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Facilitators and barriers to tuberculosis diagnosis and treatment in India: a qualitative meta-synthesis protocol

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Abstract

Tuberculosis is a chronic infectious disease caused by bacteria Mycobacterium tuberculosis complex. We propose to collate and synthesize various facilitators and barriers to tuberculosis diagnosis and treatment in India by adopting a method of qualitative evidence synthesis. The protocol has been prepared adhering to the PRISMA-P guidelines. Primary studies on qualitative research and mixed methods on diagnosis and treatment of tuberculosis in India which are published in India from January 2000 to January 31st 2025 in English will be included. Two pass two stage screening will be adopted, with adjudication by third reviewer. Electronic databases such as MEDLINE, SCOPUS, EMBASE, Web of Science, ProQuest will be searched, along with gray literature. We will be scoping the website of Central TB division as a source of grey literature. We will be using Critical Appraisal Skills Program (CASP) Qualitative Research Checklist which is based on ten criteria for thematic synthesis of studies. We will be importing the findings to suitable data analysis software. We will be presenting the findings as narratives, categories and themes recovered from primary studies in Qualitative Meta-synthesis. The written synthesis of qualitative research will follow "Enhancing Transparency in Reporting the Synthesis of Qualitative Research (ENTREQ)". GRADE–CERQual method of assessment will be used to assess confidence in the evidence of the qualitative research. The critical themes on facilitators and barriers which will be developed in this study will help to plan context specific interventions under National Tuberculosis Elimination Program to accelerate efforts towards the target of tuberculosis elimination in India.

Keywords: *Tuberculosis, TB Elimination, qualitative meta-synthesis, health system, NTEP*

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Evidence in Context

- Qualitative evidence synthesis of barriers and facilitators for tuberculosis management will be done
- Comprehensive tuberculosis management pathway- screening, diagnosis, treatment initiation and treatment completion will be reviewed
- Thematic synthesis will be undertaken to synthesize the findings of primary studies.
- The study will synthesize evidence for formulating interventions to achieve the goals of tuberculosis elimination in India.

To view Article

Introduction

Tuberculosis (TB) is a chronic infectious disease caused by bacteria Mycobacterium tuberculosis complex. It's complex cell wall structure with high content of mycolic acids which results in very low permeability of cell wall to antimicrobials [1]. The disease has the potential of multiorgan involvement. The immunocompromised status of the host significantly increases the risk of developing severe disease complications. Presently, tuberculosis is one of the top causes of deaths due to infections in the world [2]. To address the issue of morbidity and mortality due to tuberculosis, steps are taken at global as well as at national level. In 2014-2015, Member States of United Nations resolved to end TB, through adoption of End TB Strategy. It had targets (for 2030 and 2035) to lower the incidence of TB, the total number of TB-related fatalities, and the costs incurred by TB patients and their families [3].However, TB was the second most common infectious agent-related cause of death worldwide in 2022, behind COVID-19. The estimated incidence was 133 cases/lakh population in 2022 [3].

In India, National Tuberculosis Program (NTP) begun in 1962 for domiciliary treatment with standard drug regimens. "Revised National Tuberculosis Control Program (RNTCP)" was started in 1997 with the adoption of "Directly Observed Treatment Short Course Chemotherapy (DOTS)" and scaling up of "Cartridge Based Nucleic Acid Amplification Test (CBNAAT)" testing facilities [4]. National Tuberculosis Elimination Program (NTEP) was launched in 2020 with the adoption of Drug Sensitivity Testing (DST). NTEP accelerated its pace towards ending TB by 2025 by using the National Strategic Plan (NSP) (2017-25). Four pillars of the plan are, Detect, Treat, Prevent and Build to prevent the emergence of TB [4]. The above steps have been successful in bringing down the TB incidence from 201cases/lakh population in 2015 to 172 cases/lakh population in 2022 and mortality from 20 death/lakh population in 2015 to 16 deaths per lakh population in 2022 [5].

