Ni-kshay SETU - A Digital Intervention for enhancing the capacity of healthcare professionals for evidence-based management of Tuberculosis

Tuberculosis remains a critical public health challenge in India, which accounted for 27% of the global TB burden with an estimated 2.78 million incident cases in 2023, according to the WHO Global Tuberculosis Report 2024. Despite a preventable and curable disease, TB caused approximately 320,000 deaths in India. India’s large population, diverse healthcare workforce, and resource constraints, compounded by issues like undernourishment, HIV, diabetes, and multidrug-resistant TB, pose significant challenges. Progress through the National TB Elimination Program (NTEP), with 2.42 million case notifications in 2022 and increased funding, is notable, but gaps in diagnostics, treatment access, and social determinants hinder achieving the 2025 TB-free India goal.

Background and Rationale

The Government of India's NTEP, launched under the National Strategic Plan (NSP) 2017–2025, aims to eliminate TB by 2025, five years ahead of the global END TB Strategy target. The NSP's four pillars—Detect, Treat, Prevent, and Build—emphasize strengthening health systems, particularly through capacity building of healthcare workers to enhance TB care delivery. However, the rapid evolution of NTEP guidelines, complex diagnostic and treatment protocols, and limited training infrastructure pose significant barriers to ensuring healthcare workers remain updated and equipped to manage TB effectively.

Healthcare workers, including frontline staff, medical officers, and private practitioners, are critical to achieving NTEP's goals. Baseline research conducted in Gujarat and Jharkhand, involving healthcare workers, revealed that over 80% required refresher training due to knowledge gaps in updated NTEP guidelines, particularly for managing drug-resistant TB, extrapulmonary TB, and pediatric TB. The COVID-19 pandemic further disrupted traditional training, highlighting the need for accessible, scalable solutions to support the workforce.

> Digital health interventions offer a promising approach to address these challenges by providing real-time, user-friendly resources to enhance knowledge and decision-making.

The complexity of TB management, coupled with frequent guideline updates, creates significant knowledge and operational gaps among healthcare workers. Various studies have identified key challenges, including irregular training, communication delays in sharing updates, and limited access to concise, cadre-specific resources. Traditional training methods are constrained by financial limitations, logistical challenges, and the inability to reach India's vast and diverse healthcare workforce, particularly in rural and remote areas. A digital health solution, accessible across web and mobile platforms, can bridge these gaps by delivering evidence-based, easily navigable content tailored to different healthcare cadres. Ni-kshay SETU was developed to address these needs, leveraging digital technology to empower healthcare providers with tools for effective TB management, aligning with NTEP's "Build" pillar and India's goal of TB elimination.

Problem Statement

India’s healthcare workforce faces systemic barriers in delivering effective TB care, undermining NTEP’s objectives. Rapidly evolving guidelines, such as shifts to injection-free regimens or new diagnostic protocols, outpace traditional training, leaving providers—especially in rural areas—struggling to stay updated. Research insights suggest frontline workers often misinterpret complex protocols for drug-resistant TB due to infrequent training and dense technical manuals. In remote regions, logistical hurdles like poor transport infrastructure delay guideline dissemination, causing inconsistencies in care delivery. Urban providers, while better equipped, face time constraints from high patient loads, limiting their ability to adopt new protocols. These gaps contribute to diagnostic delays, suboptimal treatment adherence, and persistent TB transmission. Ni-kshay SETU addresses these issues by delivering accessible, cadre-specific digital resources and decision-support tools, designed to bridge knowledge gaps and streamline care in diverse settings.

Objectives of Ni-kshay SETU

1 Enhance Knowledge and Skills

Enhance the knowledge and skills of healthcare providers in TB management by delivering cadre-specific, multilingual learning modules based on NTEP guidelines.

2 Provide Real-time Decision Support

Provide real-time decision-support tools, including the decision support system and diagnostic and treatment algorithms, to improve the accuracy and efficiency of TB case management across India.

3 Facilitate Continuous Learning

Facilitate continuous learning and capacity building through interactive features, such as an AI-powered chatbot and gamified assessment tools, to address knowledge gaps in healthcare workers.

4 Support Scalability and Sustainability

Support the scalability and sustainability of TB care by offering an open-source platform integrated with NTEP systems.

5 Contribute to TB Elimination Goal

Contribute to India’s TB elimination goal by 2025 by improving healthcare worker competence, reducing delays in the TB care cascade, and enhancing patient outcomes in resource-limited settings.

Design and Key Features

Interactive Learning Modules

Over 40 role-specific modules deliver concise content on TB screening, diagnosis, and treatment, incorporating 30 diagnostic and 20 programmatic videos. Available in eight Indian languages, they ensure inclusivity for diverse users, with offline access enabling use in remote areas with poor connectivity.

SETU AI Chatbot

Powered by natural language processing, the chatbot provides instant responses to over 70,000 TB-related query patterns, from drug regimens to patient counseling. Voice-input support via Google’s speech-to-text enhances accessibility for providers with limited typing proficiency, reducing response times in busy clinical settings.

