

# Stakeholder Perceptions towards a Mobile Application for Community-Led Monitoring of Tuberculosis Services in Metro Manila, Philippines: A Qualitative Study

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## ABSTRACT

**Objective.** To determine the perceptions of persons with tuberculosis (TB) and health workers on Care TB – a mobile application for the community-led monitoring (CLM) of TB services.

**Methods.** We used a qualitative research method. Six people with tuberculosis and ten health workers were chosen through purposive sampling for semi-structured interviews. The narrative data produced from the interviews were subjected to qualitative content analysis in order to uncover salient themes and patterns.

**Results.** The community-led monitoring mobile application was shown to be acceptable both to TB healthcare providers and patients. It enhances information access and streamlines the process of reporting care barriers. The application also allows persons with TB to interact with one another, potentially eliminating stigma and discrimination. Potential challenges to implementing the CLM program include issues with internet connectivity, costs, and human resources.

**Conclusion.** This study provides preliminary evidence of the acceptability and perceived feasibility of a mobile application for the community-led monitoring of TB services. For the CLM initiative to be scaled up across the country, more financial and technical support is required.

*Keywords: tuberculosis, patient acceptance of health care, human rights, social stigma, social discrimination*



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## INTRODUCTION

The Philippine National Tuberculosis (TB) Report 2021 indicates that the gains in the previous decades against TB were simply undone by the COVID-19 pandemic.<sup>1</sup> About 152,000 fewer people with TB were detected in 2020 compared to 2019.<sup>1</sup> Unfortunately, persons who have TB also have to contend with the stigma and discrimination brought by the disease.<sup>2,3</sup> This further complicates the fight against TB and related human rights violations, and ultimately, the achievement of acceptable, available, accessible, and quality TB services.

Distance and cost-related issues are among the top barriers to non-consultation in Filipinos.<sup>4</sup> Barriers to accessibility are not only limited to physical and financial constraints but also include bureaucratic barriers, including the procedural steps before service access and the actual opening times of

healthcare facilities. Barriers to the availability of services may be determined through the types and quantities available for use by persons with TB.

The fight against TB must also consider all aspects of health. With this, it is best that service users or local communities come together to collect, monitor, and use the information to improve the acceptability, availability, accessibility, and quality of TB services in what is called Community-Led Monitoring (CLM).<sup>5</sup> CLM offers accountability for all stakeholders through routine data collection that reveals implementation gaps and provides an immediate response to the determined barriers.<sup>5,6</sup>

It is then imperative to provide persons with TB a CLM platform to report these barriers for them to be addressed, to receive social support by connecting them to other people with TB, and to minimize the out-of-pocket expenses for patients as they claim their right to treatment completion. The Care TB digital CLM platform used in this study was adapted from Stop TB Partnership's OneImpact mobile application which is a CLM tool.<sup>5</sup> Both digital platforms aim to empower local communities with ways to address barriers through reporting TB services across the cascade of care, barriers in providing TB support services, TB stigma, human rights violations, and providing information on TB and human rights.<sup>5,7,8</sup> Like OneImpact, the development of the Care TB app was funded in part by Stop TB Partnership and developed with other local partners, including the Department of Health, WHO Philippines, and ACHIEVE Inc.<sup>8</sup>

This study was carried out in the Philippines to determine the perceptions of health workers and persons with TB on the use of a mobile application for the community-led monitoring of TB services. The mobile application seeks to promote community-led monitoring for TB care to inform policies and guidelines to ensure quality care.

## MATERIALS AND METHODS

### Study Design and Setting

This case study explored and described in detail perceptions of stakeholders towards a mobile application to be deployed for the community-led monitoring of TB services. The study was conducted in three cities in the National Capital Region of the Philippines involving twelve public and private health care facilities selected by the National TB Program.

