REVIEW ARTICLE

Satisfaction of tuberculosis patients to healthcare services at the global level: A systematic review

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Abstract

Patient satisfaction is a critical component of quality of care assessment in the pursuit of universal health coverage to end the tuberculosis epidemic and other diseases. This study aimed to review the level of satisfaction of tuberculosis patients and related factors. Articles were accessed from Web of Science, EMBASE, PubMed and Google Scholar. Twenty-six papers fulfilled the eligibility criteria from 13 countries. The percentage of satisfied tuberculosis patients ranged from 53.5% to 97.0% in the five African countries, 67.8 to 97.2% in India, South-East Asia, 82.0% in Pakistan, East-Mediterranean and 92.9% in Armenia, the European region. Accessibility, healthcare cost, treatment duration and taking supervised-directly observed treatment were healthcare service-related determinants. Technical competency, interpersonal relationships, confidentiality, time spent with healthcare providers, time spent waiting for care and counselling and health education were health worker-related determinants. Patient-related variables that determine satisfaction were gender, age, ethnicity, place of residence, marital status, educational status, income and health status. Developing and/or approaching an internationally-agreed tool to measure tuberculosis patient satisfaction in healthcare settings will improve the availability of high-quality and comparable data to verify actual variation across and within a country. A multidimensional approach considering clients, health workers and healthcare settings is required to holistically address satisfaction issues of tuberculosis patients to gradually realise universal health coverage.

KEYWORDS
patient satisfaction, systematic review, tuberculosis

1 | INTRODUCTION

Patient satisfaction reflects the quality of care in universal health coverage (UHC) performance by patient evaluation of the treatment process, experiences, values and perceptions (Kravitz, 1998). In addition, it is a direct or proxy indicator of the health system's, programs', managers' and clinicians' success (Press & Fullam, 2011; Rider & Perrin, 2002; Smith et al., 2009). Sustainable Development Goal (SDG) target 3.8 has launched the "Health for All" agenda with quality as a core value (, 2014b; World Health Organization, 2014a). Furthermore, the United Nations (UN) high-level meeting in September 2018 resulted in the adoption of a political declaration on tuberculosis (TB),

reaffirming countries' commitment to "end the TB epidemic" globally by 2030. The political declaration included a list of targets to be met over the next 5 years, from 2018 to 2022, including treating 40 million people for TB, reaching at least 30 million people with TB preventive treatment for a latent TB infection and mobilising at least US$13 billion annually for universal access to TB diagnosis, treatment and care (United Nations, 2018). All of these goals are part of the 2015 UHC concept of SDGs, which aimed to end the TB epidemic by improving the quality of care (United Nations, 2015). The United States Agency for International Development (USAID) initiative suggests improved access to high-quality care (USAID, 2020). To monitor and evaluate the level of services, patient satisfaction is one of the ways in measuring the quality of care (World Health Organization, 2011).

Measuring TB patient satisfaction helps to ensure whether UHC activities fulfil patients' therapeutic needs, which leads to better treatment outcomes. This also indicates the extent of quality care provided to more than 10 million TB-infected people worldwide in 2019; the majority lived in South-East Asia (44%), Africa (25%) and the Western-Pacific (18%) region (World Health Organisation, 2020). Without assessing the satisfaction of patients, the death rate from TB may not be reduced to an acceptable level. Patients who are satisfied with healthcare are more likely to adhere to recommended healthcare procedures, return to health institutions for more services or refer others to get health services and then, successful treatment outcomes could be recorded (Marelich et al., 2002; Otani et al., 2010; Prakash, 2010). This would contribute to achieve the post-2015 global 'End TB Strategy' targets; reduce TB deaths by 90%, TB incidence by 80% and zero household suffering from catastrophic costs due to TB care (, 2014b; World Health Organization, 2014a).

With the presence of different programs, a significant gap in TB care services was observed in many countries (UNAIDS, 2021). Combining ineffective services with the chronic nature of the diseases results in a disastrous economic burden in many countries (Tanimura et al., 2014). For example, in Ethiopia, 66% of patients with multidrug-resistant TB lost household income (Collins et al., 2018). Further research on TB care is necessary. As a result, determining levels of satisfaction and its parameters remains a research priority (Dhingra et al., 2004; Tegegn et al., 2020). For example, 71.5% of TB patients in India were satisfied (Rai et al., 2016); 56.2% in Sudan (Mohamed et al., 2014), 82% in Pakistan (Ali et al., 2019) and 70.24% in Brazil (Portela et al., 2014). In spite of having these pieces of data, there was no prior review about the satisfaction of TB patients and determinants around the world. This study aimed to conduct a systematic review of the satisfaction of TB patients and its determinants.