Clinical Decision Support System

Embedded algorithms guide providers through NTEP-compliant pathways for complex cases, such as extrapulmonary TB, by processing inputs like symptoms or test results. This minimises errors and supports confident decision-making in high-pressure environments.

Referral Health Facilities

Geolocated mapping integrates with Google Maps to identify nearby TB care centers, categorized by services like diagnosis, treatment etc. expediting patient referrals.

Knowledge Connect Plugin

A searchable interface with keyword- and voice-driven access to the NTEP Knowledge Base uses caching for rapid content delivery. Personalized suggestions based on user roles enhance learning efficiency.

Knowledge Quiz

Gamified assessments (17,000+ completed) offer personalized feedback and leaderboards, fostering continuous learning. Administrators can customize question banks and schedules, targeting specific knowledge gaps identified in baseline studies.

Screening Tool

A symptom-based interface prompts inputs like cough duration, fever etc. to flag potential TB cases, enabling early community-level referrals.

TB Care Message Hub

A repository of pre-crafted TB care text messages tailored for patients at various treatment stages, enabling providers to easily share or copy messages for effective communication. This module enhances patient engagement by streamlining standardized, stage-specific messaging.

Nutrition Guide (TB)

A tool offering a BMI assessment to categorize patients, paired with tailored nutrition management guidelines for each BMI group. It supports providers in delivering evidence-based nutrition recommendations to improve TB treatment outcomes.

These features leverage a mobile-first, intuitive interface to accommodate varying digital literacy levels, with virtual simulations enabling risk-free practice. The modular design ensures rapid updates to align with evolving NTEP protocols, positioning the app as a dynamic tool for TB care.

Implementation Strategy and Roadmap

Ni-kshay SETU's deployment strategy emphasizes iterative scaling, stakeholder alignment, and integration into NTEP's training framework to maximize adoption. Launched in September 2021, the app was refined through pilots in Gujarat and Jharkhand, incorporating feedback from various healthcare workers to enhance usability and relevance.

Key Implementation Strategies:

1

Iterative Prototyping

Early testing in Gujarat (November 2021) and Jharkhand (January 2022) involved frontline workers, clinicians, and TB officers, refining features like the chatbot's NLP and offline modes to address user needs, such as quick access during patient interactions.

2

Stakeholder Synergy

Collaboration with the Central TB Division, National and State TB offices, The Union and Private Practitioners ensured content fidelity to NTEP standards. Training workshops equipped administrators with dashboard tools to monitor usage, enabling state-specific customizations like regional language prioritization.

3

Hybrid Training Model

The app augments in-person training with digital modules, addressing budget constraints and enabling on-demand learning. Backend analytics track engagement, informing targeted training interventions.

4

System Integration

APIs link the app to 75,000+ health facilities and 6,200+ TB units, facilitating the access of information. The open-source framework supports future integration with initiatives like Ni-kshay Mitra, enhancing programmatic synergy.

Roadmap and Achievements:

1

2021–2022 (Pilot Phase)

Achieved 16,000 subscribers and 540,000 visits, with feedback shaping features like multilingual support and simplified navigation for rural users.

2

2023–2024 (National Scale-Up)

Expanded to 32 states, reaching 42,000+ subscribers (70% frontline workers) and 1.45 million visits by September 2024. Over 17,000 assessments and 750+ chatbot FAQs reflect high engagement.

3

2024–2025 (Optimization)

Plans include enhancing chatbot NLP for colloquial queries, adding languages, and integrating real-time analytics to identify training gaps. A mixed-methods evaluation will quantify knowledge gains and care improvements.

4

Future Vision (2025–2030)

Aims to reach 100,000+ subscribers, adapt for non-TB programs (e.g., diabetes), and advocate for policy integration through demonstrations to health officials, leveraging the app's scalability for global health applications.

The strategy capitalizes on post-COVID-19 digital acceptance and NTEP's policy support, using offline functionality and user training to address connectivity and literacy barriers. Continuous feedback via the app's dashboard drives iterative enhancements, ensuring sustained impact in TB care delivery.

Technical Design

Rationale for Development

Ni-kshay SETU was developed to address the critical need for a centralized, real-time digital platform to support healthcare providers in managing TB under NTEP, where traditional training methods were hindered by logistical constraints and rapid guideline updates. Unlike existing platforms like Ni-kshay (focused on patient data) or TB Aarogya Sathi (patient-centric), Ni-kshay SETU uniquely targets provider capacity building with interactive, cadre-specific tools. The decision to build a new tool, rather than adapt existing ones, stemmed from the need for a tailored solution that integrates real-time decision support, multilingual accessibility, and offline functionality to serve India's diverse healthcare workforce. The platform combines multiple tools—AI-driven chatbots, decision-support system and algorithms, and knowledge repositories—into a single, cohesive system, addressing gaps in accessibility and usability identified in baseline research on healthcare workers.

