.54 and 0.76 for knowledge and attitude, respectively.

# Results

## Socio-demographic and economic factors

The response rate of the study was 97.23%. The mean's age of respondents was 26.05±7.82 years. Of all respondents, 917 (96.6%) were from the Amhara region. The majority, 728 (76.21%) were in the age group of 13-29 years. The median family size of respondents was 5 with the Inter Quartile Range (IQR= 4-6). Of all, 447 (47.1%) had no formal education. About 644 (68%) and 177 (19%) of migrants and seasonal workers were farmers and students by occupation, respectively. The median daily income of respondents was 120 Birr with IQR of 100-150 Birr. Regarding residence, 831 (87.57%) were rural dwellers. Only 178 (18.76%) of migrant and seasonal farm workers had one visit (**Table 1**).

## Source of information of respondents

Five hundred sixty-five (59.54%) heard information about TB at different sources. Of these, 328 (58.05%) heard from mass media and the majority, 508 (90.07%) obtained health information from health workers. In addition, 270 (47.96%) obtained from friends/families, 90 (15.96%) reading posters and 145 (25.75%) from school.

## Knowledge on tuberculosis

In this study, 758 (79.87%) of respondents be acquainted with the cause of TB as germ/bacteria. Regarding symptoms of TB, 721(75.97%) respondents and nearly half (45.63%) know TB patients had persistent cough and sputum with blood, respectively. Nearly one-third of 351 (36.99%) of respondents know that TB patients had a fever. Of all, 732 (77.13%) of respondents know that TB is transmittable. Five hundred thirty-three, 533 (56.16%) know that TB transmission can be prevented by minimizing close contact. Regarding on treatment of TB, 785 (82.72%) know that TB can be prevented. In this study, 41.83% (95%CI: 38.73, 45.01) of migrant and seasonal farm workers were knowledgeable (**Table 2**).

## The attitude of respondents on Tuberculosis

The majority, 655 (67.93%) believed TB is a very serious disease and only 294 (30.2%) believed TB is a serious problem in their community. Six hundred eighty-three (72.0%) mentioned that they would not feel feared or ashamed if they would have TB. Of all, 275 (28.35%) believed that some people are more likely to be affected by TB than others. Three hundred sixty-six (38.57%) would not show any feeling of compassion and desire to help TB patients. The overall favorable attitude was observed in nearly fifty percent of respondents 50.47% (95% CI: 47.29-53.65) (**Table 3**).

## Health seeking behavior

Four hundred ninety-two (51.82%) respondents would go to doctor/health professional if they had TB. Besides, 175 (18.44%) and 175 (18.44%) respondents respond they would contact parents and close friends, respectively if they had TB. Of all, 708 (74.60%) would seek medical care if the symptoms last for

greater than two weeks. Two hundred (21.07%) would seek medical care as soon as they realized the symptoms. The remaining, 41 (4.32%) would seek medical care when my own treatment doesn't work.

### **Associated factors**

In the bivariate analysis seven factors including educational status, family size, daily income, mass media exposure, obtain health information from friends, health information from posters and hearing health information from school became significant at p-value less than 0.2. However, in multivariable analysis, only family size and mass media exposure retained significantly. The odds of having good knowledge among respondents having 3-5 and  $\geq 6$  families were increased by 80% and 85%, respectively compared to respondents having less than three families. The odds of good knowledge were increased by 42% among respondents having mass media exposure compared to their counterparts (**Table 4**).

### **Associated factors with attitude**

In the bivariate analysis educational status, occupation, family size, residency, health information, and knowledge were statistically significant. However, in the multivariate logistic regression analysis, only three variables (Health information, residence, and knowledge) were statistically significant factors to have a favorable attitude. The odds of having a favorable attitude among urban dwellers were increased by 63% compared with rural counterparts. The odds of favorable attitude on TB among respondents who had health information were increased by 72% compared with their counterparts. The odds of favorable attitudes were 4.3 times higher among participants with good knowledge compared with their counterparts (**Table 5**).

