

Tackling Tuberculosis

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INTRODUCTION

Tuberculosis remains a leading cause of death and disability globally, surpassing the death count of many major infectious killers such as HIV, Malaria, and COVID-19 in high-burden settings¹. Tuberculosis is an aerosol transmissible pathogen that rapidly spreads in populations in close contact. *Mycobacterium tuberculosis* destroys the tissue of affected patients, causing symptoms such as intense coughing, sneezing, chest pain, and hemoptysis, subsequently rapidly exposing others in close proximity (citation). Furthermore, there are individuals who carry an opportunistic, inactive form of the infection that manifests when their immune system becomes compromised (e.g., as a result of other infection) . As a result, affected individuals with no symptoms may propagate it unknowingly to communities easily susceptible to the pathogen².

Tuberculosis is commonly diagnosed through a TB skin test, blood test, or sputum sample. The TB skin test works by injecting tuberculin in the lower part of a patient's inner arm. After 48 to 72 hours, a firm red bump that develops will indicate exposure to TB. The blood test works in a similar manner, in which a physician will extract a small sample of the patient's blood and mix the protein tuberculin directly to identify changes. Sputum tests are performed by collecting a sample from an individual's airway and observing for any affected areas. Despite having a plethora of testing solutions available for TB, the common diagnoses are time consuming, lack quality, and are prone to false positives³. Additionally, these tests are unable to accurately detect latent forms of TB and can be indicative of exposure rather than an actual infection⁴. A person may be incorrectly diagnosed with an active infection, thus leading to unnecessary treatment and inappropriate care.

Strides to resolve the TB crisis in high-burden countries such as Nigeria have proved to be significantly challenging. As the aforementioned methods of diagnoses are mainly distributed, the lack of quality results, such as from false positives, contributes to the decreasing funding and availability of TB testing⁵. Nigeria had received 13, 14, 22, and 22 million USD in 2021, 2022, 2023, and 2024 respectively^{6,7,8,9}. Although they carry similar burdens as TB, funding for HIV/AIDS was approximately 741 million in 2013 and COVID-19 in 2023 received approximately 90.5 billion in funding^{10,11}.

Tuberculosis and Vaccination in Nigeria

Nigeria continues to see a gradual increase in tuberculosis cases every year. As reported by the United States Agency for International Development, there has been a 38% growth in cases from 2021 to 2024¹². In an interview with Umar Muhammad, a project coordinator in the Leadership Initiatives Nigerian operations, he states that there are both individual and structural disparities.

There is a positive response towards hospitals and getting treatment from healthcare facilities. There are a few primary health care centers scattered throughout the region, but they are ineffective at treating large populations. Natives of Bauchi State want to learn about

the symptoms and necessary details, however, the distribution of information is informal and sparse. People of Bauchi State will normally receive information about TB through radio ads or seldom conversations about the disease. As such, information about the disease and vaccination is easily susceptible to manipulation. This lack of understanding is exploited to persuade people that Western communities design vaccines to harm rather than to help.

There are some actions taken to push information, but nearly not enough. Organizations may have programs where they sponsor a cause to mitigate the disease for a short period of time, but they are limited by external powers such as the government and power issues. There are black outs that frequently occur throughout the day. Even when people turn to radios for information during these blackouts, it is unlikely they are listening for information about TB, and even if they are, the ads lack context. Furthermore, due to the lack of power, no one is able to appropriately ask questions or access hospitals. Hospitals are often located miles away from communities; consequently, people only travel if the circumstance is dire. Ultimately, many of the existing efforts only benefit a small portion of people who are fortunate to be located near these sponsored events at the right time.

Overall, it becomes a cycle of misinformation in which people are unable to receive appropriate information about the disease, and regardless of whether they do, there will not be an accessible facility to assist them. Since TB carries a high mortality rate and is highly contagious, it is crucial for people, especially infants, to have facilities available to provide vaccinations.

Identifying Causes and Systemic Barriers

The first and foremost barrier is the lack of primary care centers and medical facilities. These care centers provide necessary information about a variety of illnesses people may be exposed to; however, the sheer number of patients makes it difficult to answer any single question an individual may have about TB. Due to the lack of medical facilities, they are usually only reserved for people who require immediate medical attention. Many people work and live in close proximity to each other which contributes to the growing number of TB cases; without accessible primary care centers, people only continue to contract the disease. In addition to the scarcity of facilities, check-ups and hospital visits are paid out-of-pocket. There are no affordable insurance programs that assist individuals to help pay for life-saving medicine. Many people live hand to mouth; therefore, they do not have the money necessary to afford proper treatment.

Although most natives are aware of the disease, many do not have a particularly strong inclination for preventative medicine. As a whole, natives do not understand the need to take a vaccine if they have yet to contract the disease. This lack of understanding presents a massive obstacle blocking the push for the necessity of vaccines.