2 | MATERIALS AND METHODS

2.1 | Registration and reporting

The protocol was registered in the 'International Prospective Register of Systematic Reviews' under registration number CRD42020 207215. To conduct this systematic review and meta-analysis, we

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What is known about this topic?

- Patient satisfaction is one of the measurements of qualities of care in the universal health coverage path.
- Tuberculosis patient satisfaction was assessed in different healthcare settings in different countries.

What this paper adds?

- Tuberculosis patient satisfaction was heterogeneous between and within countries.
- Internal factors from the patient's side and external factors from the healthcare settings perspective affected tuberculosis patients' satisfaction towards healthcare services.
- Researchers in the reviewed articles used different tools to assess tuberculosis patient satisfaction.

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followed the 'Preferred Reporting Items for Systematic Reviews and Meta-analysis guideline' (Page et al., 2021).

2.2 | Databases and search strategies

PubMed, EMBASE, and Web of Science were used to conduct the search. Articles were also accessed through a quick search in Google Scholar for grey literature and cross-references. The first search in databases was conducted on 05 April 2021 and updated on 13 August 2021.

The search engine was designed to find articles about TB patients' satisfaction with TB services. The search terms were 'tuberculosis', 'TB', 'patient', 'satisfaction', 'determinants', 'predictors', 'risk factors', 'associated factors' and 'factors'. 'AND' and 'OR' Boolean operators were used to combine terms and develop the search syntax. The PubMed search was (((tuberculosis[MeSH Terms] OR tb OR tuberculosis OR 'Mycobacterium tuberculosis' [MeSH Terms] OR (Mycobacterium AND tuberculosis) AND ('patient satisfaction'[MeSH Terms] OR (patient AND satisfaction) OR (patient AND experience) OR (patient AND priorities) OR (client AND satisfaction) OR (user AND satisfaction))) AND (determinants OR predictors OR (factors AND affecting) OR measurement OR dimensions OR aspects OR attributes OR (associated AND factors) OR (risk AND factors)))). Search syntax for each database is shown in the supplementary file (Data S1).

2.3 | Eligibility criteria, study selection and data extraction

The following criteria were used for inclusion: (1) a study that has reported the level of satisfaction of TB patients or at least one associated factor, (2) conducted across all age groups, (3) written in English, (4) with full-text available and (5) conducted or published at any time.

Article selection began with a review of the title followed by a screening of the abstract and full-text. Articles without full-text, qualitative studies and conference presentations were excluded.

All citations were exported to the EndNote x7 (Thomson Reuters, London) reference manager and duplicates were removed. Microsoft Excel 2010 was used to extract the data. First author and publication year, data collection period, year of publication, country, study population, study design, measurement tool, data collection method, sample size and findings were extracted. Each country was categorised into either of the WHO regions or one of the World Bank (WB) economy groups.

2.4 | Data items and summary measures

Patients diagnosed with pulmonary or disseminated TB were the study population in the included articles. Patient satisfaction was defined as a patient's evaluation of TB care services provided by the healthcare system. These services were TB medication management, clinical consultation, access to TB care, TB prevention services and multidrug resistance-TB care services.

2.5 | Quality assessment

The risk of bias in each study was assessed using the Newcastle-Ottawa quality assessment scale (Modesti et al., 2016). The cut-off point for assessing the risk of bias assessment was 5 out of 10. The criteria were as follows: sample representativeness (1 point), sample size (1 point), non-respondents (1 point), exposure/risk factor determination (2 points), comparability (2 points), outcome assessment (2 points) and statistical test (1 point).

2.6 | Data analysis

We could not estimate the pooled percentage of satisfied TB patients because of the methodological heterogeneity of included studies. Studies that reported satisfaction levels using proportion, mean value or using specific dimensions and its determinants were reviewed and analysed with a narrative description. The results were presented using figure and tables. Determinants were analysed using a thematic approach that was identified in the review process and classified under the personal, health worker and healthcare settings categories.