## **Discussion**

This study revealed that there are a low knowledge and attitude on TB among migrant and seasonal farm workers. Only 41.83% of migrants and seasonal farm workers were knowledgeable. Furthermore, 50.47% had a favorable attitude towards TB. TB knowledge among migrants and seasonal farm workers were significantly affected by mass media exposure and family size. On the other hand, their level of attitude was affected by health information, residence, and knowledge of respondents. In addition, 708 (74.60%) would seek medical care if the symptoms last for greater than two weeks

In our study, 41.85% of migrant and seasonal farm workers were knowledgeable. This finding was in line with the finding from EDHS 2011 (44.14%)(17). However, the finding was lower than a study conducted in Lesotho (59.9%) (21) and Zimbabwe (73.8%) (22). This could be due to almost all (98.3%) of respondents in Lesotho and 93% in Zimbabwe had formal education. However, only 52.90% of respondents had formal education in the current study. This could be due to the fact that a high level of education is usually catalyzed awareness of TB, which acts as a precursor to having good knowledge (23). In addition, a study from Indonesia showed that education is an antecedent of knowledge and has a great contribution to fortifying respondent's knowledge (24). A case-control study conducted in Sudan showed that 66.5% of respondents had good knowledge which is higher than the present study (19). This could

be due to nearly half of the respondents were cases, which have information about their disease status and get advice during their follow up. Furthermore, a study from Iran showed that 62.04% had good knowledge (25). This difference could be due to defining the outcome variable. In the current study, good knowledge was defined if a respondent correctly answered more than half of the questions. Whereas, in Iran, study mean score was used to classify as knowledgeable.

There is a significant increase in knowledge among mass media exposed migrants and seasonal farm workers. This finding is in agreement with a study conducted in a general population of Lesotho(21) and India (26). This is due to the fact that mass media campaign has a big role in enhancing the normal passive case finding strategy by reaching a large population at a time and it provides information regarding on earliest symptoms, cause, and transmission, prevention, and treatment modalities. Accordingly, a study from Colombia showed that mass media exposure was associated with a high level of knowledge and recommended that it should be sustainable in order to have a long term change to adopt behavioral change and create a habit to use (27). Moreover, health information through mass media and other methods was significantly affecting the attitude of respondents. This could be the fact that mass media has a great role in creating awareness (28), which can later change perceptions and behaviors' of respondents (29, 30).

Family size is another significant factor affecting the knowledge status of migrants and seasonal farm workers. This finding is supported by a study conducted in Thailand among the general population and risk groups (18). This could be due to the culture of sharing information among the family members to one another if family size is large. In addition, in a large family, there could be at least one educated person who could transmit a message regarding TB during any discussion in the household.

Nearly half of migrants and seasonal farm workers had a favorable attitude. This finding is lower than a study conducted in Timor Leste (83.3% in men and 88.6% in women) (31). This could be due to the difference in defining the outcome variable. In the former study, a favorable attitude was measured for specific questions (intention to initiate TB treatment). However, in the current study favorable attitude was measured by creating a composite score and the one who scored more than half the attitude question. Similarly, our study was much lower than a community study from Botswana which showed about 92% of respondents to have a favorable attitude (32).

Good knowledge was associated with a favorable attitude. This finding is supported by a study conducted in Nigeria (7). This could be due to the fact that good knowledge influence attitude formation (29). Furthermore, it was supported by a study from Ethiopia among pastoralist communities which showed lower awareness as risk factors for unfavorable attitudes (33). This could be mainly due to perceiving a higher stigma on TB patients among pastoralists with poor awareness.

The strength of the study was determining knowledge, attitude, and factors on TB among migrant and seasonal farm workers in Ethiopia. This is the first study to evaluate migrant's knowledge and attitude in the context of one of the developing countries, Ethiopia. This study has some limitations. Initially, the study could not allow establishing cause-effect relationships because of cross-sectional nature. Besides,

this study could be vulnerable to social desirability bias. There was also a scarcity of literature among migrants and seasonal farm workers in developing countries. The conducted studies have relied on the general population not specifically on migrants. Finally, this study also suffers from recall bias due to data was collected about their previous experience.