Companies, such as Cepheid, who manufacture TB testing kits and treatment plans, contribute to the disparity by prioritizing a high profit margin, rather than the distribution of

life-saving medicine. The manufacturing cost of these cartridges are roughly only \$3 to \$4.50, whereas Cepheid sells them for \$10—a 500% profit margin¹³. These companies follow the Nespresso model in which they will price the machines that process the cartridges for relatively cheap, but significantly increase the price of the testing kits to create a considerable profit¹⁴. Not only that, but Cepheid makes different types of cartridges that are more expensive and tests for more resistance to TB drugs¹⁵. If a patient affected with TB wants to thoroughly test and confirm the types of resistances their TB strain has, they will have to pay more for treatment. As mentioned already, many individuals in Bauchi State live day to day and cannot afford proper treatment. Implementing a system where the thoroughness of a treatment plan is based on monetary value endangers the vast majority of patients who are lower-income.

Proposing Solutions

It is always important to ensure clarity and to reduce complexity when addressing a demographic with predisposed attitudes on western medicine. As a result, an immediate action that can be taken is distributing Tuberculosis pre- and post-testing surveys, provided by community leaders to check for an understanding of knowledge about tuberculosis. These questions must be answered through scaled, closed-ended questions. A sample question could be: “Education on Tuberculosis is prevalent in your community” which can be answered by choosing agree, neutral, or disagree.

After acquiring a grasp on the community's knowledge, the targeted demographic should be engaged in open discussions and stories. If possible, community leaders should be asked to participate in these discussions and share their own experiences with Tuberculosis. Community leaders will be able to better explain the symptoms, its affect on children, and create a sense of reliability to the audience. Moreover, this will further build trust with the audience as community leaders play active roles in their communities.

SAMPLE COMMUNITY WORKSHOP:

Outline and Materials:

The community workshop session is outlined as follows: an informational workshop on tuberculosis awareness.

Materials used in this workshop include, but are not limited to, handouts and brochures; posters and infographics; video resources; displays of anatomical models (specifically of the pulmonary system), sample testing materials, Q&A handouts, and feedback forms. Information presented would consist of an introduction to the tuberculosis disease; signs and symptoms; diagnosis and treatment; prevention; stigma and discrimination, etc. Resources needed would include a venue to host the workshop, audio-visual equipment to effectively broadcast the workshop, handouts to facilitate discussion, and staffing to run and promote the workshop.

Group Size:

We believe that the appropriate group size for our workshop will be around 50 group participants, which includes potential community staff, the workshop facilitator, and the workshop participants. There are a variety of reasons for this choice, as this group size employs sufficient diversity of participants, better engagement, increased interaction, easier logistics, and a more personalized form of attention.

Assess Time Needed:

We believe that the appropriate time for the workshop would fall to about 1 hour of active participation, because that time frame seems most conducive to extensive group discussion between both community staff, the workshop facilitator, and the workshop participants. Due to the nature and inclusivity of our active participatory methods, it would be most desirable to limit ourselves to this timeframe as it requires extensive concentration and mandates everyone in the workshop to convene and engage in discussion. In addition, we believe that 1 hour is a suitable assessment time as it gives adequate time for the presentation of activities that we have planned to incorporate in the workshop.

Participatory Methods (Gender Role Analysis and Focused Group Discussion)

This community workshop uses participatory teaching methods such as gender role analysis, focused group discussion, and use of infographics and posters. Participants will have many opportunities to practice using new skills including gaining a self-awareness of personal impact on tuberculosis as well as an openness to change.

The advantages of active participatory methods include:

- **Increased engagement:** Active participatory methods increase learner engagement and motivation by involving participants in the workshop. When learners are actively involved, they are more likely to pay attention, ask questions, and retain information.
- **Increased social interaction:** Active participatory methods increase social interaction, which may facilitate discourse that is more inclusive and conducive to acceptance of the workshop.
- **Increased information retention:** Active participatory methods increase retention of information as learners are given opportunities to practice and apply what they've learned
- **Improved critical thinking and problem-solving:** Active participatory methods can promote critical thinking and problem-solving skills by providing learners with opportunities to analyze, synthesize, and apply information in real-world situations. These methods can also promote creativity and innovation by encouraging learners to think outside the box.
- **Enhanced learning outcomes:** Active participatory methods can lead to better learning outcomes by promoting deeper understanding and retention of information. When learners are actively engaged, they are more likely to connect new information to their prior knowledge and experiences, leading to more meaningful and lasting learning.

Gender role analysis specifically directs efforts towards reducing the gender disparity of tuberculosis infection rates, and more effectively targets the most vulnerable groups in an effort to drastically reduce overall spread. Men are drastically more likely to contract the disease, at a rate that is 61% higher than among women. There are several factors that contribute to this disparity, and gender role analysis seeks to break these down and spread awareness in a way that may make the factors easier to deal with. Such factors include differences in health-care seeking behavior between the two sexes, cultural norms that impact access to healthcare, and biological differences in TB susceptibility.