3 | RESULTS

3.1 | Search results

A total of 4659 articles were found; 44 from Google Scholar, 677 from EMBASE, 1422 from Web of Science and 2516 from PubMed. After duplicates were removed, there were 3594 articles left. A total
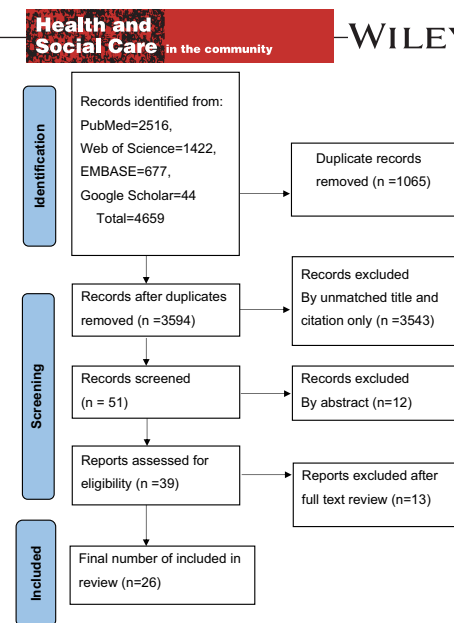

FIGURE 1 Flow chart of the study screening process.

of 3543 articles were then eliminated due to their unrelated titles. Following the full-text screening, 13 were eliminated. Eventually, 26 articles were included in the final review (Figure 1).

3.2 | Quality status

Three articles have scored below 5 points of assessment criteria. The included studies' quality status is shown in the supplementary file (Data S2).

3.3 | Studies characteristics

According to the WHO region, 13 articles were from Africa, seven from South-East Asia, three from the Americas and one each from the European, the Eastern Mediterranean and jointly from the Western Pacific and Africa regions. According to the WB economy group (World Bank, 2021), 10 articles were from low-income, 9 from lower-middle-income, 5 from upper-middle-income and two from high-income countries. Thirteen countries are represented in this review (Table 1).

3.4 | Methodological characteristics of studies

Ten articles determined the overall percentage of satisfied TB patients. Seven articles assessed the percentage of satisfaction and associated factors. Two studies assessed mean values of satisfaction and factors. A single study determines only the mean value of satisfaction. One study was about only associated factors and five articles were about satisfaction with lists of dimensions. Regarding study design, five studies did not report study design; one study followed a mixed approach, one study observational, one study

TABLE 1 Characteristics of included studies

First author/year	Data collection period	Country	WHO region	World Bank economy	Age group	Study design	Sample size	Percentage/mean*
Nezenega et al. (2013)	March to April 2011	Ethiopia	Africa	Low-income	>15 years	Cross-sectional	531	90.0%
Babikako et al. (2011)	NR	Uganda	Africa	Low-income	≥18 years	cross-sectional	133	49.1–95.3*
Ssengooba et al. (2016)	September 2012 and February 2013	Uganda	Africa	Low-income	≥18 years	cross-sectional	178	91.0%
Mohamed et al. (2014)	NR	Sudan	Africa	Low-income	≥15 years	cross-sectional	292	56.2%
Ali et al. (2019)	2017	Pakistan	Eastern-Mediterranean	Lower-middle	≥15 years	cross-sectional	572	82.0%
Chimbindi et al. (2014)	2009	South Africa	Africa	Upper-middle	Adult	Not reported	296	97.0%
Getahun and Nkosi (2017)	September 2015 to November 2015	Ethiopia	Africa	Low-income	≥18 years	Mixed method	601	67.7%
Sule et al. (2014)	2003	Nigeria	Africa	Lower-middle	≥18 years	cross-sectional	154	36.4%
Onyeonoro et al. (2015)	NR	Nigeria	Africa	Lower-middle	≥15 years	Not reported	378	3.44*
Portela et al. (2014)	2010	Brazil	Americas	Upper-middle	≥18 years	cross-sectional	295	57.6%–95.2%[E&G]
Srivastav and Mahajan (2014)	January 2009 to March 2009	India	South-East Asia	Lower-middle	≥6 years	cross-sectional	220	78.6
Srivastava et al. (2017)	July to December 2013	India	South-East Asia	Lower-middle	All	Observational	300	87.0%
Dhingra et al. (2004)	January 2000 to December 2001	India	South-East Asia	Lower-middle	NR	Cohort	36	97.2%
Gupta (2015)	NR	India	South-East Asia	Lower-middle	NR	Not reported	400	84.5%
Rai et al. (2016)	October 2007 to March 2008	India	South-East Asia	Lower-middle	All age group	Cross-sectional	337	71.5%
Mukasa et al. (2015)	January 2006 to June 2008 and July to October 2005	Australia and Malawi	Western–Pacific and Africa	High- and low-income	≥18 years	Not reported	194	4-24%[AAS], 15.8%–42.1%[E], 4%–52.7%[M]
Davidson et al. (1999)	June to December 1995	USA	Americas	High-income	NR	Not reported	435	59-88%[VS]
Davtyan et al. (2019)	2014 to 2015	Armenia	European	Upper-middle	Adult	cross-sectional	505	92.9%
Syachroni (2018)	March to April 2018	Indonesia	South-East Asia	Upper-middle	≥17 years	cross-sectional	126	9.6*
Mohammed and Jaleta (2020)	March 1–30, 2016	Ethiopia	Africa	Low-income	>15 year	cross-sectional	484	73.8%
Gebrekidan et al. (2014)	March 11 to 22, 2011	Ethiopia	Africa	Low-income	All	cross-sectional	292	75%
Tegegn et al. (2020)	March 15 to April 30, 2019	Ethiopia	Africa	Low-income	All	cross-sectional	82	53.7%
Lafaiete et al. (2011)	December 2008 to February 2009	Brazil	Americas	Upper-middle income	≥18 years	Quantitative	88	41.0%–71.5%[G]