The findings of this study would contribute significantly to design tailored interventions intended in increasing awareness through the use of mass media and developing a favorable attitude in migrants and seasonal farm workers towards TB. Furthermore, this finding provokes policymakers to design programs and to implement appropriate public health strategies targeted migrants and seasonal farm workers. As a result, improving the level of knowledge and attitude has paramount importance in the control and elimination of TB cases. Therefore, it is compulsory to do on migrants and seasonal farm workers to control and eliminate TB in the country.

## **Conclusion**

This study revealed low overall knowledge and attitudes of migrant and seasonal farm workers. Mass media exposure and family size significantly affect the knowledge of respondents. Moreover, health information, urban residency, and good knowledge were the main identified factors of a favorable attitude. Health education interventions, focused on TB cause, mode of transmission, prevention, and treatment are important to migrants and seasonal farm workers. Besides, the role of mass media should be strengthened to improve the knowledge and attitude of migrants and seasonal farm workers.

## **Abbreviations**

AOR: Adjusted Odds Ratio, BSc: Bachelor of Science, CI: Confidence Interval, COR: Crude Odds Ratio, EDHS: Ethiopia Demographic Health Survey, HIV: Human Immunodeficiency Virus, IQR: Inter Quartile Range, MDR: Multi-Drug Resistance, TB: tuberculosis, WHO: World Health Organization.

## **Declarations**

### **Ethics Approval and Consent to Participate**

The study protocol was approved by the ethical review committee of the College of Medicine and Health Sciences, University of Gondar. Besides, we took ethical approval from Amhara Public Health Institute. Verbal informed consent was taken from all respondents enrolled in the study. In addition, for children under the age of 18 years permission was obtained from guardian and children themselves since they are far apart from their parents. However, written consent was not taken rather verbal consent was obtained from guardian. Then approval was taken from the ethics committee. To keep confidentiality, respondent's names and other personal identifiers were not included. The collected data were password protected.

### **Consent to publication**

Not applicable

## Availability of data and material

Data will be available from the corresponding author upon request

## Competing Interests

There is no competing of interests related to this work

## Funding

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## References

1. World Health Organization. Global tuberculosis report 2017. Geneva: WHO; 2017
2. Cousins S. Progress towards TB reduction targets is faltering, report finds. *Bmj*. 2017;359:j4758.
3. Asgedom SW, Teweldemedhin M, Gebreyesus H. Prevalence of Multidrug-Resistant Tuberculosis and Associated Factors in Ethiopia: A Systematic Review. *Journal of pathogens*. 2018;2018:7104921.
4. THE 12TH NATIONAL TB RESEARCH ANNUAL CONFERENCE AND COMMEMORATION OF WORLD TB DAY.
5. DeLuca A, Dhupal G, Paradkar M, Suryavanshi N, Mave V, Kohli R, et al. Addressing knowledge gaps and prevention for tuberculosis-infected Indian adults: a vital part of elimination. *BMC infectious diseases*. 2018;18(1):202.
6. Abbasi A, Rafique M, Saghir A, Abbas K, Shaheen S, Abdullah F. Gender and occupation wise knowledge, Awareness and prevention of tuberculosis among people of district Muzaffarabad AJ & K. *Pakistan journal of pharmaceutical sciences*. 2016;29(6):1959-68.
7. Balogun MR, Sekoni AO, Meloni ST, Odukoya OO, Onajole AT, Longe-Peters OA, et al. Predictors of tuberculosis knowledge, attitudes and practices in urban slums in Nigeria: a cross-sectional study. *The Pan African medical journal*. 2019;32:60.
8. Arroyo Rojas L, Sanchez Valdes CL, Bonne Carcasses MA, Perez Perez HR, Armas Perez L. [Knowledge and perception about tuberculosis in Habana Vieja municipality]. *Revista cubana de medicina tropical*. 2012;64(3):268-78.