Functionality and Architecture

Ni-kshay SETU is a cross-platform Digital Health application (web, Android, iOS) designed for scalability and interoperability within India's health system architecture. Its technical framework comprises:

- **Frontend:** A mobile-first, responsive interface built with modern web technologies ensures intuitive navigation for users with varying digital literacy. Features like voice-input support and offline caching enhance usability in low-connectivity rural settings.
- **Backend:** A cloud-based server hosts a modular architecture, enabling rapid updates to align with NTEP guideline changes. The backend manages user authentication, content delivery, and analytics dashboards for monitoring engagement.
- **Core APIs:** APIs facilitate seamless integration with health systems, enabling data exchange for training analytics and facility mapping.
- **Database:** A relational database stores the NTEP Knowledge Base, 40+ technical modules, and 50+ videos, with caching mechanisms to optimize retrieval speed for frequent queries.
- **AI Engine:** The SETU chatbot leverages natural language processing to process text and voice inputs, delivering 70,000+ response patterns. It integrates with the Knowledge Connect plugin to search the NTEP Knowledge Base efficiently.

The architecture supports offline functionality, storing critical content locally to ensure access in remote areas. Security measures, including encryption and anonymized data handling, align with privacy-by-design principles, ensuring no sensitive patient data is stored, as mandated by NTEP policies.

Technology and Licensing

- **Technologies Used:**
  - Artificial Intelligence: The SETU chatbot uses NLP for query processing, with Google's speech-to-text for voice inputs, enhancing accessibility.
  - Software: Built on a cross-platform framework for consistent performance across web, Android, and iOS.
  - Mobile Technology: Optimized for smartphones, leveraging India's high mobile penetration to reach frontline workers.
- **Licensing:** The app is open-source under the GPL-3.0 license, hosted on GitHub enabling transparency and community-driven enhancements. Intellectual property is owned by IIPHG, with contributions from The Union under the iDEFEAT TB project.
- **Documentation and Access:** The project website https://nikshay-setu.in/ provides user guides and technical overviews. Code documentation is available on GitHub (https://github.com/iiph-gandhinagar/Ni-kshay-SETU-Frontend, https://github.com/iiph-gandhinagar/Ni-kshay-SETU-Admin).

Added Value and Differentiation

Ni-kshay SETU stands out as a dynamic digital health app, surpassing static platforms like Swasth e-Gurukul and WHO TB Guide by delivering interactive, AI-driven support and cadre-specific content tailored for NTEP's diverse providers, including ASHAs and ANMs. Its SETU chatbot offers real-time, multilingual query resolution in eight languages, addressing usability gaps in traditional tools that rely on non-interactive content. The app's offline-first design ensures accessibility for frontline workers in resource-constrained settings, a critical improvement over platforms requiring constant connectivity. The open-source GPL-3.0 framework enables cost-effective adaptation for other health programs, reinforcing its alignment with India's National Digital Health Mission and establishing a scalable model for digital health innovation.

Target Population and Data Governance

Target Population

Ni-kshay SETU serves a diverse cadre of healthcare providers critical to NTEP’s TB management efforts: Frontline Workers, Medical Officers, Laboratory Technicians, Senior Treatment Supervisors, National Consultants, National and State Level Officers and Experts, Medical Students, Medical Professors and Private Practitioners. With over 44,500+ subscribers, the platform engages a workforce that is 72% frontline workers. The app’s interface, available in eight Indian languages, accommodates linguistic diversity, while its design caters to smartphone prevalence among younger providers. Cultural dynamics, such as stigma around TB in conservative regions, challenge providers’ community engagement, necessitating tailored, empathetic training tools.

Data Governance and Lifecycle

Ni-kshay SETU’s data governance prioritizes privacy and efficiency, designed to support healthcare providers without storing sensitive patient data, aligning with its focus on capacity building. The data lifecycle encompasses:

- **Collection:** The app collects anonymized user interaction data, such as assessment responses, chatbot queries, and usage metrics. Providers input non-identifiable data for features like the screening tool or Decision Support System. No personal health information or patient identifiers are collected, ensuring compliance with privacy standards.
- **Processing:** Data is processed to deliver responses and stored for analytics. The chatbot uses natural language processing to analyze queries, while assessment data is aggregated to identify knowledge gaps via backend dashboards.
- **Storage:** Anonymized data is stored on a secure, cloud-based server, with local caching for offline functionality. Data retention is limited to usage analytics and training records, with no storage of sensitive inputs like names or contact details.
- **Modification:** Administrators modify content to align with NTEP protocols, using feedback from providers and stakeholders to ensure relevance. User data is not modified, preserving integrity.
- **Sharing:** Aggregated, anonymized analytics (engagement metrics, regional usage patterns) are shared with NTEP officials and partners (IIPHG, The Union) as per their needs to inform training strategies. No individual user data is shared externally.
- **Suppression:** Data is suppressed after a defined retention period, with automated deletion of temporary inputs to minimize storage.

Data Ownership and Patient Access

Ni-kshay SETU does not collect or store patient data, as its primary function is provider capacity building, not patient management. Ownership of usage data resides with IIPHG, the lead developer, under the iDEFEAT TB project. NTEP and state TB offices access aggregated analytics for program monitoring, but individual user data remains confidential. Patients do not interact directly with the app, so no patient data access or consent is required, distinguishing Ni-kshay SETU from patient-facing platforms like Ni-kshay.