TABLE 1 (Continued)

First author/year	Data collection period	Country	WHO region	World Bank economy	Age group	Study design	Sample size	Percentage/mean*
Sulaiman et al. (2017)	February 2010	Sudan	Africa	Low-income	≥15 years	cross-sectional	107	90.7%–97.2%
Rashmi and Vijaykumar (2010)	NR	India	South-East Asia	Lower-middle income	NR	cross-sectional	30	46.7%–100.0%
Lencho Megene et al. (2018)	20 May to 30 June, 2016	Ethiopia	Africa	Low-income	≥18 years	cross-sectional	251	71.6*

Abbreviations: AAS, Australian of Anglo-Saxon or European descents; E, Australian of all other ethnic descents other than Anglos-Saxon or European; E&G, Excellent and Good; G, Good; M, Malawian of African descent; vs, very satisfied.

* represents mean values.

quantitative approach, one study cohort and the remaining appeared with a cross-sectional study design. The sample size of the study population ranged from 36 to 601 in each study (Table 1).

Ten studies have presented associated factors after multivariable analysis using different statistical analyses. One study appeared to have done a multivariable generalised estimating equations model. Four studies appeared to have done linear regression. The review shows that many of the articles are measured the outcome methodologically varied and therefore descriptive statements about the overall satisfaction were made. Despite the methodological limitations, most of the studies reported on the percentage of satisfied patients and determinants, and only a small number attempted to assess the mean value of satisfaction (Table 2).

3.5 | Satisfaction of tuberculosis patients

In the American region, out of three studies, a study from Brazil, *Portela MC* and colleagues rated the patients' response to each aspect of care and the percentage of TB patients rated excellent and good was 92.2% for information, 91.4% for opportunity to express concerns, 95.2% for the supply of medication by the clinic, 90.3% for medication administration, 89.1 for privacy, 83.8% for ease of making an appointment, 57.6% for waiting time, 63.2% for cleanliness, 94.3% for respect by professionals, 90.2% for accessibility of doctors and 69.6 for the availability of facilities to do a physical examination. Another study in Brazil found that 58.0% of TB patients rated their satisfaction as good with the appearance of settings; accommodations (41.0%), ventilation (44.3%), medication availability (60.2%), waiting time (53.4%), time of supervised dose (71.5%), site of supervised dose (64.0%), reception (64.7%), trust in the health team (62.0%), guidance from the health team (62.5%) and availability of professionals (60.0%) rated satisfaction as very good (Lafaiete et al., 2011). Davidson et al. estimated the satisfaction of TB patients in the USA towards, rather than estimating the overall estimation, 88% of TB patients were very satisfied with nurses; 83% very satisfied with doctors and 83% very satisfied with outreach workers, 81% very satisfied to social workers, 78% very satisfied to referrals and 59% very satisfied to peer support groups.