9. Gebrehiwot TT, Tesfamichael FA. Knowledge, Risk Perception and Practice Regarding Tuberculosis Transmission among Long-Distance Bus Drivers in Addis Ababa, Ethiopia: A Cross-Sectional Study. *Ethiopian Journal of health sciences*. 2017;27(6):601-12.
10. Geraee N, Kaveh MH, Shojaeizadeh D, Tabatabaee HR. Impact of media literacy education on knowledge and behavioral intention of adolescents in dealing with media messages according to Stages of Change. *Journal of advances in medical education & professionalism*. 2015;3(1):9-14.
11. Badane AA, Dedefo MG, Genamo ES, Bekele NA. Knowledge and Healthcare Seeking Behavior of Tuberculosis Patients attending Gimbi General Hospital, West Ethiopia. *Ethiopian Journal of health sciences*. 2018;28(5):529-38.
12. Hossain S, Zaman K, Quaiyum A, Banu S, Husain A, Islam A, et al. Factors associated with poor knowledge among adults on tuberculosis in Bangladesh: results from a nationwide survey. *Journal of health, population, and nutrition*. 2015;34:2.
13. Bisallah CI, Rampal L, Lye MS, Mohd Sidik S, Ibrahim N, Iliyasu Z, et al. Effectiveness of health education intervention in improving knowledge, attitude, and practices regarding Tuberculosis among HIV patients in General Hospital Minna, Nigeria - A randomized control trial. *PloS one*. 2018;13(2):e0192276.
14. Craig GM, Daftary A, Engel N, O'Driscoll S, Ioannaki A. Tuberculosis stigma as a social determinant of health: a systematic mapping review of research in low incidence countries. *International Journal of infectious diseases: IJID: official publication of the International Society for Infectious Diseases*. 2017;56:90-100.
15. Gil N, Lopez L, Rodriguez D, Rondon M, Betancourt A, Gutierrez B, et al. Myths and realities about knowledge, attitudes, and practices of household contacts of tuberculosis patients. *The international journal of tuberculosis and lung disease: the official journal of the International Union against Tuberculosis and Lung Disease*. 2018;22(11):1293-9.
16. Fabrigar LR, Petty RE, Smith SM, Crites SL, Jr. Understanding knowledge effects on attitude-behavior consistency: the role of relevance, complexity, and amount of knowledge. *Journal of personality and social psychology*. 2006;90(4):556-77.
17. Gelaw SM. Socioeconomic Factors Associated with Knowledge on Tuberculosis among Adults in Ethiopia. *Tuberculosis research and treatment*. 2016;2016:6207457.
18. Pengpid S, Peltzer K, Puckpinyo A, Tiraphat S, Viripiomgool S, Apidechkul T, et al. Knowledge, attitudes, and practices about tuberculosis and choice of communication channels in Thailand. *Journal of infection in developing countries*. 2016;10(7):694-703.
19. Suleiman MM, Sahal N, Sodemann M, Elsony A, Aro AR. Tuberculosis awareness in Gezira, Sudan: knowledge, attitude and practice case-control survey. *Eastern Mediterranean health journal = La revue de sante de la Mediterranee orientale = al-Majallah al-sihhiyah li-sharq al-mutawassit*. 2014;20(2):120-9.
20. Hassan AO, Olukolade R, Ogbuji QC, Afolabi S, Okwuonye LC, Kusimo OC, et al. Knowledge about Tuberculosis: A Precursor to Effective TB Control-Findings from a Follow-Up National KAP Study on