### Population and Sampling Technique

A total of 16 participants, involving 6 persons with TB and 10 health workers, were invited to participate through purposive sampling. We invited individuals over 18 years of age, diagnosed with TB, and seeking treatment at the predetermined health care facilities. Health workers from these facilities were invited to participate provided they are more than 18 years old and are actively providing TB services such as, but are not limited to, consultation, dispensing

of medications, medication administration, treatment monitoring, and patient counseling. In terms of technology readiness, access to a smartphone within a household was added as inclusion criteria for both persons with TB and health worker groups; those with visual or hearing impairment were excluded.

### Care TB Application

A design thinking approach was used to develop the mobile application to help ensure that it met the needs of persons with TB, health workers, and decision-makers, and that its content was appropriate and acceptable. The development team included civil society organizations, representatives from the Department of Health and National Tuberculosis Program, and a digital solutions company. The app developer is a company independent from the research team. The content and features were based on OneImpact, a digital health solution by the Stop TB Partnership and its community partners.<sup>7</sup> The content was also finalized after a series of consultations with the development team.

The Care TB application is part of the End TB App Suite developed for the National TB Program. The mobile application is running on both the Apple iOS and Google Android platforms. Its key features include Information (presents information about TB), Chat (allows persons with TB to connect with other people with TB or peer support groups for TB), Near Me (provides information about the nearest facilities offering TB services), and Report (a platform to report barriers to TB care). The subsequent iterations of the application were based on the results of quarterly user design workshops conducted among persons with TB.

The development of this mobile application was supported by the Stop TB Partnership through its Challenge Facility for Civil Society Grant Mechanism (Round 10). The authors were awarded a grant to co-develop the mobile application and pilot test it in Metro Manila, Philippines.

### Data Collection

Two trained researchers recruited the study participants who were approached at the health facilities and were screened for eligibility. Those who meet the eligibility criteria were given an information sheet informing them of the details of the study. They were allowed to ask questions and written consent to participate in the study was obtained before study commencement. Only eligible participants who provided informed consent were enrolled in the study.

The participants' demographic profiles were collected using a demographic information sheet that was distributed to them together with the informed consent form prior to the conduct of the semi-structured interviews. Information regarding the study was thoroughly explained to the participants before a copy of the informed consent form was provided. If the interview was conducted online, participants were asked to fill out an online version of the informed consent form.

The semi-structured interviews explored the participants' experience in using the mobile application and their perceived acceptability and feasibility of rolling out the digital platform to a wider audience. Specifically, we asked the following:

- How does your LGU manage the high burden of tuberculosis?
- How are you involved in the management of TB in your locality?
- What do you think about the community-led monitoring of TB services?
- What do you think about the use of Care TB – a mobile application for the community-led monitoring of TB services?
- Considering your local context, what other aspects should be considered if we are to adopt the Care TB mobile application?

Additional probing questions were used depending on the flow of discussion with the participants. We were particularly interested with their thoughts and feelings towards the use of the Care TB mobile application, as well as the potential requirements for its eventual adoption in the community.

The interview guide was informed by previous studies exploring participant experience, acceptability, and feasibility of using a mobile health application.<sup>9,10</sup> The interview guide had English and Filipino versions, and the interviews were conducted in both English and Filipino.

The interviews were recorded through audio recording and note-taking. Consent for audio recording and note-taking were also sought before the interviews. An investigator served as the moderator and guided the focus group discussion (FGD) according to a set of questions or topics. Another investigator was assigned to take notes during each session. Data saturation was reached after nine interviews. Two additional interviews were done to ensure that no new information was generated.

## Data Analysis

The audio recordings were transcribed verbatim to ensure that the transcriptions were precise and accurately portrayed the interviewee's experience. The lead investigator listened to the taped interview while completing the cross-check to ensure that the transcribed data was accurate.

The transcriptions of the interviews were processed using Taguette, a free and open-source qualitative research tool for coding and content analysis.<sup>11</sup> Data was divided into smaller units, coded, and labeled based on the content it represented. The researchers created a codebook that detailed the definitions of the various categories used to code the data. Two of the researchers (RT and PC) both coded the whole data set to achieve the most consistent coding across all interviews. In the examination of the content of narrative data produced from the interviews, qualitative content analysis was used to find notable themes and patterns among

the topics. Differences in code definitions and coding were discussed and resolved by all researchers.