Elimination is the intentional process of bringing the incidence of a certain illness in a designated geographic region down to zero [6]. In the year 2020, NTEP had set the target of elimination of TB by 2025. In spite of the aforementioned steps to end TB, the incidence of tuberculosis India stood at 172 cases/lakh population in the year 2022 [5]. In order to achieve the target of zero incidence at national level, collective and accelerated steps are to be taken to address the epidemiological triad in tuberculosis. Tuberculosis results from complex interplay between various factors such as drug resistance of the bacterium, environmental factors such as physical and social living conditions, health and immune status of the host, health care seeking behavior of patients, availability of services, adherence to treatment and care giver support. There is a need to examine these social factors and health system related factors in a comprehensive manner, which in turn will assist in India's journey towards achieving the TB elimination. Qualitative research plays a key role in understanding these social and health system factors, which are context specific. When multiple qualitative studies are available, it becomes vital to use a systematic approach to identify, appraise, and synthesize their findings for a meaningful understanding. Qualitative evidence synthesis (QES) or meta-synthesis enables us to achieve this.

Qualitative Meta-Analysis (QMA) is defined as "the aggregating of group of studies for the purposes of discovering the essential elements and translating the results into an end product that transforms the original results into a new conceptualization" [21]. As per Sandelowski, Meta synthesis is an "Integration that are more than the sum of parts as they offer opportunity for novel interpretations of findings" [8]. Qualitative Meta synthesis or QES is popular form of QMA [22]. The aim of meta-synthesis is to integrate qualitative research and synthesize qualitative studies on a topic of interest in order to locate key themes that provide more powerful explanations for the phenomena under review [9].The meta-analytic approach to findings of individual qualitative studies may be referred to in the literature by other terms such as qualitative meta-synthesis, meta-study, meta-ethnography. We would be using qualitative meta-synthesis approach in our study as it is best suited method of qualitative evidence synthesis in healthcare research.

So far, only two qualitative meta-synthesis regarding tuberculosis were conducted in India. The study by Shringarpure et al, [7]. is a qualitative meta-synthesis that primarily focusses on patients' adherence to anti tuberculosis drugs, one of the components under the tuberculosis treatment. The aspects prior to treatment initiation such as screening for tuberculosis, and confirmation of diagnosis were not reviewed in the above study. It includes the primary articles published till 2020, which is before the launch of NTEP. It includes findings from the countries of India, Nepal, Pakistan, and Bangladesh, hence, they may not be very specific to India. The study by Rakesh et al was exclusively on private sector engagement in TB care in India and has not included the findings from public sector for TB care.

Thus, there is a dearth in literature for developing better context specific interventions, in depth analysis of all facilitators and barriers to tuberculosis diagnosis and treatment in India is required. In the proposed meta-synthesis, we will review the enablers, and challenges at various levels in a patient's pathway to TB cure right from screening, detection, confirmation of diagnosis, treatment, and its adherence. We will be including studies till January 2025 which includes the period after the launch of NTEP, and findings from both public as well as private health sectors. This is particularly important when India is aspiring towards TB elimination.

Purpose Statement

To collate and synthesize various facilitators and barriers to tuberculosis diagnosis and treatment in India. Framework and detailed eligibility criteria of the review question is enumerated in Table S2

Review of Literature

Defining a Qualitative Meta-synthesis

From the herald of the era of qualitative research, we can appreciate the evolution of definitions of Qualitative meta-synthesis. Qualitative meta-synthesis is a secondary analysis of primary qualitative studies' findings that are relevant to specific domain of Qualitative meta-synthesis [22].

Qualitative research has historically been undervalued and marginalized as a research paradigm in psychology. Since 1980s the number of qualitative studies has grown exponentially and qualitative research has become a firm scientific discipline [23]. As there is a raise in number of qualitative studies on the same phenomenon of interest, qualitative synthesis methods can be aptly used to derive a meaning out of findings generated from primary qualitative studies. Qualitative meta-synthesis and quantitative meta-analysis are similar in that both provide a synthesis beyond the findings of primary studies [22].

History of Qualitative meta-synthesis

Since the late 1980s, Qualitative meta-synthesis has been a well-established method in area of nursing. The work of Noblit and Hare et al, [24].in the field of education was very influential in the development of Qualitative meta-synthesis. They outlined their approach to a comparison and synthesis of studies that had investigated similar events, situations and cases and named their method meta-ethnography. They also included lines of argument synthesis. It was used to synthesize qualitative studies with similar focus that could potentially contribute to a more comprehensive picture (a discovery of the whole among a set of parts; Noblit and Hare et al p.63). In the field of nursing in 1998, Kearny, a grounded theory researcher, built on the contributions of Glaser and Strauss (1967) and presented an approach to Qualitative meta-synthesis called Grounded formal theory. This approach calls for meta-analyzing studies that have examined the same or similar phenomenon to determine what can be abstracted as being relevant to several contexts [25].

