

Perceptions, Barriers, and Opportunities to Strengthen Tuberculosis Prevention and Control in Nigeria: A Qualitative Study of Policymakers and Program Managers

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Abstract Policymakers and program managers play a critical role in shaping tuberculosis (TB) control strategies, yet their perspectives on implementation barriers remain underexplored. This qualitative study examined perceptions of TB control, preventive activities, and implementation challenges in Nigeria. Nine key informants from national and subnational TB programs and partner organizations were purposively selected. Data were collected through in-depth interviews and analyzed thematically in NVivo 12. Participants reported progress in TB control, including the expansion of community-based services, improved access to diagnostics, the scale-up of tuberculosis preventive therapy (TPT), and strengthened monitoring systems. However, these gains are constrained by persistent system-level and contextual barriers. Stigma, low awareness, and financial constraints limit uptake of preventive services, while workforce shortages, staff attrition, supply chain inefficiencies, and reliance on paper-based reporting undermine program effectiveness. Respondents emphasized the need for service integration, increased domestic financing, and accelerated digitalization. TB control efforts in Nigeria are advancing but remain constrained by structural limitations. Addressing these gaps will require coordinated strategies to strengthen health systems, expand access, and improve program efficiency.

Keywords Health Systems, Health Policy, Infection Prevention, Nigeria, Programme Managers, Qualitative Research, Tuberculosis.

Introduction

Tuberculosis (TB) remains a major public health challenge despite being preventable and curable. Tuberculosis remains a leading cause of death from a single infectious agent globally, disproportionately affecting low- and middle-income countries where health system constraints limit access to timely diagnosis and treatment [1, 2]. In 2023, the World Health Organization (WHO) estimated that 10.8 million people developed TB and more than one million died from the disease [1]. The WHO End TB Strategy emphasizes early diagnosis, effective treatment, preventive therapy, patient-centered care, and strong health systems as core pillars for TB elimination [1, 3, 4].

Barriers to effective TB prevention and control are multidimensional and interrelated, spanning the community, provider, facility, program, and policy domains. At the community level, stigma, limited awareness, and socioeconomic constraints can delay care-seeking and reduce uptake of preventive services. At the provider and health-system levels, common barriers include shortages of trained personnel, weak drug and diagnostic supply chains, inadequate contact investigation, weak service integration, and limited access to rapid molecular diagnostics [1, 5, 6]. Financing shortfalls further constrain scaling up preventive activities in many low- and middle-income countries [1].

At the same time, program experience has produced several promising approaches. These include integrating TB services into broader healthcare delivery, using shorter, better-tolerated TPT regimens, adopting digital tools to support adherence and reporting, and strengthening laboratory networks to enable rapid diagnosis. These strategies are more likely to succeed when supported by political commitment, financing, and implementation capacity [1].

Policy makers and program managers occupy a critical position between global guidance and frontline implementation. Their perceptions, priorities, and decisions determine which interventions are considered feasible, urgent, and worthy of investment. Their perspectives are therefore essential to understanding why evidence-based TB preventive measures are implemented successfully in some settings but not in others [7, 8].

Understanding this decision-making layer is crucial for closing the gap between recommendations and implementation in TB prevention and control. This study therefore examined policymakers' and program managers' perceptions of TB control activities, barriers to implementation, and opportunities to strengthen TB prevention and control efforts in Nigeria.

Methods

Study Setting

This study was conducted in Nigeria and included policymakers and program managers at the national level and in three states in Southeast Nigeria: Enugu, Ebonyi, and Abia. The study team purposively selected these states to capture subnational TB program experience within its operational context. Nigeria has a three-tier public health system, with primary care managed by local governments, secondary care by state governments, and tertiary care by the federal government.

Study Design

This qualitative descriptive study used key informant interviews to explore perceptions of TB control and preventive activities, implementation barriers, and opportunities for improvement in Nigeria.

Study Participants and Sampling

Participants included national TB program officers, state TB program managers, and

representatives of partner organizations involved in TB control in Nigeria, such as WHO, KNCV, CARITAS, IHVN, and GLRA. Participants were selected purposively based on their roles, experience, and involvement in TB policy or program implementation. Heads of agencies or senior representatives were invited to participate. A total of nine key informants were interviewed.