- Tuberculosis among Nigerians. *Tuberculosis research and treatment*. 2017;2017:6309092.
21. Luba TR, Tang S, Liu Q, Gebremedhin SA, Kisasi MD, Feng Z. Knowledge, attitude and associated factors towards tuberculosis in Lesotho: a population-based study. *BMC infectious diseases*. 2019;19(1):96.
  22. Musuka G, Teveredzi V, Mutenherwa F, Chingombe I, Mapingure M. Tuberculosis knowledge, misconceptions/myths in adults: findings from Lesotho, Malawi, Namibia and Zambia Demographic Health Surveys (2013-2016). *BMC research notes*. 2018;11(1):778.
  23. Miandad M, Nawaz-Ul-Huda S, Burke F, Hamza S, Azam M. Educational status and awareness among tuberculosis patients of Karachi. *JPMA The Journal of the Pakistan Medical Association*. 2016;66(3):265-9.
  24. Mondal MN, Nazrul HM, Chowdhury MR, Howard J. Socio-demographic factors affecting knowledge level of Tuberculosis patients in Rajshahi City, Bangladesh. *African health sciences*. 2014;14(4):855-65.
  25. Bagheri Amiri F, Doosti-Irani A, Sedaghat A, Fahimfar N, Mostafavi E. Knowledge, Attitude, and Practices Regarding HIV and TB Among Homeless People in Tehran, Iran. *International journal of health policy and management*. 2017;7(6):549-55.
  26. Sharma AK, Sharma R. Impact of mass media on knowledge about tuberculosis control among homemakers in Delhi. *The international journal of tuberculosis and lung disease: the official journal of the International Union against Tuberculosis and Lung Disease*. 2007;11(8):893-7.
  27. Jaramillo E. The impact of media-based health education on tuberculosis diagnosis in Cali, Colombia. *Health policy and planning*. 2001;16(1):68-73.
  28. Nglazi MD, Bekker LG, Wood R, Shey MS, Uthman OA, Wiysonge CS. The impact of mass media interventions on tuberculosis awareness, health-seeking behavior and health service utilization: a systematic review protocol. *BMJ Open*. 2014;4(1):e004302.
  29. Zhu X, Xie X. Effects of Knowledge on Attitude Formation and Change Toward Genetically Modified Foods. *Risk analysis: an official publication of the Society for Risk Analysis*. 2015;35(5):790-810.
  30. Hatzenbuehler LA, Starke JR, Smith EO, Turner TL, Balmer DF, Arif Z, et al. Increased adolescent knowledge and behavior following a one-time educational intervention about tuberculosis. *Patient education and counseling*. 2017;100(5):950-6.
  31. Pengpid S, Peltzer K. Knowledge, Attitudes, and Practices Regarding Tuberculosis in Timor-Leste: Results From the Demographic and Health Survey 2016. *Journal of preventive medicine and public health = Yebang Uihakhoe chi*. 2019;52(2):115-22.
  32. Musuka G, Teveredzi V, Busang L, Chingombe I, Makadzange P, Mokgweetsinyana S, et al. Community attitudes on tuberculosis in Botswana: an opportunity for improving the National Tuberculosis Programme outcomes, 2011. *BMC research notes*. 2018;11(1):499.
  33. Sima BT, Belachew T, Abebe F. Knowledge, attitude and perceived stigma towards tuberculosis among pastoralists; Do they differ from sedentary communities? A comparative cross-sectional study. *PloS one*. 2017;12(7):e0181032.

## Tables

**Table 1:** Socio-demographic and economic characteristics of migrant and seasonal farmworkers in West Gondar zone, northwest Ethiopia 2018 (N=949)