The TB patients' satisfaction level in the European and Eastern-Mediterranean regions was from Armenia (92.90%) and Pakistan (82.00%), respectively. Regarding the Western Pacific region, a study in Australia and Malawi revealed 4%–24% Australian Anglo-Saxon, 15.8%–42.1% European ethnic background and 4%–52.7% Malawian for dimensions of care.

Regarding the South-East Asia region, six articles in this review were from India; five of them have appeared with the percentage of satisfied TB patients in the range of 67.8 to 97.2%. *Rashmi and Vijaykumar* determined satisfaction of TB patients towards different dimensions; 86.67% with waiting time and fulfilment of healthcare facility, 46.67% with facilities and equipment, 80% with interpersonal quality and 100% with the availability of services, professional competence and skill, and efficiency to treat. One study from

TABLE 2 Operational definition and method of satisfaction assessment in each study

Articles	Operational definition and assessment method
Nezenega et al. (2013)	Proportion of TB patients scored above uncertain (neither agree nor disagree) rated as satisfied. The percentile values showed that 10% of the respondents scored 10 or less for the satisfaction subscale of the 3-items Likert scale
Chimbindi et al. (2014)	'Very satisfied or satisfied', 'neither satisfied nor dissatisfied', 'dissatisfied' or 'very dissatisfied' and 'do not know' for the question were responses of patients to the question 'how satisfied were you with the service today?'
Getahun & Nkosi (2017)	The calculated mean score equal to 2 and less were classed as unsatisfied and the mean score 4 and above were classed as satisfied. For scores between greater than 2 and less than 4, first, the median was calculated then the scores less than the median were classed as unsatisfied and the rest classed as satisfied
Portela et al. (2014)	Aspects of care with the highest rates of satisfaction are considered the sum of 'excellent' and 'good' from excellent, good, regular, poor and very poor responses. Finally, satisfaction was categorised as more satisfied and less satisfied
Davtyan et al. (2019)	Based on the average score of responses the patients were stratified into 'satisfied' or 'unsatisfied' groups. The average score was 68; patients whose score was above 68 were categorised as 'satisfied'
Mohammed and Jaleta (2020)	The level of patient satisfaction with TB treatment services was scored on a 5-point Likert scale and summed to give an overall satisfaction score from 20% to 100%. 75% and above satisfaction scores were categorised as 'satisfied'
Tegegn et al. (2020)	Patient satisfaction was measured using a composite variable and the mean score of five-Likert scale questions reported the result. ≥ 75% overall satisfaction was considered as good satisfaction
Ssengooba et al. (2016)	Measurements of outcome for patient satisfaction were rated as good; >75% was considered acceptable, 50%–75% with more effort needed and < 50% as unacceptable.
Mohamed et al. (2014)	Variables measuring satisfaction with care were recorded on a 5-point Likert scale. Not well clear how to operationalise the overall satisfaction measured
Ali et al. (2019)	Not well clear how to operationalise the overall satisfaction measured
Sule et al. (2014)	Not well clear how satisfaction was categorised as good, fair and poor/dissatisfied
Srivastav and Mahajan (2014)	Did not describe how satisfaction was measured as fully satisfied
Srivastava et al. (2017)	Satisfaction with measured by the dichotomous method as those answers "Yes" counted as satisfied or "No" counted as not satisfied
Dhingra et al. (2004)	Not well clear how the level of satisfaction is categorised as satisfied and unsatisfied
Gupta (2015)	Not clear how satisfaction was measured as highly satisfied, satisfied and not satisfied
Rai et al. (2016)	Those patients who answered satisfied for each of the satisfaction-related questions were taken as fully satisfied
Gebrekidan et al. (2014)	Patients who answered satisfied for each of the satisfaction-related questions were taken as fully satisfied
Syachroni (2018)	Using a 10-point Likert scale, the estimated mean value was calculated
Onyeonoro et al. (2015)	Using a 5-point Likert scale, overall satisfaction was calculated by determining the average of all the mean scores
Lencho Megene et al. (2018)	The magnitude of score a respondent gives to 15 items, the maximum score is 75 and the minimum is 15
Sulaiman et al. (2017)	Measured satisfaction as fully-satisfied, satisfied and not satisfied
Davidson et al. (1999)	Measured satisfaction towards healthcare providers/programmes as very satisfied, somewhat satisfied and not satisfied
Lafaiete et al. (2011)	Measured satisfaction to dimensions of care as 'regular', 'good', 'very good' and others ('very bad' and 'bad')
Vijaykumar (2010)	Measured percentage of satisfied TB patients for each dimension
Babikako et al. (2011)	Satisfaction was measured by a mean score out of 100
Mukasa et al. (2015)	Percentage of satisfaction calculated based on the frequency of responses for each asked question