Data Collection and Analysis

Data were collected using a pretested key informant interview guide. The guide was piloted with program staff who were not included in the final study, and minor revisions were made for clarity. Interviews were conducted in English, either face-to-face or by phone when in-person interviews were not feasible. Each interview lasted 45 to 60 minutes and was audio-recorded with the participant's consent. Field notes were also taken to capture nonverbal cues and contextual observations.

Audio recordings were transcribed verbatim and cross-checked against field notes for completeness and accuracy. Transcripts were imported into NVivo version 12 for analysis. Coding followed a thematic approach that drew on predetermined themes from the interview guide and on new themes that emerged during analysis. Codes were reviewed and reconciled by the research team, and related codes were grouped into broader thematic categories. The final analysis yielded themes related to TB control activities, preventive activities, barriers, service integration, reporting systems, and recommendations for program improvement. Data saturation was reached when no new themes emerged from subsequent interviews.

Ethical Considerations

Ethical approval was obtained from the Health Research Ethics Committee of the University of Nigeria Teaching Hospital (UNTH). Written informed consent was obtained from all participants after the study's purpose was explained. Participation was

voluntary, and participants were informed of their right to withdraw at any time without consequence. All information provided was treated confidentially, and transcripts were anonymized before analysis.

Results

Participant Characteristics

Nine key informants participated in the study, including seven males and two females. All participants were married and had tertiary education. The mean age of participants was 48 years ($SD \pm 9.39$). Participants included policymakers, program managers, and representatives of partner organizations involved in TB control and prevention in Nigeria.

Perceptions of TB Control Activities

Most key informants described themselves as highly experienced in TB control and prevention. They generally agreed that the TB burden in Nigeria is responding to ongoing program interventions, including active and passive case finding, strengthened engagement with primary healthcare, improved diagnostics, digital chest X-ray, and monitoring and evaluation activities. Respondents consistently viewed these efforts as evidence of progress in case detection, linkage to care, and program reach, particularly at the primary healthcare and community levels.

"...The most important thing that has been done is community structure and primary health care has been empowered to provide care (TB care) which is very important because it's helping us reach health inequality because people at the rural area, the hardly-reached communities...and also to ensure that the patent medical vendors, the community structures are fully involved in TB" (CARITAS KI)

"....So by and large, they continue to ensure that the drugs are available, diagnostics are available. We even with the introduction of these artificial intelligence

for screening, portable digital screening, we see that bringing cutting-edge technology closer to the people, offering like a holistic care....” (CARITAS KI)

Participants consistently reported significant progress in TB control activities. One of them said the following in support of the benefits of the control activities:

“....., I would say that the implementation of the TB control and preventive activities in our state has witnessed notable progress,we have hit 1,885 cases as a state and more than half of these cases either came from the BPM component or the community BPM component. So that is why I said we have witnessed notable progress, most especially in case finding....” (Abia KI)

“....Before we used to have diagnostic issues, but with the inflow of access to diagnostic, now we have TD Lab, we have TUNAS, I think it has been addressed. So, diagnosis now is not a whole major issue because then it was dependent on electricity and all those but with the inflow of these other diagnostic too, I think diagnosis is getting better...” (CARITAS KI)

These respondents also noted a very impactful outcome in preventive activities, especially with the introduction of TPT for highly risk contacts with Tb cases. One respondent emphasized this

“.....Okay, my TPT is, in fact, is a laudable introduction in the TB programme.Yes, it is something I admire a lot and I believe that it has very good potentials going forward. However, there are still a few challenges that has to do with the acceptability of the TPT, especially among contacts of TB patients....” (Abia KI)

As part of control activities, a few respondents noted that their responsibilities include supporting TB control, such as conducting M&E activities using the designated tools. They track program performance. One of them stated

“....., my experience also involves providing evidence-based feedback for the programme manager and other stakeholders in the programme, which ensures that we improve our service delivery across board, as well as monitoring the uptake of TBT and identifying any other gap in the programme...” (Abia KI)

The attitude of healthcare workers was also noted

“. a lot has been said about this, and there are a lot of studies showing that the attitude of health care workers may be a barrier to health-seeking behaviour in the communities...” (KNCV KI)

Barriers to TB Preventive Activities

The most commonly reported barrier to TB preventive activities was low uptake of tuberculosis preventive therapy (TPT). Respondents cited mainly hesitancy, poor awareness, inadequate counseling, stigma, transport costs, and the perceived burden of a long treatment duration. Many participants noted that the earlier 6-month isoniazid regimen was poorly accepted, whereas shorter regimens, such as 3HR and 3HP, were more acceptable and had higher completion rates (World Health Organization, 2024).

