

# Depression and associated factors among patients with tuberculosis in Ethiopia: a cross-sectional study

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**Purpose:** The study aimed to assess the magnitude of depression and associated factors among patients with tuberculosis (TB) visiting outpatient clinics in Ethiopia.

**Patients and methods:** A cross-sectional study was conducted among 415 TB patients. Study participants were selected through a systematic random sampling technique. Patient Health Questionnaire-9 (PHQ-9) was used to assess depression using face-to-face interviews. Data were analyzed using SPSS version 20. Bivariate and multivariate binary logistic analyses were done to identify associated factors with depression. *P*-values less than 0.05 were considered statistically significant, and the strength of the association was presented by adjusted OR (AOR) with 95% CI.

**Results:** The magnitude of depression was found to be 31.1% with 95% CI (26.5–35.7). Extrapulmonary TB [AOR =1.8, 95% CI (1.02, 3.24)], poor social support [AOR =3.3, 95% CI (1.8, 6.03)] and perceived TB stigma [AOR =2.0, 95% CI (1.28, 3.18)] were variables found to be statistically significantly connected with depression.

**Conclusion:** The magnitude of depression was high compared to the general population and some other studies. Therefore, the current study area and other settings which provide TB screening and treatment need to assess patients for depression and provide intervention, giving more emphasis to patients with risk factors.

**Keywords:** depressive illness, outpatient clinics, tuberculosis patients

## Introduction

Tuberculosis (TB) is a chronic infectious disease caused by bacteria (*Mycobacterium tuberculosis*) and commonly affects the lung.<sup>1</sup> It is a public health concern due to its high morbidity and mortality throughout the world in all population groups.<sup>2</sup> Although all age groups are at risk to develop TB, it affects adults in their most productive years and over 95% of cases and deaths are in developing countries like Ethiopia.<sup>3</sup> Moreover, Multidrug-resistant TB (MDR-TB) is also a major public health crisis and a health security threat currently worsening in developing countries.<sup>4</sup> In addition to its biological deteriorative impact, TB causes social, psychological and economic problems for the individuals, families, and community as a large, and it has a bimodal relationship with depression.<sup>5,6</sup>

Mental illness comprised about 13% of the total global burden of disease and is expected to rise to 15% by the year 2020.<sup>7,8</sup> Among the psychiatric problems, depression is the fourth leading cause of disease burden worldwide; representing 4.5% of total disability-adjusted life years. Depression is predicted to become the second leading cause of the global disease burden by the year 2020.<sup>7,9–11</sup> The disability associated with depression in relation to chronic medical disease is high, where people are already struggling for survival and the catastrophic impact of a

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chronic and disabling illness.<sup>12</sup> Furthermore, depression hinders good treatment outcome, and it can cause disability and poor quality of life.<sup>13</sup>

Some studies showed that the prevalence of depression among patients with TB is higher than in the general population. A study from South Africa showed the prevalence of depression was 32.9%.<sup>14</sup> In Nigeria depression was reported as 27.7% and 45.5%,<sup>15,16</sup> and in Ethiopia, 54.0% of TB patients were reported to have depression.<sup>3</sup> Older age, level of education, social supports, female sex, perceived TB stigma and duration of illness were some factors identified as being associated with depression.<sup>3,14–17</sup>

Overall, different psychosocial problems like depression and other mild and moderate psychiatric features are very common among patients with TB. Even though some studies are available with regard to depression related to TB in Ethiopia, still little attention was given to consider depression among patients with TB. The aim of this study was to determine the magnitude of depression and associated factors among patients with TB.

## Patients and methods

An institution based cross-sectional study was conducted at Saint Peter's specialized hospital, which is a federal hospital located in Gulele subcity in Addis Ababa, Ethiopia. Patients aged 15 and above visiting an outpatient TB clinic were included in the study. Ethical clearance was obtained from the University of Gondar and Amanuel Mental Specialized Hospital Institutional Review Board (IRB). Identification or name of participants was not recorded to maintain confidentiality. Data were collected after obtaining written informed consent from participants and caregivers were required to provide consent for participants under the age of 18 years.

The sample size was determined using a single population proportion formula with a confidence interval of 95%,  $\alpha=0.05$ , and  $P=50\%$ . Proportional allocation was done for non-MDR-TB patients and MDR-TB patients using data from the registration book, and participants from both types were selected through a systematic random sampling technique. Finally, 415 (308, from non-MDR-TB and 107 from MDR-TB) patients were interviewed during data collection.

The questionnaire has four components: sociodemographic characteristics, clinically related factors, Oslo social support scale, patient health questionnaire (PHQ-9) and perceived TB stigma scale.