Indonesia estimated the mean value of TB patients' satisfaction as 9.6 on the 10-point Likert scale.

Articles from Nigeria, Sudan, Uganda, South Africa and Ethiopia represented the African region reported the percentage of satisfied TB patients in a range between 53.5% and 97.0%. *Sulaiman* and colleagues assessed TB patients' satisfaction with the attitudes of health workers (35.5% fully satisfied, 61.7% satisfied, 2.8% not satisfied), services provided by health workers (48.6% fully satisfied, 49.5% satisfied, 2.9% not satisfied) and preparedness of TB management units (21.5% fully satisfied, 69.2% satisfied, 9.3% not satisfied). Two articles from Nigeria and Ethiopia have appeared satisfaction using the mean values; of 3.4 on the 5-point Likert scale and 71.0 on the average score, respectively (Table 1).

3.6 | Determinants of satisfaction amongst tuberculosis patients

It was difficult to conduct meta-analyses for crude odds ratio because of so many factors and differences in the methodology they followed (unable to combine odds ratios with mean differences). All factors tested for association with satisfaction were extracted. Those factors confirm the alternative hypothesis and reported at least in one or more of the articles were categorised into three themes. Healthcare service-related factors included accessibility, availability, healthcare cost, treatment duration and taking supervised-directly observed treatment. Technical competency, interpersonal relationships, confidentiality, time spent with healthcare providers, time spent waiting for care and counselling and health education were health worker-related determinants. Patient-related variables that determine satisfaction were gender, age, ethnicity, residence, marital status, educational status, income, social support and health status (Table 3).

4 | DISCUSSION

This is the first systematic review that assessed the satisfaction of TB patients in healthcare settings. It would appear from this review that the satisfaction of TB patients was heterogeneous and sometimes failed to be on the expected level. Individuals, health workers and healthcare settings are all factors that influence TB patients' satisfaction. Studies that used various assessment tools made it difficult to pool the overall effect size of the percentage of satisfied patients.

In the American region, in Brazil, the lower satisfaction rate was observed for waiting time, cleanliness or appearance of the clinic, availability of facilities to do a physical examination, accommodation and ventilation. In the USA, a lower percentage of satisfaction was responded to a care delivered by peer support groups than healthcare professionals. Although TB patients' level of satisfaction towards different aspects of care did not allow seeing the overall level of satisfaction, each aspect of care influences the overall satisfaction. Long waiting time to receive medical care lowers the patient's satisfaction levels (Al-Harajin et al., 2019; Lee et al., 2020).

On the contrary, in the European region, Armenia had reported a higher percentage of satisfied TB patients, where data was collected in 2015. This time was when Armenia began a structural and financial healthcare system reform (Tsaturyan & Hayrapetyan, 2016). In 2020, 45.5% of the general population who received care in Armenia were dissatisfied or very dissatisfied with the healthcare system, whilst 25.4% were satisfied (Harutyunyan & Hayrumyan, 2020), which is lower than the percentage of satisfied TB patients. This might be because TB care has received more attention than care for the general population. In Armenia, hospitalisation for TB patients was reduced by 76% in 2017 compared to the 2013 baseline, and the

average length of hospital stay was reduced from 55 or more days to 36 days (Lylozian et al., 2019).

The Eastern-Mediterranean estimate was from a study conducted in Pakistan. In Pakistan, following a capacity-building workshop undertaken to sensitise hospital staff, patient satisfaction with outpatient health services increased from 34.4% to 82.0% in the year 2005 (Shaikh et al., 2008); almost 10 years ago, satisfaction with general care was equivalent to the recent care of TB patients. In the general healthcare settings, health inequities across a range of parameters are paramount between and within the Eastern-Mediterranean region (Al-Mandhari et al., 2021). Besides, effective implementation of standards of health service provision remains a challenge in the quality of healthcare (Letaief et al., 2021). Therefore, with the presence of unfair and unequal health services, patients' needs could not be achieved and patient satisfaction might be lowered as a result.