“...They will want to find out why they will take a medication for six months, at which is also the same duration the relative or contact will also take. So it's just like Mr. A is saying, if Mr. B has TB and is taking medication for six months, I myself, if I do not have TB, why do I also have to take medication for six months? Yeah. So which is, and their concerns are genuine....” (Abia KI)

“... you know, so one of the things also that we have also noticed in the programme within this field is that the shorter regimen, the three HR, the three HP and the one HP has also helped in acceptability. It has improved acceptability....” (Abia KI)

“...that the awareness about TB preventive therapy or preventive control or preventive practices. (CARITAS KI)

Interactions with these key informants have also shown stark differences in the uptake of control activities compared with preventive activities, with control activities favored. The rate of uptake of control activities is notably higher than that of preventive activities. These include stigma, financial constraints, hesitancy to seek counseling and testing, poor counseling, delays in acceptance of TPT, low acceptance rates for TPT, lack of social support, and perceived untoward side effects of the TPT regimen that discourage uptake.

“...stigma is part of it. People, because of stigma, they stay at home. They stay at home and don't come out to be treated...” (Ebonyi KI)

The preventive activities have also been negatively affected by a lack of access or financial resources on the part of the patients. This occurs in various forms, including the cost of transportation to and from the DOT center, as one of the respondents noted.

“.... So we've had situations, you know, spend money, give them to transport themselves down to their houses. We've also had situations where patients have defaulted and as a result of patient defaulting, the DOT provider tracks the patients by initiating a phone call and the patients, you know, reveals to the DOT officer over the phone that the reason why he or she has not come to pick the refill is because he or she does not have money for transportation...” (Abia KI)

Stigma also featured prominently among the barriers to TB control services. Both self-stigmatization and community stigmatization (family and friends) are implicated, as reported by a key informant.

“...the other one you talked about stigma, stigma is still thrive in the society and one of the challenges with stigma is that it leads to people concealing their signs and symptoms and they'll keep concealing it up to a point

where they eventually present late...” (Abia KI)

The long regimen of TPT has generally been criticized and regarded as a major barrier to its uptake, and this has been reversed with the shortening of the duration from 6 to 3 months.

“...like I told you earlier, this shorter regimen have, in fact, the progression of the shorter regimen have to be very large extent, taking care of that issue...” (Abia KI)

A low level of awareness of preventive services was also noted by almost all respondents, as some shared their insights.

“...and that person does not have information, the acceptability will not be that high, that's just it...” (CARITAS)

Barriers to TB Control Activities

Respondents identified several barriers to TB control activities in Nigeria. These included inadequate funding, weak social support for patients, insecurity, staff attrition, insufficient staffing, limited access to services in rural areas, low staff motivation, insufficient continuing training, low community awareness, stigma, and gender-related differences in health-seeking behavior. Participants emphasized that these barriers reduce case finding, treatment continuity, and overall program performance.

“...the incentive has a role it plays in the motivation of DOT officers....Insecurity is a very big challenge...” (Abia KI)

Attrition was also a major problem, leading to the depletion of trained staff, as confirmed by a stakeholder.

“...So you see someone in a facility today, by the next time you are coming, the person may have relocated out of the country. Everybody is, of course, looking for greener pastures...” (KNCV KI)

A few complained about a lack of basic TB services in rural areas. They decried the inverse distribution of healthcare facilities and workers across the state, noting fewer workers and facilities in rural communities and more in

urban areas. Funding has been a recurring complaint among these respondents. One of them stated

“...the governments have not really...the counterpart funding for most of the states are not forthcoming and with the dwindling funds, and what we are seeing in the global landscape currently, is actually a barrier...” (CARITAS KI)

“..., I would say that many, a couple of rural areas in my state lack basic TB services. And...yes and, in the sense that there are a lot of health facilities within the urban areas compared to what is obtainable at the rural areas....” (Abia KI)

Accessibility of the facilities was also a major issue, as a client had to spend significant time reaching the facility.