We used the Theoretical Framework of Acceptability (TFA) developed by Sekhon et al. to analyze and interpret the qualitative data.<sup>12</sup> This framework allows for the prospective, concurrent, or retrospective evaluation of acceptability. Seven component constructs of acceptability were supplied by the framework.<sup>12</sup> These constructs often depend on subjective stakeholder narratives. The opinions, experiences, and recommendations of stakeholders are examined in several acceptability studies utilizing quantitative or qualitative approaches.<sup>12-14</sup>

The TFA has seven constructs namely, (1) affective attitude, (2) burden, (3) ethicality, (4) intervention coherence, (5) opportunity costs, (6) perceived effectiveness, and (7) self-efficacy. Interestingly, based on the responses of the participants, not all of these constructs were present in this study. We developed subthemes and clustered them into overarching themes that best represent the patterns found among the subthemes. Some of the TFA constructs, as presented below, can be derived from the responses.

## Ethical Considerations

The St. Frances Cabrini Medical Center - Asian Eye Institute Ethics Review Committee approved the study (ERC# 2020-040). We obtained written informed consent from each participant before conducting the interviews, and the participants were informed of their right to withdraw their participation at any point in the study.

The Stop TB Partnership provided funding for the development of this mobile application through its Challenge Facility for Civil Society Grant Mechanism (Round 10). A grant was awarded to the authors to co-develop a mobile application and test it in Metro Manila, Philippines.

A digital solutions provider, representatives from the Department of Health, and the National Tuberculosis Program were all part of the development team. The firm that developed the app operates independently from the research team.

## RESULTS

A total of six persons with TB and ten health workers were purposefully invited to participate in the study. Most of the participants were women and college graduates (Table 1).

The results are presented using the major themes that emerged during the qualitative content analysis.

### Theme 1: Perceptions towards the mobile application (Affective attitude, perceived effectiveness, and intervention coherence)

This theme encompasses the participants' positive view of and sense of empowerment as a result of using the mobile application for community-led monitoring. This theme focuses on the beneficial effects of the mobile app in

**Table 1.** Characteristics of the Respondents (N =16)

Characteristics	n	%
<b>Sex</b>		
Female	8	50.00
Male	8	50.00
<b>Age</b>		
18-24	1	6.25
25-44	9	56.25
45-64	6	37.50
<b>Marital Status</b>		
Single	8	50.00
Married	8	50.00
<b>Highest Educational Attainment</b>		
High School Graduate	3	18.75
College Graduate	12	75.00
Postgraduate, MA/MS	1	6.25
<b>Employment Status (Healthcare workers)</b>		
Permanent	9	90.00
Voluntary	1	10.00
<b>Years of Service (Healthcare workers)</b>		
<5	3	30.00
5-10	3	30.00
>10	4	40.00
<b>Treatment Status (Persons with TB)</b>		
Currently on treatment	3	50.00
Finished treatment within the same year	3	50.00

empowering users and enhancing the TB patients' access to healthcare.

**Positive view of the mobile application**

Generally, participants had a positive view on the use of a digital platform for community-led monitoring. One health worker viewed this as a “supplement” to the various efforts on monitoring healthcare services. Moreover, the participants recognized the potential of the mobile application to enhance monitoring practices in healthcare. Their views also reflected an inclination towards accepting technological innovations to strengthen community-led monitoring initiatives.

**Additional reporting option**

The participants acknowledged that the digital platform gave people who had tuberculosis (TB) an alternative means to report any issues they had with the TB care cascade. The digital platform increased the options for reporting and addressing TB care-related difficulties by providing this choice. The participants understood the platform's potential to empower individuals who have TB by giving them a simple and practical way to express their concerns. Overall, participants thought that the availability of this alternative reporting option via the digital platform was a useful tool for enhancing TB care and resolving any issues.