<b>Variables</b>	<b>Frequency (%)</b>
<b>Region</b>	
Tigray	27 (2.8)
Amhara	917(96.6)
Oromia	5 (0.5)
<b>Sex</b>	
Male	942 (99.3)
Female	7(0.7)
<b>Age</b>	
13-20	244 (25.7)
21-29	484 (51.0)
30-39	151 (15.9)
40-67	70 (7.4)
<b>Family size in their family</b>	
1-2	88 (9.3)
3-5	536 (56.5)
6-14	325 (34.2)
<b>Educational status</b>	
Unable to read and write	374 (39.4)
Able to read and write	73 (7.7)
Primary education	405 (42.7)
Secondary education	97 (10.2)
<b>Occupation before departure</b>	
Student	177 (18.7)
Farmer	644 (67.8)
Unemployed	128 (13.5)
<b>Residence</b>	
Rural	831 (87.6)
Urban	118 (12.4)
<b>Religion</b>	
Orthodox	931 (98.1)
Muslim	15 (1.6)
Protestant	1 (0.1)
Catholic	2 (0.2)
<b>Marital status</b>	
Single	648 (68.3)
Married	243 (25.6)
Divorce	58 (6.1)
<b>Income</b>	
Low	496 (52.3)

High	453 (47.7)
<b>Number of visits to the farms</b>	
First	178 (18.8)
2-4	293 (30.9)
5-8	280 (29.5)
≥9	198 (20.8)
<b>Length of stay</b>	
Less than two month	576 (60.7)
Two months and above	373 (39.3)

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**Table 2:** Knowledge on Cause, symptoms, methods of transmission and prevention of tuberculosis among migrant and seasonal farm workers in West Gondar zone, 2018 (n=949)

<b>Variables</b>	<b>Frequency (%)</b>
<b>Cause of Tuberculosis germ/bacteria</b>	
Yes	758(79.9)
No	191 (20.1)
<b>Persistent cough</b>	
Yes	721(75.97)
No	228(24.03)
<b>Sputum with blood</b>	
Yes	433 (45.63)
No	516 (54.37)
<b>Fever</b>	
Yes	351 (37.0)
No	598 (63.0)
<b>Poor apatite</b>	
Yes	381 (40.2)
No	568 (59.8)
<b>Night sweating</b>	
Yes	318 (33.5)
No	631 (66.5)
<b>Weight loss</b>	
Yes	412 (43.4)
No	537 (56.6)
<b>Chest pain</b>	
Yes	496 (41.7)
No	553 (58.3)
<b>Transmit through cough/sneezing</b>	
Yes	658 (69.3)
No	291 (30.7)
<b>Via touching TB person</b>	
Yes	219 (23.1)
No	730 (76.9)
<b>Through sharing utensils</b>	
Yes	521 (54.9)
No	428 (45.1)
<b>By sexual contact</b>	
Yes	168 (17.7)
No	781 (82.3)
<b>By drink un boiled milk</b>	
Yes	240 (25.3)
No	709 (74.7)
<b>TB is preventable</b>	
Yes	686 (72.4)
No	262 (27.6)
<b>Minimizing close contact</b>	
Yes	533 (56.2)
No	416 (43.8)
<b>Covering mouth while coughing</b>	
Yes	468 (49.3)
No	481 (50.7)
<b>Avoid sharing utensils</b>	
Yes	445 (46.9)
No	504 (53.1)
<b>Early treatment</b>	

Yes	410 (43.2)
No	539 (56.8)
<b>Good nutrition</b>	
Yes	315 (33.2)
No	634 (66.8)
<b>Using separate rooms</b>	
Yes	371 (39.1)
No	578 (60.9)
<b>Close opening windows</b>	
Yes	232 (24.4)
No	717 (75.6)
<b>Using modern drugs</b>	
Yes	762 (78.3)
No	211 (21.7)
<b>Nutritional support</b>	
Yes	38 (3.9)
No	935 (96.1)
<b>TB is not treatable</b>	
Yes	192 (20.2)
No	757 (79.8)
<b>Overall TB knowledge</b>	
Poor knowledge	552 (58.2)
Good knowledge	397 (41.8)

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**Table 3:** Attitude of respondents on Tuberculosis among migrant and seasonal workers in West Gondar, 2018 (N=949)