Outcome variables were assessed using PHQ-9 questionnaires which have 9 items, and each item has a 4-point Likert scale (0=not at all to 3=nearly every day).

Individuals who score 10 and above were considered as having depression.<sup>18</sup> The PHQ-9 has been previously used in Ethiopia in other studies.<sup>19,20</sup> PHQ-9 is also culturally validated in the Ethiopian context with specificity and sensitivity of 67% and 86%, respectively.<sup>18</sup>

Social support was assessed by a 3-item Oslo social support scale, which ranges from 3 to 14. Oslo-3 has three categories: score of 3–8 is poor support, 9–11 moderate support and 12–14 strong support.<sup>21</sup>

TB stigma was assessed using a 12-item perceived TB stigma scale. This stigma scale consists of a 4-point Likert scale and item scores of the stigma questions were summed to construct a single stigma variable. Respondents were classified as having or not having perceived TB stigma using the mean of the stigma scale as a cutoff point.<sup>22</sup>

Data were collected by two psychiatric nurses using pre-tested face-to-face interviewer-administered questionnaires. To control the quality of data the questionnaire was designed, modified appropriately and was translated to the local language (Amharic) to be understood by all participants and translated back to English. Training was provided to data collectors and supervisors for two days on methodology, ethical concern and how to supervise the data collection process. The questionnaire was pretested and data collectors were supervised, and the filled questionnaires were checked daily.

Data were entered to Epi-data version 3.1 and exported to SPSS version 20 (IBM Corporation, Armonk, NY, USA) for further analysis. Bivariate analysis was done to see the association of each independent variable with the outcome variable. Finally, from multivariate analysis, a  $p$ -value less than 0.05 was considered statistically significant, and adjusted OR with 95% CI was used to determine association.

## Results

### Sociodemographic distribution of the participants

About 415 participants were included in the study, and the response rate was 98.1%. The age range of the participants was 15–78 years with a mean age of 34.56 ( $\pm 12.6$ ). Over half (222; 53.5%) were male. Among participants, 161 (38.8%) were orthodox religion followers and 134 (32.3%) were Amhara in their ethnicity. Regarding the educational status of participants, 118 (28.4%) of them had a primary level of education. The majority of respondents were from urban areas (328; 79%). The monthly income of respondents ranged from 100 to 5,000 Ethiopian birr (Table 1).

**Table 1** Sociodemographic distributions of TB patients attending outpatient treatment at Saint Peter's Specialized Hospital, Addis Ababa, Ethiopia, 2018

Variable	Frequency (N=415)	Percent (%)
Age		
15–24	96	23.1
25–34	140	33.74
35–44	83	20
45–54	61	14.7
>54	35	8.4
Sex		
Female	193	46.5
Male	222	53.5
Religion		
Orthodox	162	39
Protestants	95	22.9
Muslim	116	28
Catholic	29	7
Others*	13	3.1
Marital status		
Single	140	33.7
Married	176	42.4
Divorced	54	13
Widowed	45	10.8
Ethnicity		
Amhara	134	32.3
Tigre	91	21.9
Oromo	117	28.2
Gurage	56	13.5
Others**	17	4.1
Education level		
Have no formal education	79	19
Primary	118	28.4
Secondary	94	22.7
Preparatory	63	15.2
College and above	61	14.7
Occupational status		
Trading	97	23.4
Farming	101	24.34
Government employee	135	32.52
Private employee	62	14.94
Others***	20	4.82
Residency		
rural	87	21
Urban	328	79
Monthly income		
<1,539 ETB	246	59.3
≥1,539 ETB	169	40.7

**Notes:** Others \*Jehovah's Witnesses and have no religion; \*\*Wolyita and Silite; \*\*\*House wife and students.

**Abbreviations:** TB, tuberculosis; ETB, Ethiopian Birr.

## Clinical and psychosocial factors of the respondents

The majority of respondents had a diagnosis of pulmonary TB (344; 83%) and 257 (61.9%) of participants were in the new TB treatment category. Two-thirds of the participants were in the intensive phase of treatment (277; 65.5%). Among psychosocial factors poor social support and perceived TB stigma were reported by 177 (42.7%) and 187 (45.1%) of participants, respectively. Among study participants, 40 (9.6%) had comorbid HIV illness (Table 2).