In nursing context in 2001, Paterson et al, [26] refer to their approach as meta–study, a method that describes how to analyze and synthesize data from various studies, including the methods and theories used in those studies. This has three main features; a) analysis of findings from primary studies referred to as meta data analysis; b) analysis of the methodological characteristics of the primary studies and their influence on the results of the meta-analysis, referred to as meta method; c) assessment of methodological characteristics present in the primary studies, referred to as meta theoretical background and also the socio historical context of the analyses present in the primary studies.

Other methodologists from the nursing field, Sandelowski and Barroso et al, [9] presented an approach of Qualitative meta-synthesis in a method called Meta–summary. This is a more descriptive approach than other approaches. In health research, Thomas and Harden et al, [18] used a method called thematic synthesis. In the first stage, descriptive themes are developed that summarize the findings of original qualitative studies, in the next stage, analytical themes are developed which is used to attempt to answer a research question that a particular thematic synthesis is seeking to answer. By 2003, efforts to review and accumulate the primary qualitative studies began.

Qualitative meta-synthesis uses descriptive interpretative approach where in the researchers' personal, professional and theoretical background is a central part of qualitative research [22].

Undertaking a Qualitative meta-synthesis

Qualitative meta-synthesis can be undertaken in the following instances, a) When a particular stakeholder wants to have a specific understanding from qualitative perspective, b) When there is a large body of knowledge already present in the form of primary qualitative studies c) To develop comprehensive conceptualization of a specific phenomenon. The Qualitative meta-synthesis team comprises of at least one expert who has the solid knowledge of Qualitative meta-synthesis the other team members need to have the skills to critically appraise the primary qualitative studies. The number of team members depends on the number of primary studies which are to be included in Qualitative meta-synthesis [22].

Formulation of the research question is done by breaking down the research problem into specific questions to bring in focus for whole of the Qualitative meta-synthesis. The research questions are set at the start of the study and most of the times remain unchanged as they are the guiding principles A simple research question will allow to sharpen the focus and decide clearly as to which of the findings in primary studies contain relevant information to Qualitative meta-synthesis. The process of conducting Qualitative meta-synthesis is flexible, evolving and potentially iterative [].

In order to ensure transparency, Qualitative meta-synthesis protocols are preregistered. PROSPERO – Prospective register for Systematic Reviews is one such International open access database for pre-registration. It offers guidelines and structure for conducting Qualitative meta-synthesis. This facilitates the researchers to comply with standards for systemic reviews [10].

Benefits of Qualitative Meta-synthesis

The significant benefits which can be attributed to Qualitative meta-synthesis are, a) Social sciences systems are complex and in-depth insight is essential to evaluate them whereas such comprehensive conceptualization would not be achieved through quantitative methods. b) Qualitative meta-synthesis utilizes a rigorous approach to analyze and interpret findings from primary qualitative studies. c) Qualitative meta-synthesis offers a holistic picture of a topic of enquiry which can bring about newer dimensions and further lead to advancement of knowledge and practice [27].

Previous Qualitative Meta-synthesis studies on Tuberculosis

01. A qualitative meta-synthesis by Jane Noyes and Jennie Popay et al., published in 2006 included 59 studies from the year 1990 – 2002 across the globe explored the role of DOTS in tuberculosis. Critical Appraisal Skills Program (CASP) frame work was used for quality appraisal of primary studies. A narrative summary approach was used. Five themes emerged from the study a) Socio economic domain b) The available resources and individual agency c) Knowledge systems with regard to tuberculosis and its treatment d) Social stigma associated with tuberculosis e) Incentives, caregiver support and social capital [28]. This signifies that, even a small study conducted with a high methodological rigor can make a notable contribution towards development of global knowledge system [28].

02. A qualitative meta synthesis of determinants for tuberculosis diagnosis and treatment by Charity Oga – Omenka et al published in 2021 included ten primary qualitative studies from 2006 to June 2020 in Nigeria. Three stage thematic meta synthesis was used. Findings from results section of the primary studies were extracted. Line by line coding was done. Descriptive subthemes and analytical themes were generated. The key findings of the study were, 1) Diagnosis and treatment for TB in Nigeria highly depended on health seeking behavior of patients, thus emphasizing on understanding patients' perspective [29]. 2) Steps to improve case detection and improve healthcare service delivery are also put forward by the study [29].

