

Critical Appraisal Focusing on Tuberculosis Risks among Displaced Persons: Do We Have a Smoking Gun?

Chukwuebuka Emmanuel Nwoke

Texila American University, Georgetown, Guyana
Email: emmab1755@gmail.com

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Abstract

The UNHCR 2017 report stated that about 44,400 people are displaced from their homes daily and about 68.5 million people are currently displaced globally. This article aims at critically analyzing the tuberculosis risks among displaced people especially as there is an increase in the number of migrants globally and proliferation of man-made and natural disasters. Research conducted among displaced persons and most of the studies concluded that active surveillance and proper case follow-up are the best ways to ensure adequate tuberculosis case management. In conclusion, the application of diverse methods in tackling tuberculosis risks should be especially through a culturally, acceptable precise and feasible plans without compromising international standards.

Keywords

Displaced Persons, Tuberculosis Incidence, Tuberculosis Risk, Critical Appraisal

1. Introduction

Tuberculosis remains an ancient disease which has been known to have killed more people than most war in history. A 2015 report by the World Health Organization [1] agrees that tuberculosis kills far more people each year than any other infectious disease. It is one of the most treatable infectious diseases if the case was identified early.

Migration is a constant phenomenon and the highly controversial issue facing the entire world today. Internally displaced individuals are a heterogeneous group, and the circumstances around the patterns of movement of people varies by location and most often create untold risks to the health and well-being of dis-

placed persons, with the vulnerability levels being higher in some than others irrespective of gender. Dhavan *et al.* [2] in 2017 studied how the social determinant of a populace relate to tuberculosis to worsen the susceptibility of displaced persons to the disease and their worsened therapeutic consequence, identifying them as a target population for the incidence of TB.

2. Population at Risk of Tuberculosis Infection

Fox *et al.* [3] in 2013 agreed that individuals with a near proximity with active tuberculosis subjects are at enormous risk of being contaminated and, if contaminated, to degenerating to a full-blown tuberculosis case, and specifically within the initial year after contamination with the disease. Ear-marking a particular set of individuals to be at the greatest risk of having a tuberculosis infection would be quite difficult. However, McLaren *et al.* [4] identified that the following risk factors could facilitate the infection by the tuberculosis disease and they include living and occupational factors, under nutrition, inadequate access to healthcare services, confinement, poor source of livelihood, co-morbidities, tobacco smoking and exposure to silica dust.

McIntyre [5] in 1999 agreed that displaced individuals are the most at risk members of the community. Active finding and treating of TB cases among displaced individuals would always be a significant issue of immigration health for the coming decades. The primary aim of this paper is to protect host populations from infectious disease like tuberculosis by decreasing the transfer of this communicable disease carried by the newly arriving migrants from anywhere utilizing this literary medium.

3. Scope of Study

The researcher considered studies done around the tuberculosis risks among displaced persons and immigrants. The periods and geographical location were not among the exclusion/inclusion criteria. Only studies published in English language was considered and studies were collated from all geographical location in different periods for a proper understanding of how these risks have evolved over time.

4. Appraisal and Review of Current Evidences of TB Risks and Recommended Actions from Evidence

Orr *et al.* [6] in 1990 conducted a tuberculosis case prevalence study among immigrants in Manitoba which was mainly aimed at understanding the prevalence of TB cases and determining the incidence rate of the disease in Manitoba over a 2 - 6-year follow-up period. The study concluded that most of their new TB cases were among the new arrivals in Manitoba. Their study recommended the improvement of surveillance system for Tuberculosis cases especially as 1 infectious TB case can potentially infect 10 people with the tubercle bacilli within the initial year of contact. They also reported that the identified TB cases were not sick enough to seek for medical assistance which points to the dire

need to boost surveillance systems for TB especially in areas where they reside or are kept.

Wang *et al.* [7] in 1992 studied retrospectively, the prevalence and incidence of TB among Asian immigrants to British Columbia, Canada. This study was conducted between the years 1982 and 1985 while concluding that the influx of migrants into British Columbia increased the incidence rate of TB cases to about 8 times the national average. It was recommended by the study that the identification of active TB cases before the immigration of people into British Columbia would have played a major role in decreasing tuberculosis cases in the initial year after their arrival.

The studies in Canada [6] [7] points strongly to incidence of new cases of tuberculosis to be mostly among the new migrants and the need for improved surveillance. The main advantage with tuberculosis surveillance is in the early establishment of latent infection [8], the only challenge noted is in the credibility of the results.