“...so you find a situation where somebody in the rural area has to travel for a longer distance to access the nearest health centre compared to the distance somebody in the urban area would have to travel....” (Abia KI)

The issue of social support for patients was also noted as one of the barriers

“...Social support for patients is also a major barrier, you know TB is like, in quote or unquote, the use of the drug, so most times you're trying to give someone drug and the person not eaten, the person has other underlying issues, Yes...which could help in getting this person to do well. .So, it's a major barrier.” (CARITAS KI)

The Monday sit-at-home order by non-state actors affects attendance in service areas, as noted by most.

“....we noticed that monday, people were really not coming to the hospital again and those that missed opportunities, because those who would have come and would have been screened for TB were not. So, in fact, the insecurity in Imo, we also noticed that some hospitals that were in areas that had high insecurity, even up to now, they have not really been able to get themselves. So, it

has an indirect impact on the programme....” (CARITAS)

However, with the sit-at-home order on Mondays relaxed by the current state government, an unprecedented increase has been observed in case finding and enrollment, as confirmed by a KI.

“...We have now started witnessing an increase in notified cases from that LGA, which buttresses the point that insecurity has a role it plays on case finding and, you know, running of the TB programme in a location...” (Abia KI)

Poor awareness or ignorance about TB control activities among the population has also been noted, as mentioned by one of them.

“...knowledge gap in the community.there are some places you go to, and you encounter presumptive cases, and they tell you they have been coughing for a long time, and none of them have thought of TB at all...” (Abia KI)

“....Nobody wants to die! If you interview your patient very well, the one that is defaulting from treatment or refuses treatment, it's because the patient is ignorant. He doesn't understand what you are saying...” (Ebonyi KI)

Inadequate staffing also affects activities

“Health worker issue is a general problem for the country and even for the world. We don't...we don't have enough but with tasks shifting...and in fact even the capacity of the ones we have, is also a major issue. But by and large, there is not enough health workers currently...” (CARITAS KI)

Gender is also acknowledged as a factor affecting the uptake of these services. Some respondents noted that females were the greater beneficiaries compared to males, but surprisingly, they felt there were more females who came for TB screening, while more males seemed to be cases.

“...and TB disproportionately affects men....So when you look at the numbers, I've done screening there, you see you have

screened more women, then as you move towards presumptive, you start seeing you're seeing more men, then as you move towards case...it's almost double. You understand? The screening is more of women, but the cases are more of men....”(CARITAS KI)

Stigma is still considered a major challenge by most of these informants.

“TB still has a stigma. In as much as we are still struggling in the community trying to raise awareness, there's still self-stigma that the person thinks and there's still stigma from the around. So, those affect the uptake of TPT...” (CARITAS KI)

Perceptions of DOTS

Respondents regarded the DOTS strategy as a major strength of TB management in Nigeria. They described it as effective in promoting adherence, reducing treatment defaults, facilitating follow-up, and lowering the risk of drug resistance. Participants also noted that DOTS enables closer patient monitoring and contact tracing. However, some respondents reported that recent stock-outs of anti-TB medicines had affected implementation.

“...., in terms of adherence, well, I would say that the DOT strategy has helped a lot. We've had a significant compliance with treatment, that is, uptake of treatment among TB patients...” (Abia KI)

DOTS offers TB healthcare workers a great opportunity to get to know these patients closely and follow them up, preventing attrition and tracking contacts. A stakeholder stated

“.. and most times when you call them, they will not tell you that they have travelled to this place, they can't come back, or they have relocated. So, what we do in that situation is now to find a way to link them to the nearest facility there, so that they can continue treatment over there...” (Abia KI)

One of the challenges of DOTS recently was drug stock-out syndrome, as noted by a respondent.

“...for the past one year or thereabouts, we had a disruption with the global supply chain system for for TB drugs, where we had a very serious stock out of these commodities...”(NTBCL KI)

“....ab initio (before now), but I think we're practising expanded DOT or something...the DOS is still there, because now the patient goes home but he's supposed to have a treatment supporter...”(CARITAS KI)

Views on Integrated TB Services

All respondents supported integrating TB services with other healthcare services. They viewed this approach as more patient-centered, more efficient for the health system, and potentially helpful in reducing stigma. Several participants believed that service integration had already contributed to improved case detection and broader program reach, provided that TB service quality is maintained.