03. Shringarpure et al, in 2023, conducted a qualitative evidence synthesis on 24 primary studies of qualitative and mixed methods from the year 2000 to year 2020 from India, Nepal, Bangladesh and Pakistan on patient adherence to tuberculosis. Similar codes were grouped into categories from which overarching themes were generated. Three themes were developed – a) Personal concerns of TB patients include self-experience of living with TB and keeping up the responsibilities in family. b) Treatment adherence significantly relying on quality of services provided by individual health care worker. c) Treatment compliance being impacted by logistic, socio-economic, and cultural aspects [7].

04. Rakesh et al in 2024 meta-synthesized the determinants of engaging private sector in TB care in India, from 19 primary studies. Similar codes were grouped into analytical categories through inductive coding. Overarching themes were generated through deductive coding. The key findings observed were: Concerns about financial loss being identified as a major barrier for private sector involvement. Enablers for private sector engagement were recognition and a good spirit of partnership between public and private health sector [30].

Need for qualitative meta-synthesis on tuberculosis

Since 1960s the efforts to achieve tuberculosis control in India is evolving. Introduction of RNTCP with DOTS and CBNAAT in 1994 played a significant role in early diagnosis and ensuring patients adherence to treatment. In the year 2020, NTEP augmented efforts to eliminate TB by introducing DST and has set the goal of eliminating TB by 2025. In 2022, India had a burden of 172/lakh TB cases [4]. To examine the present status of tuberculosis management in India, we ought to consider perspectives of various stakeholders such as patients, caregivers and health care workers. In the meta-synthesis studies, which are already published, [7,30]. there is a lack of evidence on facilitators and barriers for TB diagnosis and treatment in India. Synthesized findings on these domains would be more transferable and can have pragmatic applications.

Gaps in Literature

In the qualitative meta-synthesis studies conducted by Shringarpure et al, [7] the findings prior to treatment initiation such as a) healthcare seeking behaviour of the community, b) tuberculosis case detection, c) availability and accessibility of appropriate healthcare services, d) quality of service delivery by trained healthcare professionals with regard to tuberculosis diagnosis, treatment and follow up, e) operationalization of the national health programs and the domain of capacity building of healthcare professional are not included. The study by Rakesh et al, [30]. focusses exclusively on private sector engagement in providing TB care, whereas, findings from treating doctors and other healthcare workers from public sectors such as staff nurse, pharmacists, health assistants and ASHA were not included

Hence, we will be undertaking the qualitative meta-synthesis to address above said gaps. We will include primary articles from the year 2000 to January 2025

Methods

The protocol has been prepared adhering to the PRISMA-P guidelines (Table S1). We will be conducting the study in the following steps.

Setting

The study will be conducted in the Department of Community Medicine, AIIMS Nagpur from the year 2024 (From the date of Institutional Ethics Committee Approval – 12/11/2024) to June 2026.

Planning and pre-registering the qualitative meta-analysis

We will be pre-registering qualitative meta-analysis in the registry of – Prospective Register of Systematic Reviews commonly known as PROSPERO [10] (Available at https://www.crd.york,ac.uk/prospero/).

Searching the articles

Primary studies on qualitative research and mixed methods on tuberculosis diagnosis and treatment in India from the year 2000 to January 2025 will be searched. One of the authors (SPG) will develop the search strategy, which will be reviewed and modified by the co-author (APG). A combination of manual search and online search will be done to ensure comprehensiveness of the list of articles included for Qualitative meta-synthesis. Electronic databases such as MEDLINE (through PubMed), SCOPUS, EMBASE, Web of Science and ProQuest will be searched. We will search grey literature sources such as central TB division website of India and university libraries. To develop search strategy for online databases such as PubMed, key words will be selected from the refined purpose statement. In addition to that, to get unambiguous search terms, reading the existing literature, brainstorming with team members and consultation with experts will be done. Clusters of key words with regard to 1) topic of interest 2) qualitative research 3) type of primary studies will be used [16].

Search strategy

The unambiguous search terms and appropriate Boolean operators (AND/OR/NOT) will be used to develop a precise search strategy to obtain scientific articles from online databases. We consider synonyms and broad versus narrow terms to bring about a balance between sensitivity and specificity. We will use "Sample Phenomenon of Interest-Design-Evolution-Research

Type (SPIDER)" framework to develop the Boolean search strategy (Table S2) [11]. Sample PubMed search strategy has been enumerated in Table S3. We will also screen the list of the references from the studies eligible from the database search. The STARLITE framework for reporting literature searches will be used [13].