DeRiemer *et al.* [8] conducted a retrospective cohort study of immigrants and refugees that settled in the United States within the 1st of July 1992 through 31st of December 1993. The study tried to determine the precision of TB screening conducted outside of the United States while tracking the individuals within their initial year of settlement to check for TB incidence. They concluded by understating the significance of early detection of TB cases, early therapeutic treatment of cases and proper follow-up of cases with the greatest risk. They went on to recommend that the use of culturally acceptable techniques and strategies for better healthcare service delivery should be adopted in places that are receptive of large number of displaced people.

Pang *et al.* [9] analyzed the surveillance system of TB cases in Western Australia. Their study was aimed at the assessment of the efficacy and effectiveness of TB surveillance among immigrants in Western Australia. They adopted a retrospective descriptive analytic research technique for the study of immigrants from January, 1994 through December, 1995. The study concluded that the normal Mantoux (skin) testing is not an effective TB screening for immigrants. They further recommended some changes in the administration for an improved efficiency and compliance.

LoBue *et al.* [10] retrospectively reviewed computer-based data and medical records of immigrants and refugees in a county in California. Their study was aimed at assessing the results of a TB screening of immigrants and refugees within San Diego County, California. They concluded that the number of active TB cases were minimal especially among the foreign-born immigrants. They recommended the introduction of new strategies for the early detection of TB cases.

Erkens *et al.* [11] analyzed retrospective 29 months data of immigrants who were screened for TB in the Netherlands. The study aimed at assessing the effectiveness of the Dutch TB screening policies of immigrants newly arriving in the Netherlands. They concluded that the screening reach was high but the follow-up of normal screening was really low. The study recommended the increase of fol-

low up reach of screened cases beyond 1 year period.

Harstad *et al.* [12] conducted a retrospective cohort study of TB screening among asylum-seekers in Norway. Their study evaluated the programme for identification, therapy and follow-up of TB cases among asylum seekers in Norway. They concluded that the screening was adequate but the follow up of identified cases were not properly handled. The study recommended easing the TB protocols and referral channels, rolling out of compliance systems for maintenance of standards, and enhanced interaction between the Government and the health systems.

The challenge with culturally acceptable techniques is that it may not necessarily align with international standards. Efforts need to be channeled towards ensuring intervention maintain standards while appearing less conspicuous. The research work done by Pang [9] showed how deficient testing can be ineffective in detecting tuberculosis. Perhaps, adopting the idea by Erkins [11] in ensuring proper follow-up of cases after testing could help in detecting cases of tuberculosis and would be handy to Harstad *et al.* [12].

Lowenthal *et al.* [13] did a study that adopted a retrospective analysis design to analyze the effectiveness of an enhanced pre-immigration screening and therapeutic protocols to reduce the importation of infectious TB into California and the United States. The enhanced pre-immigration screening incorporated sputum culture to the existing sputum smears of abnormal chest radiographs. They argued that there has been a statistically significant decline in the number TB cases due to the enhanced screening and therapeutic protocols being introduced. They recommended the continuous monitoring of risks by the local and national authorities to ensure the effectiveness of the newly adopted strategy.

Gidado *et al.* [14] conducted a retrospective study in the security challenged states in the Northeast Nigeria which aimed at describing how TB services are executed in states under emergency rule. The study concluded that case finding of TB is majorly affected whenever there is insecurity. They recommended the addition of the management of infectious diseases like TB into emergency responses executed by international organizations and parastatals for displaced persons.

The study done and recommendations provided by Gidado *et al.* [14] seemed fair and reasonable for war-torn regions of the world without adequate tuberculosis screening due to poor access to these test materials. Perhaps, maintaining a high-level of suspicion for tuberculosis would go a long way in the prevention of cases as suggested by Hassanain [15], in addition to applying the recommendations by Lowenthal *et al.* [13].

Hassanain *et al.* [15] did a cross-sectional review of the Sudan's National Tuberculosis program for the past 10 years within the conflict and non-conflict areas. Their study objective was to measure the case notifications, characteristics and outcomes between the troubled and non-troubled areas. They concluded that there were poor case follow-up and increased treatment failures in the troubled areas as compared to the non-conflict areas. They recommended the immediate

review of the surveillance system in the conflict areas and the use of context-flexible measures for case-finding especially among displaced persons.