“...for now, our cases are increasing, our case started increasing from 300, from 600. It's now over 1,000. It's there because I am playing and I integrate my programme with other programmes. I don't say just because I am a TB man, I cannot work with nutrition. I don't say because I am a TB man, I cannot work with MNC....” (Ebonyi KI)

“...Like, I'm a champion of integration now. Anything that is not integration doesn't have me, any backstop project...” (CARITAS)

They also look beyond increasing case finding and view the integration of services as a way to address socio-cultural issues such as stigma, as one respondent stated:

“...So integration is very good because if you work in solitude, you can't get to all the people, because if you work in integration, the stigma will reduce. The reduction of stigma can only survive in integrated services...” (Ebonyi KI)

Perceptions of the Recording and Reporting System

Respondents expressed general satisfaction with the standardized TB recording and reporting system, noting it is consistent and widely used across facilities and program levels. However, many emphasized that continued reliance on paper-based tools is costly and inefficient. Digitization was repeatedly described as overdue, particularly because shortages of printed forms often lead to photocopying, which can compromise data quality and standardization.

“...Our recording and reporting system are okay, even though we've had situations where other programmes that uses the quarterly system of reporting. And I don't know why they always quick to tell us that because some of them are either reporting monthly or bimonthly but for us in the programme, it is very effective. It is very efficient, including the, you know, the route of reporting, starting from the health facility up to the local government level, to the state level, to the national level, very sound...” (Abia KI)

“...I must tell you sincerely in terms of recording and reporting system we have, it is one of the best in the world, in the sense that anywhere you go in Nigeria, any facility you go, we have the standard way of recording and reporting TB interventions. The indicators are the same across the board. And the same tools, the same reporting, irrespective of who is supporting it and as a national programme.” (NTBLC KI)

While they acknowledge that the reporting tools were needed quarterly, the recording tools are used daily. Most of them noted with sadness the inadequacy of these instruments, which necessitates photocopying and might affect the standardization and quality of the tools, as they have noted.

“...The only challenge we've had with the reporting and recording system is that for

some time now, we have not had adequate reporting tools. While the recording tools have been in adequate supply, the reporting tools are not adequate in supply...resulting to photocopying ... it affects the standardization...” (Abia KI)

“...So with that, it makes it a bit challenging that currently we are having some stock out of some recording tools. For example, like the sample specimen request form, they are in shortage in Nigeria, though there are top-line preparations to print enough this year....” (NTBLCP KI)

Recommendations for Improving TB control

Respondents proposed several strategies to improve TB control and prevention in Nigeria. These included increased domestic funding, stronger political commitment, improved community sensitization, engagement of religious and traditional leaders, staff recruitment and retraining, social support for patients, greater integration of services, digitization of reporting systems, and expansion of local production of TB medicines and diagnostics. Participants also emphasized the need to fully integrate TB services into national health insurance.

“...So I recommend that every stakeholder, including the government of Nigeria at all levels, should intensify funding to ensure that adequate resources by way of funding is available for the TB programme to ensure that the implementation is smooth without any hitches...” (Abia KI)

“So one thing now which, TB across the country now, they've done this community intervention that's everywhere and we are hoping that it should saturate and we will have lesser and lesser of the misconceptions around TB...” (CARITAS KI)

“....we should also make sensitization, let people know that for every diagnosed TB patient, there is a therapy that can help the

contacts and prevent them from coming down with TB....” (Abia KI)

“And also, in addition to creating awareness, we also need to engage religious leaders, engage traditional rulers. ...” (Abia KI)

“....I would also recommend that the ACSM unit of the National TB Programme should go a long way in engaging traditional rulers, religious rulers, so that they can be used as contact points in the communities to counter cultural barriers...” (Abia KI)

Training and retraining of workers, including DOT officers, were also recommended, given the high rate of attrition, as requested by a key informant. On-the-job training was also mentioned.