**Table 2** Clinical and psychosocial factors of TB patients attending outpatient treatment at Saint Peter's Specialized Hospital, Addis Ababa, Ethiopia, 2018

Variables	Frequency	Percent (%)
TB site		
Extrapulmonary	71	17
Pulmonary	344	83
Duration of illness		
<6 months	166	40
6–12 months	185	44.6
>12 months	64	15.4
TB treatment category		
New	257	61.9
Re-treatment	53	12.8
MDR-TB	105	25.3
Phase of treatment		
Continuation phase	143	34.5
Intensive phase	272	65.5
Physical illness		
HIV	40	9.6
Other chronic illness	33	8
No	342	82.4
Family Hx of mental illness		
No	362	87.2
Yes	53	12.8
Social support		
Poor	177	42.7
Moderate	121	29.4
Strong	117	28
Perceived TB stigma		
No	228	54.9
Yes	187	45.1

**Notes:** Other chronic illnesses include hypertension, diabetics, and cardiac diseases.

**Abbreviations:** TB, tuberculosis; MDR-TB, multidrug-resistant tuberculosis; Hx, history.

## Current substance use characteristics of respondents

Thirty-one (7.5%) of respondents reported that they had used alcohol, 12 (2.9%) had smoked cigarettes and 17 (4.1%) had chewed khat in the three months before data collection (Table 3).

## Prevalence depression among patients with tuberculosis

The prevalence of depression among patients with TB was 31.1% with 95% CI (26.5–35.7). Among respondents with depression, 66 (51.2%) were female and 95 (73.64%) of depressed participants had a diagnosis of pulmonary TB. Regarding the treatment category of TB, 75 (58.14%) of respondents were in the new treatment category, 41 (31.8%) were in the MDR-TB treatment category. Sixty-four (49.6%) of participants with depression had poor social support and 75 (58.12%) reported perceived stigma related to TB (see Figure S1).

## Factors associated with depression among patients with tuberculosis

In bivariate binary logistic analysis variables, being female, having extrapulmonary TB, duration of TB illness >12 months, treatment category of MDR-TB, comorbid HIV illness, poor social support and perceived TB stigma were found to have *P*-values less than 0.25. These variables fulfilled the minimum requirements for further multivariate binary logistic regression.

From multivariate binary logistic regression variables; extrapulmonary TB 1.8 (95% CI, 1.02, 3.24) poor social

support 3.3 (95% CI, 1.8, 6.03), and perceived TB stigma 2 (95% CI, 1.28, 3.18) were statistically significant with depression at *P*-value less than 0.05 (see Table 4).

## Discussions

The magnitude of depression in the current study was 31.1% with 95% CI (26.5–35.7). Regarding the magnitude, the finding was similar to studies carried out in Nigeria 27.7%,<sup>15</sup> South Africa 32.9%<sup>14</sup> and India 35%.<sup>23</sup>

The finding of the current study was lower than studies done in India (39.5%),<sup>24</sup> Greece (49.2%),<sup>25</sup> Ethiopia (43.3%),<sup>17</sup> Nigeria (45.5%, 41.9%),<sup>16,26</sup> Pakistan (69.55%, 46.5%),<sup>4,27</sup> and Tanzania (46.9%).<sup>28</sup> The possible reason for the discrepancy might be variation in study design and sample size used. The study conducted in India used a consecutive sampling technique, and the Beck Depression Inventory was the tool they used to assess depression. The difference in study design might be another possible reason for the variation, as an ongoing prospective study was used in Nigeria.<sup>16</sup> Another possible reason might be socioeconomic, cultural and sample size differences between the previous and the current studies.

However, the finding was higher than other studies conducted in India (22%),<sup>29</sup> and UK (20.8%).<sup>30</sup> The variation might be due to the difference in study design; the Indian study was a retrospective study from medical records, and hospital anxiety and depression (HADS depression D) was used to assess depression. A difference in study participants might be another possible reason for the variation. Participants form continuation phase of TB treatment in previous study might have improvement due to better duration of treatment contact with professional and their interaction could minimize their depressive feeling.<sup>31</sup>

Participants with poor social support were 3.3 times more likely to have depression as compared with participants with good social support. This is supported by study results from Pakistan (46.5%),<sup>27</sup> Ethiopia (43.4%)<sup>17</sup> and India (39.5%).<sup>24</sup> This might be due to a lack of social support, and somatic illness (TB) may lead to increased psychological distress (mental disorders); on the other hand, good social support is vital for good disease prevention.<sup>32</sup>

Diagnosis of extrapulmonary TB was another factor associated with depression; patients with extrapulmonary TB were about 1.8 times more likely to be depressed as compared with their counterparts. This is in agreement with a study from Nigeria.<sup>16</sup> This could be due to extrapulmonary TB having a poorer prognosis than pulmonary TB, which might lead patients to be depressed more.