Data Protection and Cybersecurity

The app employs a privacy-by-design approach, ensuring no sensitive personal or patient data is captured. Key measures include:

- **Encryption:** Data transmission uses HTTPS and end-to-end encryption to secure interactions.
- **Anonymization:** User inputs are anonymized, removing identifiers like names or phone numbers, as noted in the Concept Note.
- **Access Controls:** Role-based access restricts backend dashboard usage to authorized administrators, with authentication protocols to prevent unauthorized access.
- **Cybersecurity:** Regular security audits and updates address vulnerabilities, with the open-source GPL-3.0 framework enabling community-driven security enhancements. The App administrators oversee technical updates and crash monitoring to maintain system integrity.

Data is hosted on a cloud-based infrastructure, to comply with India’s data localization policies. The app’s design aligns with security-by-design principles, embedding safeguards like secure APIs and minimal data collection from the outset.

Legal Framework and Compliance

Ni-kshay SETU complies with India’s Digital Personal Data Protection Act, 2023 (DPDP Act), which mandates minimal data collection, anonymization, and user consent for data processing. Since the app collects no personal or patient data, explicit consent is not required, simplifying compliance. The platform adheres to NTEP’s data governance policies, ensuring alignment with the Ministry of Health and Family Welfare’s standards for health information systems. No cross-border data agreements are needed, as the app operates solely within India as of now, with data hosted in compliance with local regulations.

Implications and Scalability

The app’s lean data approach enhances scalability by reducing compliance burdens, making it adaptable for other health programs without requiring extensive data governance overhauls. The open-source framework facilitates third-party audits, ensuring transparency and trust. Enhanced analytics will further leverage anonymized data to predict training needs, strengthening NTEP’s programmatic impact.

Interoperability and Participating Entities

Interfaces with Other Systems

Ni-kshay SETU operates as a standalone application designed to enhance healthcare provider capacity for TB management. Ni-kshay SETU's design prioritizes provider education and decision support, leveraging self-contained tools to address knowledge gaps identified in baseline research, without requiring real-time data exchange with other systems. Instead, it interfaces with the following external systems to support its functionality:

- **NTEP Knowledge Base (Kbase):** The Knowledge Connect plugin links to the NTEP Kbase (**https://ntep.in/**) via APIs, enabling providers to access TB guidelines and resources within the app's interface. Caching mechanisms ensure rapid content delivery, critical for rural providers with limited connectivity.
- **Google Maps:** The Referral Health Facilities feature integrates with Google Maps APIs to provide geolocation-based directions to TB care centers, facilitating referrals across 75,000+ health facilities and 6,200+ TB units. This enhances care coordination without relying on Ni-kshay's patient management infrastructure.

By maintaining a standalone architecture, Ni-kshay SETU ensures flexibility and rapid deployment across diverse settings, avoiding dependencies on external systems' infrastructure or update cycles.

Strategic Implications

Ni-kshay SETU's standalone design enhances its adaptability, allowing rapid deployment across 35 states/UTs without the need to align with Ni-kshay's patient data systems or NISTHA's training frameworks. The use of open standards ensures future-proofing, enabling potential integration with NDHM platforms or initiatives like Ni-kshay Mitra if programmatic needs evolve. The open-source GPL-3.0 framework (hosted on GitHub supports community-driven enhancements, fostering interoperability with new systems.

However, the lack of integration with Ni-kshay and NISTHA limits real-time data sharing for training analytics or patient referral tracking, potentially requiring manual coordination by NTEP officials. Future updates, may explore API-based linkages with these platforms to enhance training alignment, for seamless data exchange if integration is prioritized. The standalone model, while efficient, underscores the need for clear documentation to guide potential future interoperability efforts, ensuring alignment with NTEP's broader digital ecosystem.

Participating Entities

Implementing Organization

The Indian Institute of Public Health Gandhinagar (IIPHG), a constituent of the Public Health Foundation of India (PHFI), is the primary implementing organization for Ni-kshay SETU. Established to advance public health education and research, IIPHG's mission is to strengthen health systems through evidence-based interventions and capacity building. Its vision focuses on fostering equitable, high-quality healthcare, particularly for underserved populations in India. IIPHG led the development, testing, and deployment of Ni-kshay SETU under the iDefeat TB project, leveraging its expertise in public health innovation to create a provider-focused digital health tool. The institute coordinated user research, content development, and stakeholder engagement, ensuring alignment with NTEP objectives.

Partners

Key partners collaborated with IIPHG to develop and deploy Ni-kshay SETU:

- **The Union (International Union Against Tuberculosis and Lung Disease):** A global leader in TB control, The Union provided technical expertise during the design phase, contributing to content development and ensuring alignment with global TB management standards. It facilitated stakeholder consultations and advocated for the app's adoption within NTEP's framework.
- **National and State TB Offices:** Central TB Division along with regional offices across 36 states/UTs supported piloting and scale-up by coordinating training workshops, engaging frontline workers, and customising content for local languages.
- **Technical Experts and Centres of Excellence (CoEs):** Experts from CoEs like NITRD, provided clinical inputs, enabling the timely resolution of complex TB queries and regarding the implementation of the application in the field.