Inclusion and exclusion criteria

Primary studies on qualitative research and mixed methods on diagnosis and treatment of tuberculosis in India which are published in India from January 2000 to January 31st 2025 in English will be included. The rationale for including studies from the year 2000 onwards is, a) We intend to draw a comparison between the programs of RNTCP and NTEP. b) As the change in psycho-social and behavioral factors are gradual, we have considered to include the studies from the year 2000 onwards. If the review takes more than 6 months to be completed, a top-up search will be conducted. The process of selection of articles for QMA will be as per the PRISMA 2020 flow diagram [31]. Detailed inclusion and exclusion criteria are enumerated in Table S2. We will also take into consideration pragmatic issues like time duration and access to articles to make further decisions on inclusion and exclusion.

Selection of primary studies

Two authors, independently, will start the selection process by reviewing titles and abstracts of articles obtained using the search strategy. The studies which potentially meet inclusion criteria will be advanced. Full texts of all such advanced studies will be retrieved, which will be reviewed by two authors, independently. Studies based on qualitative methods and mixed methods with results that align with the focus of Qualitative meta-synthesis will be included. We will be using software program such as NESTED Knowledge to facilitate the review of abstracts, identification of duplicates and storing the full text of articles. Any discrepancy between the two authors in the eligibility of the studies will be resolved by discussion with the third author.

Appraisal of primary studies

We will be using CASP Qualitative Research Checklist which is based on ten criteria for thematic synthesis of studies, to appraise the eligible studies. These criteria are about the purpose statement of research, research design, appropriateness of methods, systematic data collection, rigorous analysis, the relationship of the researcher and researched, ethical issues, reporting of the research and finally the implications of the findings [17].

CASP checklist has the list of 10 items under the 3 sections namely

Section A – Are the results valid? (5 questions)

Section B – What are the results? (4 Questions)

Section C – Will the results help locally? (1 Question)

Based on the above checklist the studies will be categorized as methodologically sound or relatively poor methodology in overall appraisal.

Considering diverse nature of qualitative research and various approaches to address the research questions, the appraisal process will be kept flexible and iterative. We will be doing 'initial mapping' of the characteristics of the articles and we will be including the studies which meet the inclusion criteria for 'Methods' and then scan them for 'Results'. In case of insufficient information in the published study, we will try to contact the authors of primary studies for clarifications required. Appraisal of the studies will be independently done by the two authors followed by consensus meeting by the authors. Although, we will be following the CASP checklist, the potential biases in primary studies such as author reported limitations will be presented as a narrative in the review.

Data extraction

Authors will include all the findings under the 'results' section of the primary studies. The findings of the primary studies that pertain to the research question of the Qualitative meta-synthesis which are presented in various forms like quotes from participants, narratives, categories, themes will be included. Further we will also localize and extract data from any parts of the primary

Sstudies that contain information on the study characteristics relevant to Qualitative meta-synthesis. We will extract all potential information and tabulate it. We will be importing the findings to suitable software such as Qualitative Data Analysis Software QDA Miner. We will be presenting the findings as narratives, categories and themes recovered from primary studies in the Qualitative meta-synthesis [22].

Thematic synthesis and content analysis.

Thematic synthesis will include active reading and re-reading for the purpose of identifying the segments and classifying them. Method of QES is decided as per the level of conceptual and contextual details in the included primary qualitative research, with additional considerations of resources in hand as well [33,34]. Since we might be getting both thin and thick data from the primary studies during the review, it has been decided to adopt 'Thematic Synthesis' as the QES method [33,34]. We will use Lewin's framework to classify facilitators and barriers [35] and organize the data into meaningful chunks – Meaning Units (MU) which is the smallest piece of data that can enable the readers to determine its meaning, These MU can be words, lines or para. We will be forming clusters of similar MUs to form meta-categories. According to Thomas and Harden, we will be following three steps approach to thematic synthesis [18].

- Line by line coding of study findings using inductive and deductive coding.
- Formation of Categories – Similarities and differences in codes will be checked. New categories will be formed by bringing together similar codes. A summary will be written in consensus.
- Generation of analytical themes – It is the journey from specific categories to more abstract conceptualization. This will be called third order interpretation that integrates both first and second order constructs into a new theory about the phenomenon [16]. Third order interpretations will be verified for validity by adopting the following methods:

01. Validating the findings by peers in the department
02. Validating the findings with practitioners (program staff) to check how well the results apply to their settings.