Discrepancies in findings were observed between studies conducted in India, the South East Asia region between 2004 and 2008. This disparity could be attributed to the non-representative small sample size in 2004. Regarding measurement tools, patients were considered satisfied if they answered yes to all of each listed satisfaction-related questions in a 2008 study. Another study published in 2013 found a higher percentage of patients satisfied than in 2008. In addition to year variation, the most recent study measured satisfaction using a 'yes' or 'no' answer to a single question.

Similarly, studies in different African countries found a wide range of levels of satisfaction amongst TB patients, with the lowest reported in Nigeria for data collected in 2003 and the highest reported in South Africa for data collected in 2009. This difference might attribute to the different study periods and measurement tool variations. For example, Ethiopian findings in 2019 were rated lower than Nigerian findings in 2009. In Nigeria, satisfaction was recorded when a patient answered very satisfied or satisfied to a single question ('how satisfied were you with the service today?'), but in Ethiopia, satisfaction was built on composite variables (those who got more than 75% overall satisfaction using composite indicator was considered as good satisfaction).

This review found potential factors that increase or decrease the satisfaction level of TB patients. Variables categorised within the three themes can potentially have a substantial impact on the overall satisfaction that represents each article from which factors are driven. For example, access to services affects satisfaction through lack of services, a long distance from health facilities, financial difficulties, individual acceptability of the services and waiting a long time to receive healthcare (Aday & Andersen, 1974; Cavalieri, 2013; Chen & Hou, 2002). This might result in unmet healthcare needs, which later affect the perceived satisfaction of TB patients. The perceived convenience of the healthcare setting includes cleanliness, the physical structure of the service area, the convenience of toilets for samples and TB clinic location influence satisfaction. In most countries, TB treatment rooms are kept separate from other service areas. This helps to avoid patients feeling that they are being

TABLE 3 Factors associated with higher satisfaction

Factors after multivariable analysis	Study by the first author with country									
	Nezenega ZS Ethiopia	Chimbindi N South Africa	Getahun B Ethiopia	Portela MC Brazil	Davtyan K. Armenia	Mohammed FI Ethiopia	Tegegn BA Ethiopia	Megene SL Ethiopia	Onyeonoro UU Nigeria	Mukasa JP Australia & Malawi
Patient-related										
Older	–v	–		✓	–	✓	–	–	–	–
Male	–v	–	X	–	–	–	–	–	–	–
Religion			–v				–v	–	–	–
Ethnic minorities			–v			–v	–v	✓[G]	–	✓[AE], X[A]
Rural residence	–v		✓			–v	–v	–		
Married	–v	–	–		✓	–v	–v	–	–	–
Family size					–	–v		–		
Higher education	–v	–	–	X	X	X	–v	✓	–	
High income					✓	–	–v	–		
Employed		–	–			–v	–v	–		
Living with family						–v				
Having treatment supporter		–v	✓							
Smear negative PTB					–		–			
Pulmonary tuberculosis (PTB)					–		–			
Having TB symptom			X			X	X			
History previous treatment				–		–	–v			
Do not feel good health status	X		–v			X				✓
Being HIV positive						X			–	
Being on treatment					–					
Adhere with medical prescription	✓				✓					
Health worker-related										
Perceived technical competency	✓									
Perceived professional care	✓					✓				
Perceived relational empathy	✓				X					
Good communication	–v	–v	–							
Perceived confidentiality/privacy	✓	–v	–v	–v						
Spent more time with the care provider	✓					✓				
Long waiting time to receive care	X		–v	–v	X	–v				
Received counselling	✓				X					

TABLE 3 (Continued)

Factors after multivariable analysis	Study by the first author with country									
	Nezenega ZS Ethiopia	Chimbindi N South Africa	Getahun B Ethiopia	Portela MC Brazil	Davtyan K. Armenia	Mohammed FI Ethiopia	Tegegn BA Ethiopia	Megene SL Ethiopia	Onyeonoro UU Nigeria	Mukasa JP Australia & Malawi
Received health education										
Seen by the same health worker						-				
Health service related										
Means of transportation	-v						-v	-		
Private health facility									-	
Tertiary-level health facility									-	
Accessibility (short distance walk)	✓					✓	-v	-	-	
Convenience(cleanliness)	✓		-v	-v						
Healthcare cost			-v					-	-	
Being on drug-resistant TB					X					
Taking supervised DOTs				✓						
Long-time duration of treatment				-	-		-	-		
Intensive treatment phase	✓					-		X		
Treatment non-adherence					X					
Inpatient treatment					X					-