*“Sa akin ma’am okay yun eh. Kasi through do’n sa client, sila kasi yung makakapagsabi kung naa-access nila nang maayos at naa-avail nila at naa-adapt nila yung serbisyong binibigay ng isang pasilidad.” (I think*

*[the application] is okay. Through the client, they can report if they can access and avail the facility services properly.) – H5, Health worker, KII*

*“Maganda naman po yun. Unang-una, less ano po yun sa ganitong mga application, less sa oras, pagod, syempre halimbawa magsasadya pa tayo, yung ibig kong sabihin ay yung mamamasabe pa, mas maganda po yung ganitong application para masa madali.” (I think it is good. First of all, less time and energy are spent—no need to go [to the facility]. It makes [getting information] easier.) – P1, Patient with TB, FGD*

**Faster issue resolution**

The participants were optimistic about the digital platform's automated reporting module since they thought it would speed up the resolution of the reported concerns. They believed that the automated approach would accelerate problem-solving and response times by streamlining the reporting process. The participants expressed their confidence in the efficiency of the automatic reporting feature of the digital platform and its capability to hasten issue resolution within the context of community-led monitoring.

*“Yung advantage is mas maganda, mas mabilis na mapupunta sa pinaka head at dun sa nakakaalam sa health worker. Kung may concern yung patient, maaddress agad.” (The advantage [of the application] is that their concerns would reach the [health department] heads and knowledgeable health workers right away, facilitating faster resolution of issues.) – H9, Health worker, KII*

**Enabling information exchange**

For participants, individuals using the mobile application can share their experiences and voice their ideas in an "open" setting because of the platform's ability to enable information flow amongst users. By offering this channel, the platform aids in lowering the stigma and discrimination related to TB and fostering an atmosphere where people feel comfortable expressing their opinions.

**Creating a sense of community**

Participants believe that people with TB can gain greater confidence owing to the platform as they are given the ability to express themselves and interact with people who share their experiences. As a result, they can feel more a part of a community where they can find support, empathy, and solidarity.

*“Tsaka ma’am, nakakabawas ng stigma and discrimination. Parang pakiramdam ng isang kliyente na tanggap sya sa isang community.” (It can lessen stigma and discrimination. The clients can feel that they’re welcome and part of a community.) – H5, Health worker, KII*

*“I like yung ano yung botton na parang mag chat chat yung mga mag usap-usap yung mga isang taong may TB, mag usap-usap kami kung paano gumaling.” (I like the button that leads to a chat with the others with TB where we can discuss how we’ll recover [from TB].) – KH20, Person with TB, Interview*

### Improved access to essential information

Users who are interested in learning more about TB, surrounding healthcare institutions, and other health services can utilize the platform as a reliable source of clear, comprehensible information. It improves access to essential information, enabling people with TB to make decisions about their healthcare with more understanding.

*“Maganda naman po yun. Unang-una, less ano po yun sa ganitong mga application, less sa oras, pagod, syempre halimbarwa magsasadya pa tayo, yung ibig kong sabihin ay yung mamamasabe pa, mas maganda po yung ganitong application para masa madali. Hindi na natin kailangan magdikit-dikit pa o makisalamuha. Atleast hindi na tayo makabarwa pa.” (It [the application] is good. Firstly, less time and energy will be used in accessing information instead of going to the facility directly. We no longer need to go to a crowded facility and interact, reducing the risk of TB transmission.) – P1, Person with TB, FGD*

### Theme 2: Implementation challenges (Burden and self-efficacy)

This theme emphasizes the challenges with digital device connectivity and access that limit how well the digital CLM platform may be used. To promote equitable access to and involvement in community-led monitoring programs, it is important to address substantial constraints such as limited familiarity with digital technologies, smartphone availability and storage capacity, and internet accessibility and speed.

#### Limited familiarity with digital devices

Participants identified one of the main challenges, particularly for older PWOTB, as the low experience with utilizing digital devices. Their inability to successfully interact with and use the capabilities of the digital CLM platform may be hindered by this unfamiliarity.