**Table 3** Current substance use characteristics of participants with tuberculosis visiting outpatient clinics at Saint Peter's Specialized Hospital, Addis Ababa, Ethiopia, 2018

Variables	Frequency	Percent (%)
Current alcohol use		
Yes	31	7.5
No	384	92.5
Current cigarette use		
Yes	12	2.9
No	403	97.1
Current khat use		
Yes	17	4.1
No	398	95.9

**Table 4** Logistic regression analysis of factors associated with depression among patients with tuberculosis visiting outpatient clinics at Saint Peters Hospital, Addis Ababa Ethiopia, 2018 (N=415)

Explanatory variables	Depression		COR (95%CI)	AOR (95% CI)
	Yes (N)	No		
Sex				
Male	63	159	1	1
Female	66	127	1.31 (0.86, 1.99)	1.03 (0.65, 1.65)
Site of TB				
Pulmonary	95	249	1	1
Extrapulmonary	34	37	2.41 (1.43, 4.1)	<b>1.8 (1.02, 3.24)</b>
Category of TB Rx				
New	75	185	1	1
MDR	41	66	1.53 (0.96, 2.46)	1.32 (0.77, 2.24)
Re-treatment	13	35	0.92 (0.46, 1.83)	0.97 (0.45, 2.1)
Medical illness				
HIV	21	19	2.83 (1.46, 5.5)	1.93 (0.94, 3.93)
Others*	12	21	1.46 (0.69, 3.1)	1.41 (0.62, 3.2)
No	96	246	1	1
Social support				
Poor	84	93	2.04 (1.21, 3.44)	<b>3.3 (1.8, 6.03)</b>
Moderate	24	97	1.02 (0.57, 1.85)	1.04 (0.53, 2.06)
Strong	21	96	1	1
Perceived TB stigma				
Yes	79	108	2.6 (1.7, 4)	<b>2 (1.28, 3.18)</b>
No	50	178	1	1
Duration of illness				
<6 months	53	114	1	1
6–12 months	51	133	0.83 (0.52, 1.3)	0.6 (0.36, 1.01)
>12 months	25	39	1.4 (0.76, 2.51)	1.19 (0.61, 2.34)

**Notes:** Chi-square =1.8, df =8, Hosmer Lemeshow test  $p$ -value =0.32. \*Others include hypertension, diabetics, cardiac diseases. The significance of values in bold is to recognize and identify associated factors easily.

**Abbreviations:** COR, crude odds ratio; AOR, adjusted odds ratio; TB, tuberculosis; Rx, treatment; MDR, multidrug resistance.

The study revealed that perceived TB stigma was also associated with depression; patients with perceived TB stigma were 2 times more likely to have depression. This is in line with studies conducted in Pakistan (46.5%)<sup>27</sup> and Ethiopia (43.3%).<sup>17</sup> Patients with perceived TB stigma might use health services less due to low self-esteem, and social isolation, and as a result, this might predispose them to developing depression.

While there are important findings in the current study, care should be taken in interpreting the results due to the following limitations. Side effects of the anti-TB medication were not addressed. Since the entire sample was taken from a single hospital in the capital city, the findings of this study might not be generalized to other areas, especially in rural settings.

## Conclusions

The magnitude of depression was high compared to the general population and some other studies. Therefore, the current study area and other settings which provide TB screening and treatment need to assess patients for depression and provide intervention, giving more emphasis to patients with risk factors. Additionally, further research using different study designs on risk factors of depression like TB medication side effects should be conducted to broaden the current findings.

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## Author contributions

All authors contributed towards data analysis, drafting and critically revising the paper, gave final approval of the version to be published, and agreed to be accountable for the all aspects of the work.

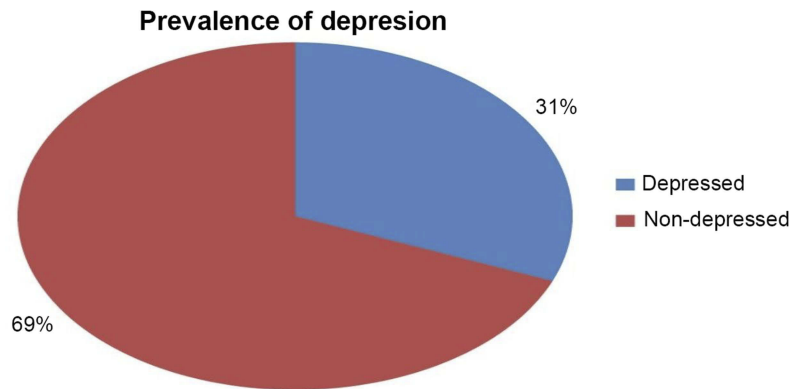
## Disclosure

The authors declare that they have no conflicts of interest in this work.

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## Supplementary material



**Figure S1** Magnitude of depression among patients with tuberculosis visiting outpatient clinics at Saint Peter's Specialized Hospital, Addis Ababa, Ethiopia.

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