Abbreviations: ✓, significant; X, significant in reverse direction; -, studied, not significant; -v, listed as variable, did not consider in the bivariable or multivariate analysis; A, Australian; AE, Australian ethnic minorities; Blank space, not studied; G, Gurage ethnicity.

discriminated against or stigmatised by other patients and health workers attending other clinics.

The perceived poor technical competence of health workers negatively affects TB patients' satisfaction. Technical competence is a subset of general competence, and the primary attention of patient perception towards technical competence is about the skills of providers (Kak et al., 2001). This affects the client-perceived poor quality of care (Alhassan et al., 2015). If TB patients perceive their care providers to be technically incompetent, it is understandable that the care they receive might be of poor quality. As a result, TB patients' satisfaction levels could be affected negatively. The perceived level of confidentiality was also related to the level of satisfaction of TB patients. Gathering data or performing any procedure with control over and confidentiality of patient information is the responsibility of healthcare providers and the right of patients (fer Demirsoy & Kirimlioglu, 2016; van Bogaert & Ogunbanjo, 2014). Respecting and implementing this ethical concept increased the satisfaction of TB patients. Consultation time was directly associated with TB patients' satisfaction. Because of the chronic nature of drug therapy, TB patients may experience stress, anxiety and impaired quality of life (Duko et al., 2020; Peltzer et al., 2012).

There are limitations relating to the conduct and interpretation of a systematic review of this nature. First, the heterogeneity of the studies limits pooled analysis of the data. For example, the findings in determining the level of satisfaction might be interpreted within the context of a country where the study was conducted. If a pooled estimate of TB patient satisfaction is possible, it will help to monitor the progress of TB care quality at the regional and global levels. Second, satisfaction was assessed for the percentage, mean value and factors by different statistical models. It would therefore be inappropriate to make a global view about the satisfaction of TB care services unless an agreed measurement tool is established. Third, the appropriateness of the standard-cut point estimation and operational definition-set by the authors is open to argument. Finally, patients' responses to care might have changed over time, but we are unable to depict trend analysis because of methodology variations.

The findings of this review have significant implications for the quality of care agenda in ending the TB epidemic. This review creates a crucial view that the overall estimation assessment method of satisfaction for TB patients' challenges to apply. Tuberculosis care and treatment protocol followed similar guidelines and therefore the measurement of TB patients' satisfaction better have a tool at least within a region having further possibility at the global level. Factors that foster the satisfaction of TB patients might have the potential to create a picture of where problems are that lead to a solution within a country. In the WHO regions countries, with the different health systems approach, the incomparable burden of the diseases, varied values and expectations of health are apparent. However, there is a global agreement that accommodates various health systems that strives to improve the quality of care in fostering the satisfaction of clients. For example, in each WHO region, countries usually establish

and follow similar treatment approaches. The European Union has established guiding TB care standards that are tailored to the context of European settings (Migliori et al., 2012). Therefore, developing and following a common tool to assess the satisfaction of TB patients will improve the availability of high-quality data so that the satisfaction of people with TB can be easily monitored and improved.

5 | CONCLUSION AND IMPLICATIONS

This paper describes a systematic summary of TB satisfaction and its determinants. The research in the field presents a various picture of the satisfaction of TB patients using different measurement methods and it was difficult to estimate the overall percentage of satisfaction, effect sizes for factors and trend analysis. However, personal, health worker and healthcare-related determinants were identified qualitatively. This requires due attention as the unfulfilled needs of TB patients may hamper the progress towards achieving UHC in ending the TB epidemic. This should be addressed with a multi-dimensional approach, including individual patient needs, healthcare providers and healthcare settings.

CONFLICT OF INTEREST
The authors declare that they have no competing interests.

DATA AVAILIBILITY STATEMENT
All data generated or analysed during this study are included in this manuscript.

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Additional supporting information can be found online in the Supporting Information section at the end of this article.