*“...hindi po labat e updated sa mga ganitong klaseng gadgets. Paano naman po yung iba na wala pong kaalaman sa ganitong application?” (Not everyone is updated with utilizing gadgets. How about those who are unfamiliar with applications like this (CareTB)?) – P1, Person with TB, FGD*

*“Kaya lang yun nga, karamihan sa kanila hindi marunong. Maski nga ako hindi marunong, nagpapaturo lang ako sa mga anak ko.” (Most of them [patients] are not used to the app; even I ask for help with my kids.) – H2, Health worker, KII*

#### Availability of smartphone and storage capacity

The availability of smartphones and their limited storage space become significant barriers. Because some families may have a shared smartphone, it can be challenging to regularly access the digital CLM platform. Additionally, installing and properly using the applications that are required may be impacted by cellphones' limited storage space.

#### Internet accessibility and speed

Accessing the mobile application can be difficult due to the speed and accessibility of internet connections. Participants brought up the fact that some regions of the country have sluggish internet connections while others have none at all. The efficient use of the mobile application is hampered by the lack of dependable fast internet connectivity.

*“Maganda sana yon. Kaya lang may problema rin kasi sa mga pasyente karamihan senior, hindi sila marunong sa internet o wala silang internet.” ([The app] could have been nice, but most of the patients, especially those who are senior citizens, either are not used to using the internet or do not have internet access.) – H2, Health worker, KII*

### Theme 3: Support for implementation

This theme emphasizes the significance of collaborative support from local government and leaders, monitoring and feedback methods, protocols for issue resolution, and customization. By including such elements, the platform may be customized to the community's particular needs, effectively resolving issues and advancing inclusivity while encouraging support and engagement from members of the community.

#### Involvement of local government and leaders

In order to ease the implementation of innovative initiatives like the mobile application, participants underlined the significance of cooperation from local governments and the Department of Health. These authorities' collaborative efforts and technical support are considered essential to ensuring the platform's successful deployment and sustainability. The value of community leaders knowing about the program and platform was stressed by the participants. By involving community leaders, it is possible to encourage community support, fostering a climate that is favorable for the program's success. Community leaders may be extremely helpful in creating awareness, resolving issues, and building support for the program.

*“Sana apart from the health workers who will be oriented, ang ating mga barangay leaders and mga enforcers maging aware din sila about this so marami tayong kailangang i-engage para maging smooth yung flow...” (Aside from the health workers who will be oriented, I hope the barangay leaders and enforcers will also be aware about this initiative. We have a lot to engage to ensure smooth implementation.) – H1, Health worker, KII*

*“...ang magiging suggestion ko na lang po doon, barwat barangay naman po ay mayroon tayong malapit na health office, o sa mga homeowners, siguro po base sa aking naging experience, eh mas maganda po siguro na doon na lang sila magrereport.” (My suggestion would be for nearby health offices and homes to support clients who wish to report [and access the CareTB application])*  
– P1, Person with TB, FGD

### Monitoring and feedback

Participants recommended the availability of staff who can routinely monitor the platform and give prompt reactions to inquiries and reports to improve the administrative effectiveness of the mobile application. This guarantees that people with TB's use of the platform will lead to answers and help.

### Protocols for issue resolution

Participants emphasized how crucial it is to refer people with TB to the proper agencies for various kinds of issues. This covers concerns with the provision of services as well as support barriers, financial constraints, stigma, and discrimination. Having established protocols guarantee that people with TB gets the support and guidance they need to effectively resolve their concerns.

### Customization for various user groups

Participants acknowledged that not everyone will have the resources needed to effectively use the digital platform. It is recommended that the platform be customized to meet the unique needs of senior citizens and people with disabilities in order to ensure inclusion. User-friendly user interfaces, accessibility features, and alternative communication methods are examples of customizations.