Focused group discussion facilitates appreciation and recognition of the problem and better sets the group for success, as all participants will simultaneously learn and synthesize information presented in the workshop. It is defined as a qualitative method in which a group of people are brought together to discuss a specific topic, issue, or problem, usually with a moderator to facilitate honest communication. With this type of participatory method, all perspectives and opinions are able to be heard and understood, and with the moderator, a safe and respectful environment is created. This is overall more conducive to a successful workshop.

Infographics and posters serve to increase participant engagement both during the workshop and after, especially since they are able to be maintained and passed on. They are visually appealing and are better able to capture the attention of workshop participants. In addition, infographics and posters are often powerful tools to convey information in concise and clear ways, such that it is much easier to understand the presented material. Finally, infographics and posters have the added benefit of being able to be commented on without loss of information, as opposed to verbal communication. Because of all of these reasons, infographics and posters simply contain complex, abstract information and promote greater understanding, which ultimately expedites information acquisition and promotes an openness to change.

SESSION DESCRIPTION

This community workshop seeks to educate members of the community about the dangers of tuberculosis. Additionally, we hope to push members of the community to use the tools provided to recognize symptoms of tuberculosis and take appropriate precautions.

Learning Objectives:

- Understand the symptoms of tuberculosis
- Discover possible solutions and precautions to avoid tuberculosis
- Apply certain learned skills to make lifestyle changes

Time:

- 45-60 minutes

Materials:

- Handouts to take home (notes)
- Diagrams of tuberculosis (handout)
- List of possible precautions to take (can take notes)
- Flyers regarding the workshop to spread the word

Facilitator Preparation:

The facilitator should be knowledgeable about the traditions and lifestyle of the members of the community, and respectful of their boundaries.

Activities:

- Activity 1: Tuberculosis Breakdown (20-25 mins)
- Activity 2: Discussion (10 mins)
- Activity 3: Solution Analysis and Lifestyle (10-15 mins)

Activity 1:

This activity works to educate the community members about the dangers of tuberculosis and how they can recognize and avoid symptoms.

- 1) First, distribute handouts for participants to be able to take relevant notes;
- 2) Present the background information and the symptoms;
- 3) Allow participants to ask questions about the symptoms;
- 4) Present the rest of the relevant information such as statistics of tuberculosis outbreaks in the community;
- 5) Take the time to answer any questions asked by the participants to encourage them to be involved in the discussion;
- 6) Also, distribute any handouts for images
 - a) These will be used in the slides presentation so that participants have a reference to refer to while the presenter is speaking.
- 7) Once the presentation is over, hold a question and answer session to recap important details gone over in the presentation.
 - a) This is to make sure that from all the information presented, the participants have taken the most important details needed to combat tuberculosis.

Activity 2:

This activity is intended to promote more personal engagement with the group and presentation. It also intends to gather more personal data and suggestions. This will hopefully give the participants a visual representation of the information presented.

- 1) Have everyone break into smaller groups and complete a brief, verbal introduction.
- 2) In everyone's introduction, they should include something somewhat personal (although this is optional to avoid passing boundaries)
- 3) After about 4 minutes, the facilitator should bring everyone back and do their introduction.
 - a) They should ideally expose a vulnerable part of themselves
- 4) Ask questions; Questions should be along the lines of:
 - a) When have you seen tuberculosis affect someone you knew?

- b) How does this affect you?
- c) How would you personally react to this problem?
- 5) After gathering input from everyone, show appreciation and gratitude.
- 6) Ask for suggestions.

Activity 3:

This activity attempts to create another personal activity for the participants to share their ideas.

- 1) Facilitators should pass out paper and writing utensils to participants
- 2) The template will ask questions and sections that will have the participant list out their day to day schedule, input, etc. The facilitator should then go over each section in great detail and ask if there are any questions.
- 3) The facilitator should explain the benefits of the template and encourage the participants to feel free to complete it.
- 4) Complete a brief recap of the content and importance of the activities.
 - a) The recap should also circle back and include the things the participants have said before
- 5) Lastly, again, show gratitude for the group's participation

Note to Facilitator:

It is important to be sensitive and non-judgmental during this session. It is important for the participants who have left work or home to feel motivated and supported by the other participants and the facilitator. If the participants feel supported, they may feel more encouraged to share this information or apply it in their own lives in ways they haven't previously.

CONCLUSION

Addressing the tuberculosis crisis in high-burden regions such as Nigeria demands comprehensive and engaging approaches. The current challenges, including inadequate diagnostics, limited healthcare infrastructure, and pervasive misinformation, are compounded by systemic issues such as economic disparities, skepticism towards Western medicine, and the high cost for treatment.

Additionally, addressing systemic barriers requires partnerships between healthcare organizations, reducing the cost of TB diagnostic kits, and implementing targeted outreach programs to ensure equitable healthcare access. By adopting methods that combine education, policy reform, and resource allocation, sustainable solutions can be created and reduce the frequency of tuberculosis as well as strengthen the resilience of affected communities.

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