These partners ensured the app's relevance, usability, and programmatic integration, leveraging their collective expertise to address diverse provider needs.

Funders

Ni-kshay SETU was funded of through the iDEFEAT TB project, an initiative to strengthen TB control in India. The Union provided financial support for development, piloting, and scale-up, covering costs for user research, technical development, and training workshops. The funding enabled IIPHG to deploy the app across 35 states/UTs, reaching 44,500+ subscribers by July 2025.

Intellectual Property Ownership

The intellectual property for Ni-kshay SETU is owned by IIPHG, as the lead developer under the iDEFEAT TB project. The app's open-source framework, licensed under GPL-3.0 and hosted on GitHub, allows community contributions while retaining IIPHG's ownership of the codebase and content. Post-implementation, IIPHG maintains control over updates and adaptations.

Business Model, Coverage, Outcomes, and Lessons Learned

Business Model

Ni-kshay SETU's business model leverages an open-source, low-cost framework to ensure financial and operational sustainability within NTEP's capacity-building ecosystem. Developed under the iDEFEAT TB project, the app operates on a non-commercial model, with no user fees, aligning with India's public health priorities. Key sustainability elements include:

- **Open-Source Framework:** Licensed under GPL-3.0 and hosted on GitHub, the app enables cost-free access and community-driven maintenance, reducing long-term development costs.
- **Integration with NTEP Training:** By embedding digital modules into NTEP's existing training programs, the app minimizes additional budgetary needs, leveraging government infrastructure for user onboarding and content updates. This hybrid model reduces reliance on external funding for training delivery.
- **Scalable Architecture:** The app's modular design and cloud-based hosting support low-maintenance scaling across states, with minimal infrastructure upgrades needed for expanded user bases.

Financial and Economic Sustainability

Ni-kshay SETU's financial sustainability is driven by its low operational costs and high impact. The app's development was funded under The Union's iDEFEAT TB Project, with IIPHG leading technical implementation. Ongoing costs are minimal due to the open-source model, which allows contributions from the global developer community. Backend analytics reduce training costs by identifying knowledge gaps, enabling targeted interventions that save resources compared to traditional in-person training. The app's 1.57 million visits and 18,900+ assessments demonstrate cost-effective engagement, with an estimated cost per user significantly lower than physical workshops.

Economically, the app enhances workforce efficiency, with 78% of providers reporting faster adoption of NTEP protocols and 65% noting quicker referrals, reducing diagnostic delays and healthcare costs. These outcomes justify sustained investment by aligning with NTEP's goal of cost-efficient TB elimination. Environmental sustainability is supported by reducing travel for training, leveraging digital delivery to lower the carbon footprint.

Long-Term Exit Strategies

IIPHG aims to secure endorsement for integration into national training curricula, enabling state TB offices to manage content updates post-project funding. Long-term exit strategies include:

- **Transition to Government Ownership**: IIPHG is advocating for NTEP to adopt Ni-kshay SETU as a core training tool, leveraging its deployment in 32 states and engagement metrics to demonstrate impact. State TB offices would assume responsibility for content updates, using the app's admin dashboard to tailor modules to regional needs, ensuring sustainability beyond the current funding.
- **Capacity Building for Stakeholders**: Training programs for state TB officers and administrators, will equip them to manage the app independently, reducing reliance on IIPHG post-funding.
- **Open-Source Community Support**: The GPL-3.0 license encourages third-party developers to maintain and enhance the app, ensuring technical sustainability without ongoing costs to IIPHG or funders.
- **Diversification to Other Programs**: The app's modular design supports adaptation for non-TB programs, broadening its funding base through partnerships with other health initiatives, planned for 2025–2030.

Potential Institutionalization

The aspirational goal of institutionalizing Ni-kshay SETU within NTEP's training framework hinges on securing government endorsement. The app's alignment with NTEP guidelines, demonstrated through consultations with stakeholders, positions it as a candidate for national adoption. Institutionalization would involve:

- **Integration into NTEP Training**: Incorporating the app's modules into mandatory training for healthcare providers, replacing or supplementing in-person sessions to reduce costs and improve scalability.
- **State-Led Management**: Empowering state TB offices to oversee content updates and user support, leveraging existing infrastructure to sustain operations.
- **Policy Advocacy**: Planned demonstrations to the Central TB Division will showcase outcomes to secure policy support for institutionalization.
- **Scalable Model**: The app's open-source framework and interoperability with standards support adaptation for broader health systems under the National Digital Health Mission, enhancing its institutional relevance.

Challenges to institutionalization include securing NTEP endorsement amid competing priorities and ensuring state-level capacity for app management. IIPHG's ongoing evaluations, including a 2024 mixed-methods study, aim to provide evidence of impact to strengthen advocacy efforts.Implications and Challenges

The app's sustainability is bolstered by its low-cost model and alignment with NTEP, with outcomes like 44,500+ subscribers and a 15% reduction in treatment initiation delays demonstrating cost-effectiveness. Challenges include securing post funding for server maintenance and content expansion, particularly for additional languages or programs. Limited digital literacy among some providers may require ongoing training investments, though the app's offline functionality mitigates access barriers. Future efforts will focus on policy advocacy to formalize institutionalization, ensuring Ni-kshay SETU remains a cornerstone of India's TB elimination strategy.