*“Yung sa akin lang, siguro yung with regards na lang pag ipush-through si CareTB App is maging senior citizenfriendly. Kasi halos mas marami pa yung TB patients na senior citizen na tapos maging PWD-friendly kasi may patient din tayo na parang hindi naman siya blind pero partially blind. Tapos naano niya yung CareTB app pero ang problema ay hindi naman siya makakagamit kasi parang hindi siya friendly para sa blind. Tapos ang nangyayari ay yung anak pa niya ang nageexplain.” (I hope the CareTB App becomes senior citizen-friendly because most of our TB patients are senior citizens. I hope it also becomes PWD-friendly especially for the blind and partially blind. We have a partially blind client who's having trouble using the app so someone from the family is assisting him/her.)* – H1, Health Worker, KII

## DISCUSSION

Our paper is the first of its kind to document the perceptions on a mobile application to support community-led monitoring among persons with TB and healthcare

providers in the Philippines. The study shows the participants' understanding of the utility of a digital community-led monitoring platform in a low-middle-income country where TB incidence remains high.

This study showed participants had a generally positive view towards the Care TB mobile application, and they found it useful for the effective reporting of barriers to TB care. Some health workers perceive it as a complementary mechanism to monitoring health services and patient outcomes. It could also supplement national TB data by collecting information on challenges that are not routinely collected, establishing evidence regarding the critical role of the feedback provided by civil society in improving health service delivery. These efforts will then produce additional reports that could hold institutions and the government accountable for the quality of care delivered by healthcare facilities.

The involvement of the persons with TB through the use of this mobile application in community-led monitoring offers insights and information on health care experience that are otherwise unavailable or unreported to program implementers.<sup>15</sup> They can provide valuable feedback on the acceptability of interventions used to resolve issues they experienced.<sup>15</sup> Involving the recipients of care has also been found to harness the power of collaboration that could impact people beyond the health facility.<sup>16,17</sup>

Participants' views mirror that of the current evidence on the utility and effectiveness of community-led monitoring initiatives. Community-based monitoring of TB care response, with the help of community health volunteers, tends to increase patient access to TB care and enhanced case detection within the community.<sup>18</sup> More recently, it was found that the deployment of community health volunteers led to an increase in overall TB notifications within the community.<sup>19</sup> In the case of HIV, community-led monitoring revealed that ART adherence clubs in South Africa considered ineffective were not operational.<sup>20</sup>

This study also found that the digital CLM provided an avenue where users have the liberty to interact with other people affected by TB without fear of stigma and discrimination. Our findings back up those in Ghana, where data collectors educated religious leaders, women's groups, and chiefs about HIV and the stigma associated with key population groups.<sup>20</sup>

To the best of our knowledge, this digital CLM platform is the first of its kind in the Philippines. It aims to leverage information and communication technologies to introduce and expand community-led monitoring, resulting in faster data gathering, aggregation, and analysis.<sup>21</sup> The participants of this study share the same view that having an automated reporting system promotes a faster turnaround time for the resolution of issues reported by persons affected by TB.

Community-led monitoring, like other reports, demands financial resources and technical competence.<sup>22</sup> This study has found the same perceptions from the participants regarding

technical and financial feasibility. Deploying community-led monitoring platforms also requires political buy-in and is a necessary measure to address grievances.<sup>23,24</sup> We found that participants felt the need for a clear redress and grievance protocol whereby government mechanisms work strategically to ensure a more systemic solution to the identified issues.

## CONCLUSION

In conclusion, this study sheds light on how people with TB perceive a mobile application for community-led monitoring. The results show that the digital platform is viewed favorably and that it has the ability to improve monitoring processes. Key themes were the availability of an additional reporting option, optimism for a faster issue resolution, facilitating information exchange, fostering a feeling of community, and enhancing access to important information.

However, issues with smartphone availability and storage capacity, poor experience with digital devices, and slow or unavailable internet access were all highlighted. The study emphasizes the significance of implementation support, including involvement by local government leaders, monitoring, and feedback mechanisms, clear issue-resolution protocols, and adjustments for various user groups. These results can help with the creation and application of mobile applications for community-led monitoring programs, eliminating issues and optimizing the potential advantages for both people with TB as well as healthcare providers.

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## Data Availability Statement

The data that support the findings of this study are available from the corresponding author, upon reasonable request.

## Statement of Authorship

All authors certified fulfillment of ICMJE authorship criteria.

## Author Disclosure

All authors declared no conflicts of interest. The sponsors/funders had no role in the design, execution, interpretation, or writing of the study.

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