<b>Variables</b>	<b>Frequency (%)</b>
<b>How serious are the diseases TB?</b>	
Very serious	655 (67.9)
Somewhat serious	188 (20.9)
Not serious	90 (9.5)
Not very serious	16 (1.7)
<b>How serious is the problem TB in your working area?</b>	
Very serious	294 (30.2)
Somewhat serious	223 (22.9)
Not serious	249 (25.6)
Not very serious	207 (21.3)
<b>What would be your reaction if you were found to have TB?</b>	
Fear	
Surprised	379 (39.9)
Shame	80 (8.4)
Sadness or hopeless	14 (1.5)
No special feeling	123 (13.0)
	353 (37.2)
<b>Do you think some people are more likely to become infected than others?</b>	
Yes	
No	268 (28.2)
	681 (71.8)
<b>How is your feeling towards people with TB?</b>	
Compassion and desire to help	583 (61.4)
Compassion but stay away from them	109 (11.5)
It is their problem and I cannot get TB	9 (1.0)
I fear them because they may infect me	94 (9.9)
I have no particular feeling	154 (16.2)
<b>In your community (working area) how is a person who has TB usually regarded/treated?</b>	
Most people reject him or her	81 (8.5)
Most people are friendly, but they try to avoid him/ her	398 (42.1)
Mostly supports and helps him/ her	299 (31.5)
not sure whether they help/ not	97 (10.2)
Don't give special attention	74 (7.7)
<b>The overall favorable attitude</b>	
Poor attitude	470 (49.5)
Favorable attitude	479 (50.5)

**Table 4:** Bi-variable and multivariable logistic regression analysis among migrants and seasonal farm workers on the of knowledge about tuberculosis in West Armacho, Ethiopia (N = 949)

Characteristics	Knowledge status		COR with 95% CI	AOR with 95%
	Good	Poor		
<b>Education status</b>				
Unable to read and write	147	227	1	1
Able to read and write	29	44	1.02 (0.61-1.70)	0.94 (0.56, 1.59)
Primary	180	225	1.24 (0.93, 1.64)	1.09 (0.81, 1.49)
Secondary and above	41	56	1.13 (0.72, 1.78)	0.87 (0.52, 1.45)
<b>Family size</b>				
1-2	28	60	1	1
3-5	227	309	1.57 (0.97, 2.54)	1.80
>=6	142	183	1.66 (1.01, 2.74)	(1.09,2.96)* 1.85 (1.11,3.10)*
<b>Daily income</b>				
Low	222	274	1.29 (0.99, 1.67)	1.28 (0.98,1.67)
High	175	278	1	1
<b>Mass media exposure</b>				
No	228	393	1	1
Yes	169	159	1.83 (1.39, 2.40)	1.42 (1.02,2.01)*
<b>Friends as sources of information</b>				
No	252	427	1	1
Yes	145	125	1.97 (1.48,2.61)	1.41 (0.97,2.05)
<b>Poster as sources of information</b>				
No	342	517	1	1
Yes	55	35	2.38 (1.51,3.71)	1.65 (0.97, 2.83)
<b>Scholars sources of information</b>				
No	321	483	1	1
Yes	76	69	1.66 (1.16, 2.36)	1.07 (0.68,1.70)