“...Yes! There should be more formal DOT trainings for DOT officers across board. What we have been having over the years is DOT expansion training and DOT expansion training focuses only on new DOT sites but there is no doubt that existing DOT sites have been affected by staff attrition over the years, most especially in the private sector...”(Abia KI)

On rating the TB standardized recording and reporting system as we have it now

I must tell you sincerely in terms of recording and reporting system we have, it is one of the best in the world, in the sense that anywhere you go in Nigeria, any facility you go, we have the standard way of recording and reporting TB interventions. The indicators are the same across the board. And the same tools, the same reporting, irrespective of who is supporting it and as a national programme, we try to ensure we bring all the partners together. (NTBCL KI)

Sensitization through outreaches to raise awareness of the signs and symptoms of TB among communities, using jingles with

dedicated phone numbers for DOTS facilities to enable easy access

“. So we need to be able to have those people talk about TB and increase the population's awareness and sensitize them about TB. .”(IHVN KI)

“...to know that, yeah, these are the signs, this is the number to call, this is where to go to and if somebody is positive, the contacts can as well take this medication and will not come down with TB...” (Abia KI)

“...We need to see that the...first, we are getting healthcare workers at the lowest level well-equipped with knowledge about TB and TB control, beginning from schools of health technology, schools of hygiene. All those should basically be able to understand symptoms of TB and other common illnesses...” (IHVN KI)

Advocates have called for greater political will and commitment from the government, including NHIA coverage of TB services. The government should also create an enabling environment for local production of TB medical consumables, such as diagnostics and drugs, to reduce costs for patients and the country.

“...We need to see more than political will. We need to see commitment, action by government at all levels for TB control and for integrated healthcare service delivery in Nigeria...we need to see the National Health Insurance Agency that was formerly known as NHIS. We need to see TB integrated into that package of care. ” (IHVN KI)

“...Since we know we will need them for many years to come in a large number, in a large scale, why don't we have any medicine for TB prevention or TB treatment being produced in Nigeria? Those are areas where we should look into to unlock the value chain...” (IHVN KI)

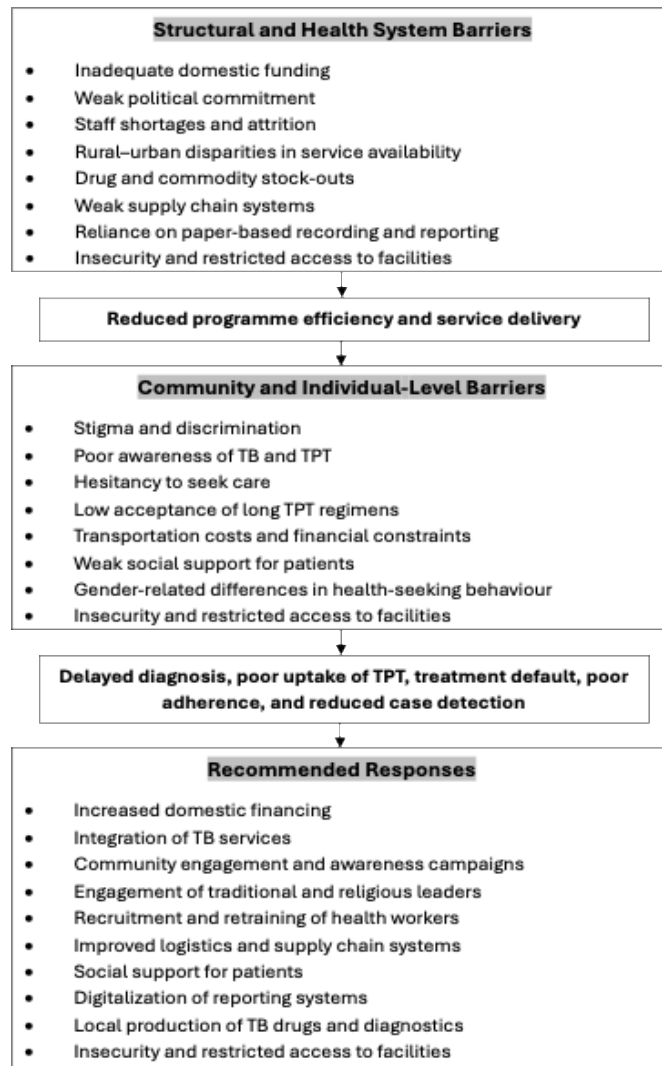


Figure 1. Conceptual Framework of Barriers to Tuberculosis Prevention and Control in Nigeria

Figure 1 illustrates the interrelationships among structural, health-system, community, and individual-level barriers to tuberculosis prevention and control in Nigeria, as well as the recommended strategies identified by policymakers and program managers.

The major themes, key findings, and illustrative issues raised by policymakers and programme managers are summarized in Table 1.