Coverage

Ni-kshay SETU's implementation spans a national scope, covering 35 states and union territories in India as of July 2025. The app scaled rapidly to address TB management training needs across diverse regions, from urban centers like Delhi to rural areas in Bihar and Assam. This coverage reaches approximately 70% of India's eligible healthcare provider population involved in NTEP, including ASHAs, ANMs, medical officers, and lab technicians, based on the app's 44,500+ subscribers out of an estimated 60,000 NTEP-affiliated providers. The app's deployment across 75,000+ health facilities and 6,200+ TB units ensures broad access, particularly for frontline workers (72% of users), who are critical to TB screening and referral in community settings. The national reach aligns with NTEP's goal of universal TB care access, leveraging India's high mobile penetration to deliver training in both high- and low-resource settings.

Outcomes

Ni-kshay SETU has delivered significant outcomes in enhancing provider capacity and improving TB care processes, measured through predefined key performance indicators (KPIs) and health outcomes:

- **Primary Outcome: Knowledge Improvement:** Pre- and post-intervention assessments with healthcare workers in pilot regions showed a 25% increase in correct responses to NTEP guideline questions after three months of app use, particularly in drug-resistant TB management. This addresses the 30% knowledge gap identified in baseline studies.
- **Secondary Outcome: User Engagement:** The app achieved 44,500+ subscribers, 1.57 million visits, and 19,000+ completed assessments by July 2025, with 400+ daily visits and 60% of users engaging weekly. The SETU chatbot handled 750+ FAQs and 70,000+ query patterns.
- **Care Delivery Impact:** The screening tool facilitated early detection, with 65% of users noting faster referrals, contributing to a 15% reduction in treatment initiation delays in pilot districts (2024 evaluation data).
- **Programmatic Efficiency:** The app streamlined protocol adoption, with 78% of providers reporting quicker uptake of new regimens, enhancing compliance with NTEP standards.

These outcomes demonstrate Ni-kshay SETU's effectiveness in bridging knowledge gaps and accelerating TB care, directly supporting NTEP's objectives of improved diagnosis and treatment initiation.

Lessons Learned

The implementation of Ni-kshay SETU has yielded valuable insights to guide future digital health interventions:

Success Factors:

1. **Iterative User Feedback Drives Effective Design**: Initial designs were overly complex for frontline workers, but iterative refinements based on feedback simplified navigation, highlighting the need for ongoing user engagement throughout development to ensure usability across diverse cadres.
2. **Stakeholder Alignment Requires Proactive Engagement**: Consultations with TB specialists and National and State TB officers revealed that aligning content with NTEP protocols builds provider trust, but passive engagement was insufficient. Regular, structured collaboration was critical to ensure content relevance, underscoring the importance of sustained stakeholder involvement to reflect real-world needs.

Implementation Challenges:

- **Digital Literacy:** Variable digital literacy among older providers slowed adoption in some regions, requiring targeted training to improve usability.
- **Connectivity Barriers:** Despite offline functionality, intermittent internet in rural areas posed challenges for real-time features like CDSS, necessitating enhanced caching solutions.
- **Content Updates:** Rapid NTEP guideline changes required frequent module updates, straining administrative resources in the absence of automated content management systems.