We will also try to contact the authors of the primary studies, share the results, and will include their inputs on the interpretations, separately.

According to Weed, [19] "Primary researchers interpret participants; Qualitative meta-analysts interpret the primary researchers" [19].

Background of the meta-synthesists

PD and AD are qualitative research experts with more than 20 years of experience in the domain. AGP is an evidence synthesis professional who undertakes systematic reviews for guideline development and research projects. PD, AD, and AGP are community medicine specialists who closely work with various stakeholders in the community and health system involved in tuberculosis management. The meta-synthesists acknowledge their extensive experience and backgrounds, which provide a deep understanding of qualitative research and evidence synthesis. The meta-synthesists are aware that their close work with community stakeholders and health systems could influence the final perspectives. However, the team is committed to maintaining an open and unbiased approach to the review, ensuring that no personal or preconceived hypotheses affect the outcomes. The team will regularly engage in reflexive practices to critically examine their own assumptions and remain transparent about their positionality throughout the research process.

A sample probable table presentation of Qualitative meta-synthesis

Meta- themes	Meta-categories	Primary study findings
Cluster of similar meta-categories	Cluster of similar categories from primary studies	Categories/themes reported in primary studies (with reference)
1.	1.	1.
	2.	2.
		3.
		4.

A sub-group analysis based on the geography and any other variable identified during the review will be done, if possible.

Reporting framework

The written synthesis of qualitative research will follow "Enhancing Transparency in Reporting the Synthesis of Qualitative Research (ENTREQ)" [14]. statement which would help us to report the various stages associated with synthesis of qualitative health research such as searching and selecting qualitative research, quality appraisal and methods of synthesizing qualitative findings.

Credibility checks

Credibility checks will be done to ensure methodological integrity and quality of results to get readers' confidence in results. According to the recommendations of Lachel [16]. We will be adapting triangulation of researchers for collaborative work to improve rigor and group reflexivity; we will be maintaining a reflective diary to document the process of entire journey to bring more transparent and honest reporting. We will also seek peer feedback on final results of the Qualitative meta-synthesis.

Certainty assessment

Assessing confidence in the review findings will be done by two authors independently reviewing the findings of the study, followed by a consensus meeting. GRADE–CERdQual method of assessment will be used to assess confidence in the evidence of qualitative research [32]. It will be done through the online tool https://isoq.epistemonikos.org

Ethical Implications

The present study has been reviewed by Research Cell of AIIMS Nagpur and approved by Institutional Ethics Committee, AIIMS Nagpur. As the study does not involve any intervention on any participants, there would be no risks involved. The findings from the study will be shared to State and Central TB divisions. A dissemination workshop or Webinar will be planned for policy makers and all stakeholders, at the end of the study.

Implications of the study

Adding upon the patient adherence to tuberculosis treatment and engagement of private practitioners in TB care which were the key focus areas of meta-syntheses by Shringarpure et al [7] and Rakesh et al, [30] our study will include the facilitators and barriers regarding tuberculosis screening, diagnosis, and treatment completion both from public as well as private sector. The critical themes on facilitators and barriers which will be developed in this study might be used: a) to develop better understanding on facilitators and barriers to tuberculosis diagnosis and treatment in India. b) to plan a context specific interventions under National Tuberculosis Elimination Program to accelerate efforts towards the target of tuberculosis elimination in India.

Abbreviations

CBNAAT: Cartridge Based Nucleic Acid Amplification Test

CASP: Critical Appraisal Skills Program

DOTS: Directly Observed Treatment Short Course Chemotherapy

DST: Drug Sensitivity Testing

NSP: National Strategic Plan

NTEP: National Tuberculosis Elimination Program

NTP: National Tuberculosis Program

QMA: Qualitative Meta-Analysis

RNTCP: Revised National Tuberculosis Control Program

TB: Tuberculosis

Supporting information: Table S1, S2

Ethical Considerations: The study will be conducted in the Department of Community Medicine, AIIMS Nagpur from the year 2024 (From the date of Institutional Ethics Committee Approval – 12/11/2024) to June 2026.

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Clinical Trial: Not applicable

Consent for publication: Note applicable

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