Table 1. Summary of Key Themes and Illustrative Findings from Interviews with Policymakers and Programme Managers on Tuberculosis Prevention and Control in Nigeria

Theme	Key findings	Illustrative issues raised by participants
Progress in TB control activities	Participants reported improvements in community-based case finding, diagnostics, TPT, DOTS, and monitoring systems.	Expansion of primary healthcare services, digital chest X-ray, AI-supported screening, and improved access to diagnostics.

Perceived benefits of TPT	TPT was viewed as an important preventive intervention, especially for household contacts and high-risk groups.	Respondents reported that shorter regimens such as 3HR and 3HP were more acceptable than 6-month isoniazid therapy.
Community-level barriers	Stigma, poor awareness, low risk perception, and poor counseling reduced uptake of preventive activities.	Fear of discrimination, delayed care-seeking, and low acceptance of TPT were commonly reported.
Financial barriers	Transportation costs, poverty, and weak social support limited access to TB services.	Patients often missed appointments because they could not afford transport to DOTS facilities.
Health-system barriers	Staff shortages, attrition, inadequate training, poor staff attitudes, and drug stock-outs reduced programme effectiveness.	Rural areas had fewer health facilities and trained personnel than urban areas.
Security and access barriers	Insecurity and movement restrictions disrupted case finding and service utilization.	Sit-at-home orders and insecurity reduced attendance at health facilities in some states.
Perceptions of DOTS	DOTS was widely regarded as beneficial for adherence, patient follow-up, and treatment completion.	Participants highlighted the importance of treatment supporters and contact tracing.
Service integration	Participants strongly supported integrating TB services into other health services.	Integration with maternal and child health, nutrition, and primary healthcare services was considered beneficial.
Recording and reporting systems	The standardized TB reporting system was viewed positively, but paper-based tools were considered inefficient.	Frequent shortages of reporting tools led to photocopying and concerns about data quality.
Recommendations for improvement	Respondents recommended stronger funding, digitization, training, social support, awareness campaigns, and local production of TB commodities.	Participants emphasized the need for political commitment, NHIA integration, and community engagement.

Source: Authors' fieldwork and thematic analysis of qualitative interviews with policymakers and programme managers on tuberculosis prevention and control in Nigeria, 2026.

Discussion

This study offers policy-level insight into the persistent gap between TB program implementation and optimal outcomes in a

high-burden setting. It found that policymakers and program managers generally viewed ongoing tuberculosis (TB) control interventions in Nigeria as beneficial, particularly the expansion of community-based activities,

improved access to diagnostics, tuberculosis preventive therapy (TPT), and directly observed treatment short-course (DOTS). However, respondents consistently emphasized that sociocultural, financial, and health-system barriers continue to limit the full impact of these interventions. This pattern mirrors the broader global TB context, where progress in prevention, diagnosis, and treatment remains constrained by persistent system weaknesses and implementation gaps [1, 5, 9, 10].

A key finding was that respondents viewed recent improvements in diagnostic access and decentralized service delivery as key drivers of progress in case detection and linkage to care. Their emphasis on primary healthcare and community structures underscores the importance of decentralization in improving access to TB services in high-burden settings. This aligns with global TB guidance, which emphasizes early diagnosis, patient-centered care, and strong health systems as core pillars for reducing the TB burden [4, 5].

Respondents also regarded TPT as an essential preventive intervention, particularly for household contacts and other high-risk populations. However, they clearly distinguished between its theoretical benefits and the practical challenges of implementation. Low uptake, hesitancy, and delayed acceptance were linked to poor awareness, inadequate counseling, stigma, transportation costs, and the burden of long treatment duration. Participants consistently reported that shorter regimens, such as 3HR and 3HP, were more acceptable than the traditional 6-month isoniazid regimen. This aligns with WHO recommendations, which support shorter rifamycin-containing regimens for their improved acceptability and completion rates [3, 4, 11].

Stigma emerged as a major barrier to TB prevention and control. This finding is consistent with extensive evidence demonstrating that stigma remains a major determinant of delayed care-seeking, treatment

interruption, and reduced uptake of preventive services in TB programmes [12, 13]. Respondents described self-stigma and community-level stigma as key drivers of delayed care-seeking, non-disclosure, and resistance to preventive therapy. They also highlighted low awareness and inadequate counseling as key contributors to poor service uptake. These findings reinforce the need for stronger community engagement, targeted health education, and the involvement of community, religious, and traditional leaders. Similar qualitative studies have identified stigma, delayed presentation, and operational barriers as persistent challenges in TB program implementation [7].