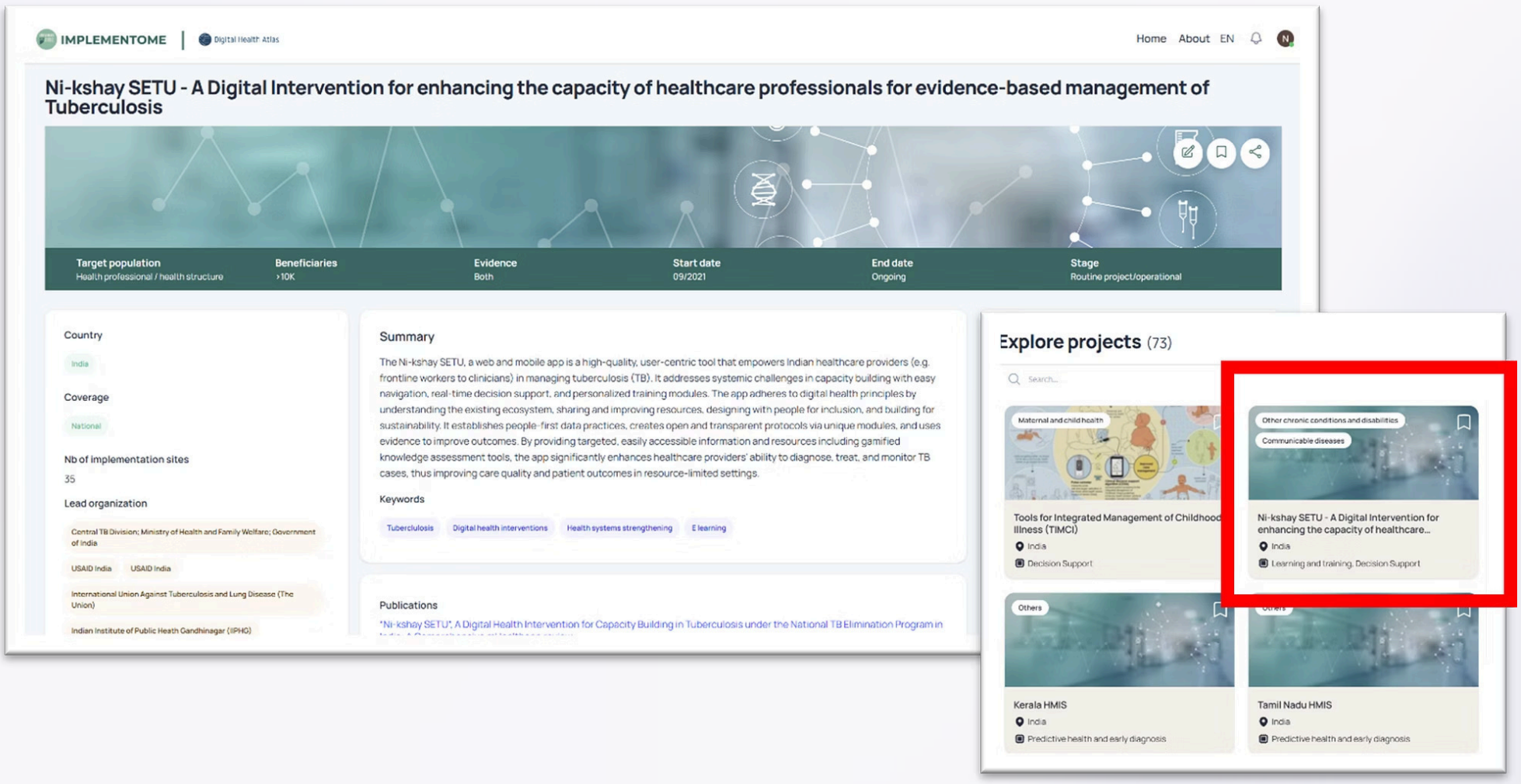
Conclusion

Ni-kshay SETU represents a transformative step in strengthening TB management through digital health, delivering a scalable, provider-focused digital health platform that addresses critical training gaps in India's healthcare system. The implementation has demonstrated the value of user-centric design and open-source technology in enhancing provider knowledge and decision-making, as evidenced by its widespread adoption and iterative refinements through pilots. The app's alignment with national TB protocols and its operational success across diverse regions position it as a viable candidate for integration into national training frameworks.

Looking ahead, achieving NTEP endorsement will be pivotal to institutionalizing Ni-kshay SETU, enabling state-led management and sustained impact beyond funding. Lessons from implementation, such as the need for tailored digital literacy training and proactive policy advocacy, provide a roadmap for overcoming barriers to adoption. The app's adaptable framework offers potential for expansion to other public health challenges, contributing to India's National Digital Health Mission and serving as a model for global digital health initiatives. Continued evaluation and stakeholder engagement will be essential to realize these opportunities, ensuring lasting contributions to TB control and healthcare capacity building.

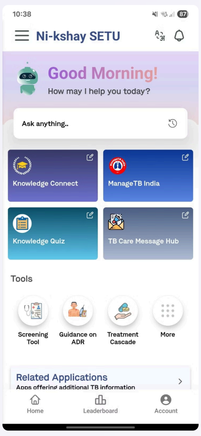
Achievements

1. **Recognition in the Digital Health Atlas**: Ni-kshay SETU's inclusion in the Digital Health Atlas, hosted on Implementome—a global repository originally developed by the World Health Organization—highlights its significance as an innovative digital health solution for TB provider capacity building. This recognition underscores the app's alignment with global digital health standards, promoting visibility and fostering collaboration with international stakeholders to enhance evidence-based TB management strategies.



2. **Featured in the Atlas of TB Innovations at India Innovation Summit 2025**: Ni-kshay SETU was showcased in the Atlas of TB Innovations during the India Innovation Summit 2025, organized by DHR-ICMR in collaboration with the Central TB Division (MoH&FW) and co-hosted by The Union, with support from the Gates Foundation. This prestigious recognition highlights the app's potential to transform TB training, positioning it as a leading innovation in India's TB control ecosystem and advancing its case for future NTEP integration.