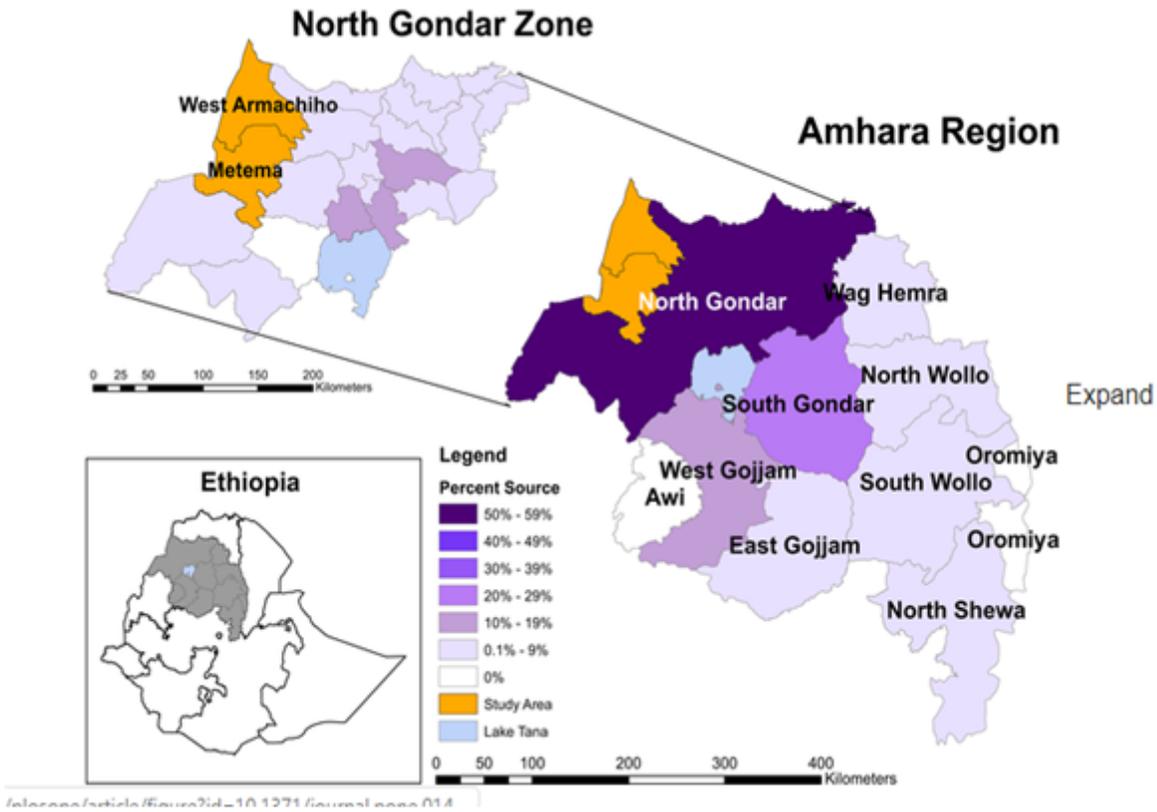
\*p-value <0.05

**Table 5:** Factors related to the level of attitude about tuberculosis among West Gondar, Ethiopia Migrants and seasonal workers in the bivariate and multivariate logistic regression analysis  
(N = 949)

Variables	Attitude status		COR with 95% CI	AOR with 95% CI
	Favorable	unfavorable		
<b>Educational status</b>				
Unable to read and write	180	194	1	1
Able to read and write	30	43	0.75	0.68 (0.39, 1.17)
Primary	208	197	(0.45,1.25)	0.68 (0.64, 1.25)
Secondary and above	61	36	1.14 (0.86,1.5)	1.31(0.75,2.29)
			1.83	
			(1.15,2.89)	
<b>Residence</b>				
Rural	407	424	1	1
Urban	72	46	1.63(1.09,2.42)	1.66 (1.05,2.62)*
<b>Occupation</b>				
Student	108	69	1	1
Farmer	309	335	0.59	0.72 (0.47,1.10)
Unemployed	62	66	(0.42,0.83)	0.68 (0.40,1.15)
			0.60	
			(0.38,0.95)	
<b>Family size</b>				
1-2	37	51	1	1
3-5	278	258	1.49	1.50 (0.90,2.49)
6 and above	161	164	(0.94,2.34)	1.37 (0.81,2.34)
			1.40	
			(0.87,2.26)	
<b>Health information</b>				
No	163	221	1	1
Yes	316	249	1.72	1.64 (1.23,2.18)*
			(1.32,2.24)	
<b>Knowledge status</b>				
Poor knowledge	198	354	1	1
Good knowledge	281	116	4.33	4.33 (3.26, 5.75)*
			(3.28,5.72)	

\*p-value<0.05

## Figures



**Figure 1**

Map of study area <https://journals.plos.org/plosone/article/figure?id=10.1371/journal.pone.0143829.g001>)