Another important theme was strong support for integrating TB services with other healthcare services. Integrating TB services into broader health systems has been shown to improve access, reduce fragmentation, and enhance efficiency in TB program delivery [14].

Respondents viewed integration as more patient-centered and more efficient, and potentially effective in reducing stigma. They also believed that integration could enhance case detection and program reach. However, they emphasized that integration should not compromise the quality of TB programmes. This highlights the need for careful implementation of integration strategies to ensure that infection control, diagnostic pathways, and reporting systems are maintained.

The findings also highlight major health-system constraints. Respondents repeatedly cited inadequate staffing, attrition of trained personnel, maldistribution of health workers, lack of ongoing training, and poor staff attitudes as key barriers to service quality and patient trust. Health workforce shortages and maldistribution have been widely documented as major constraints on TB service delivery in high-burden settings, affecting both the quality of care and program coverage [15]. These

findings align with existing evidence that workforce limitations and weak institutional readiness significantly undermine TB control in resource-constrained settings [16-18]. In addition, rural–urban disparities were noted, with rural populations facing greater barriers to accessing TB services.

Financial barriers were also prominent. Catastrophic costs for TB diagnosis and treatment remain a major barrier to access and adherence, particularly in low-income settings [19, 20]. Respondents cited transportation costs, limited social support, and insufficient domestic financing as key barriers to access and continuity of care. These findings reflect broader health system challenges in low- and middle-income countries, where indirect costs and weak financing structures continue to constrain program effectiveness [1, 5].

Respondents strongly emphasized the continued relevance of DOTS, describing it as a key strength in TB management, particularly for supporting adherence and reducing treatment defaults. However, they also highlighted the impact of drug stockouts and supply chain disruptions, which undermine program effectiveness. This underscores the importance of strengthening procurement, forecasting, and supply chain systems alongside service delivery interventions.

Another important finding concerns the recording and reporting system. Although respondents were satisfied with standardized tools, they consistently noted that reliance on paper-based systems is inefficient, costly, and prone to inconsistencies, especially when stock-outs require photocopying. Their strong call for digitization reflects a broader shift toward digital health systems to improve data quality, timeliness, and program monitoring. Digital health technologies are increasingly recognized as critical tools for improving TB surveillance, adherence monitoring, and program efficiency in resource-constrained settings [21].

This study has important strengths. It captures the perspectives of decision-makers and implementers directly involved in TB control, offering practical insights into program realities. However, it also has limitations. The small, purposively selected sample limits generalizability, and responses may have been influenced by social desirability bias. In addition, the findings are based on perceived experiences rather than on independently verified program data.

Overall, this study shows that although TB control efforts in Nigeria are progressing, their effectiveness remains constrained by structural and contextual barriers. Addressing these barriers will require coordinated, system-wide interventions that go beyond technical solutions to include community engagement, workforce strengthening, sustainable financing, and improved data systems.

Conclusion

TB control efforts in Nigeria are improving but remain constrained by persistent socio-cultural, financial, and health-system barriers. Strengthening workforce capacity, expanding service integration, improving financing, and accelerating digital transformation will be essential to improving program effectiveness and achieving TB control targets.

Competing Interest

The authors declare that they have no known competing financial or non-financial interests that could have influenced the work reported in this paper.

Consent for Publication

Not applicable. This manuscript does not contain any individual's data in any form (including individual details, images, or videos).

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Ethics Approval

Ethical approval was obtained from the Health Research Ethics Committee of the University of Nigeria Teaching Hospital, Enugu, Nigeria (Approval Number: NHREC/05/01/2008B-FWA00002458-1RB00002323). Written informed consent was obtained from all participants.

Author Contributions

EU conceptualized and designed the study. EU, AEC, AO, and JK contributed to data collection and to the development of the study methodology. EU and AEC conducted data

analysis, statistical analysis, and data visualization. EU, AEC, AO, and JK drafted the manuscript. AEC, AO, and JK critically reviewed the initial draft. All authors contributed to interpreting the findings, revised the manuscript for important intellectual content, and approved the final version.

Data Availability

The datasets generated and analyzed in this study are not publicly available because the data are qualitative and participant confidentiality must be maintained. De-identified data may be provided by the corresponding author upon reasonable request, subject to ethical approval and institutional requirements.

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