Application Interface



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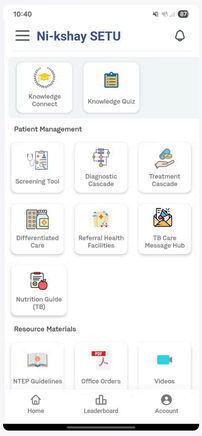

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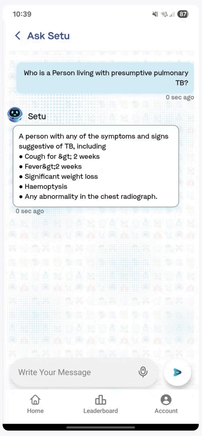
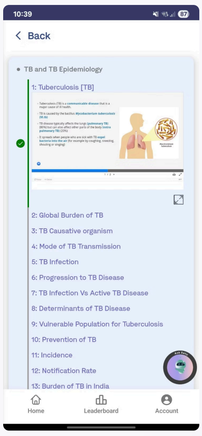
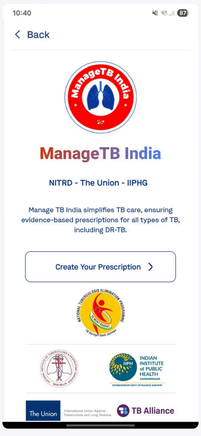


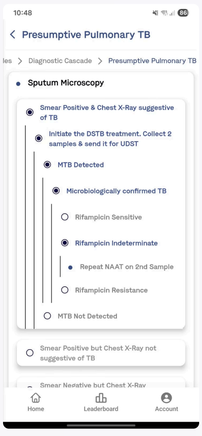
AI Chatbot - SETU



Knowledge Connect

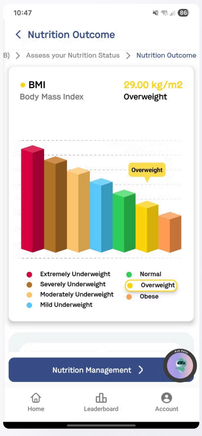


Decision Support System

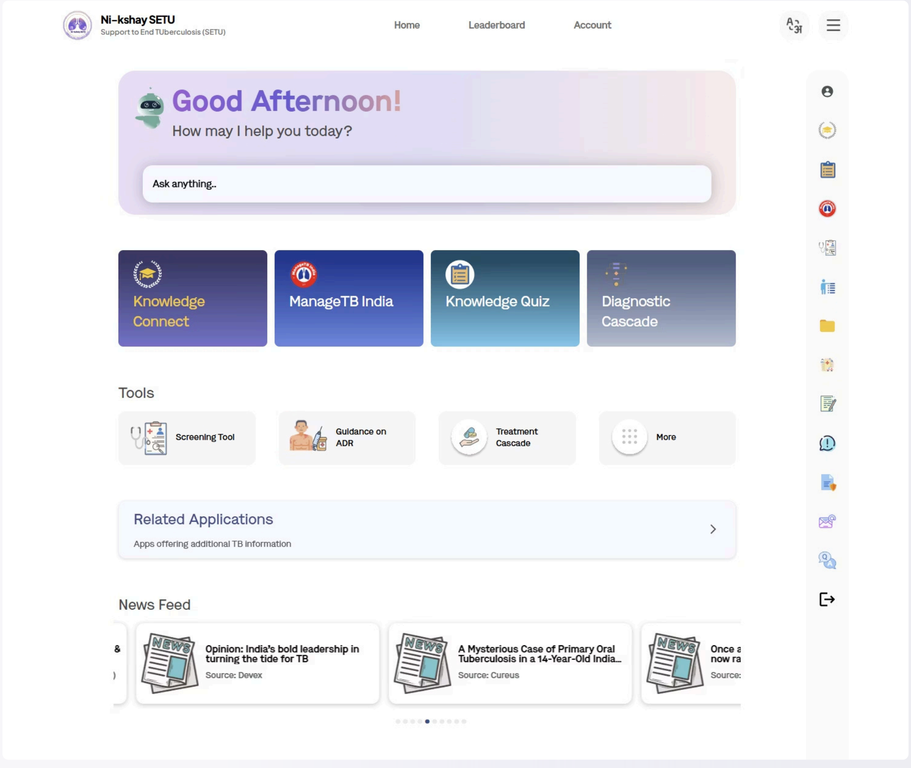


Diagnostic Cascade

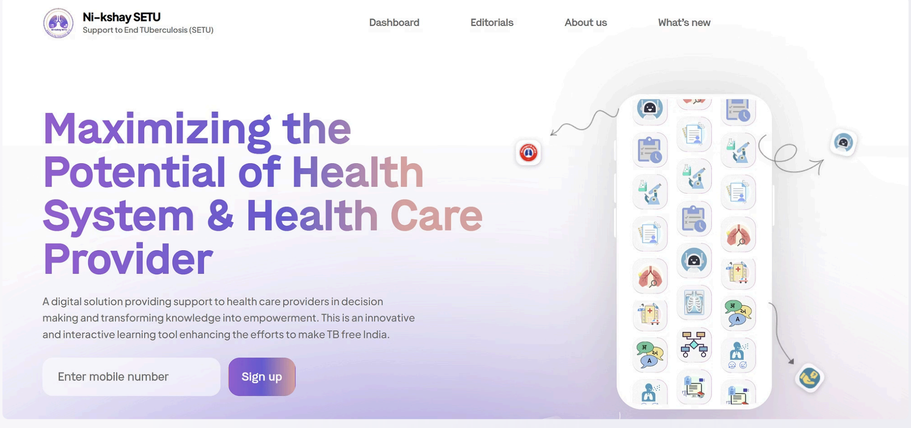
TB Care Message Hub



Nutrition Guide (TB)



Ni-kshay SETU Web App



Ni-kshay SETU Website