5. Ways of Protecting the Displaced Population from Tuberculosis

5.1. Planning and Preparedness

Hsien-Ho *et al.* [16] analyzed how China reduced the mortality attributed to TB from 63% to 80% within a ten-year period. The study reviewed all the TB policies in China using a dynamic compartmental model of tuberculosis transmission. They inferred that policies especially for TB control should be tailored to the country-specific context.

Planning for the protection of displaced people from TB would require reviews of the drivers of displacement in the sect of population being planned for. Ragonet *et al.* [17] reviewed TB control models proposed in Fiji mathematically and hence agreed that activities such as the sensitization campaigns planned were one of the most precise strategies that would decrease TB incidence and the institution of therapeutic support leading to a high effect on mortality.

It is hence agreed that modalities that would help support diagnosed TB cases and sensitize the general public with high reference to the displaced persons, be incorporated in community-oriented programs. Policies especially those related to infectious diseases should be regularly reviewed with regards to the well-being and protection of displaced persons.

5.2. Prevention and Early Detection

According to Carla *et al.* [18], there are three main tactics used for reducing the transmission of tuberculosis 1) finding and instituting treatment for tuberculosis patients; 2) identifying individuals bared to a confirmed tuberculosis case, reviewing them for the infection, and instituting the right treatment, if suitable; and 3) actively searching for people at risk of getting the latent tuberculosis infection and instituting therapy early to the affected individuals to impede development into a disease.

Dowdy *et al.* [19] agrees that prioritizing strategies that would decrease the transmissibility or transmissibility period of TB disease, exposure period, and vulnerability of exposures. Exposure of a contagious TB patient and a vulnerable individual could likely occur following the collection of a group in a little settlement as often seen among displaced persons (such as in tents, IDP camps, and refugee camps) or in the long run (such as in communal transports and displacement).

Houben *et al.* [20] agrees that the transmissibility and the transmissibility period of a TB disease would decrease with early finding and institution of therapy for identified cases through enhancing admittance into centers for tuberculosis diagnostic and treatment, utility of better and more sensitive assays, active case finding and faster referral to healthcare for institution of therapy.

5.3. Investigation and Control

It has to be noted that the spread of the tuberculosis disease is really random according to Dowdy *et al.* [19], with arbitrary outcomes, and the best method to decrease its spread by 50% would be to halve the frequency of infection of the population by the infectious tuberculosis. This can be feasibly achieved, for example, by quickly identifying and instituting treatment of half of identified patients, or halving the transmissibility period of all cases. However, the spread of TB is not regular: exposure periods are greater among some particular groups (for instance, packed settlements, exposure within family, working-class people), some persons are more contagious (for instance, the presence of more bacteria loads or ability to contaminate the air more effectively), and then more vulnerable individuals (for instance, as a result of compromised body defense system or comorbidities and severe malnutrition).

Investigating and controlling the spread of TB disease especially among displaced persons would involve reducing the transmission of the disease and instituting context sensitive surveillance channels for case finding and referral. Hsien-Ho *et al.* [16] proposed that reducing the TB prevalence among any population could occur through enhancing strategies that would enable early treatment of identified cases.

6. Strategizing for Tuberculosis Risk Preparedness and Response

6.1. Surveillance of Potential Sources of Tuberculosis Disease

The sources of tuberculosis include infectious human source and ingestion of contaminated animal product.

Churchyard G *et al.* [21] attempted to answer the burning questions of who is transmitting? Who is at risk? Through what means can this occur? The image below made this attempt. See **Figure 1**.

This image (**Figure 1**) culled from Churchyard *et al.* [21] was sourced from the Aurum Institute.

Earlier than now according to Whitney [22], tuberculosis was a common cause of infant mortality and was thought to be a congenital condition. Robert Koch publicly stated in 1901, that bovine tuberculosis is rarely a cause of human disease. This theory was strongly opposed by Dr. Rutherford who went on to prove that animal dairy products are potential source of tuberculosis. Ashford *et al.* [23] published that 15 percent of human TB up to the late 1990s, were caused by *Mycobacterium Bovi* (found commonly in unprocessed milk).

6.2. Dose-Response Assessment

In 1905, Robert Koch presented a Nobel lecture where he specifically referred tuberculosis as a disease of “accommodation”. Tuberculosis has been severally proven to be a cohort disease and establishing a dose-response relationship would depend mostly on the level of exposure, susceptibility to the disease and the infectiousness of the bacteria disease.

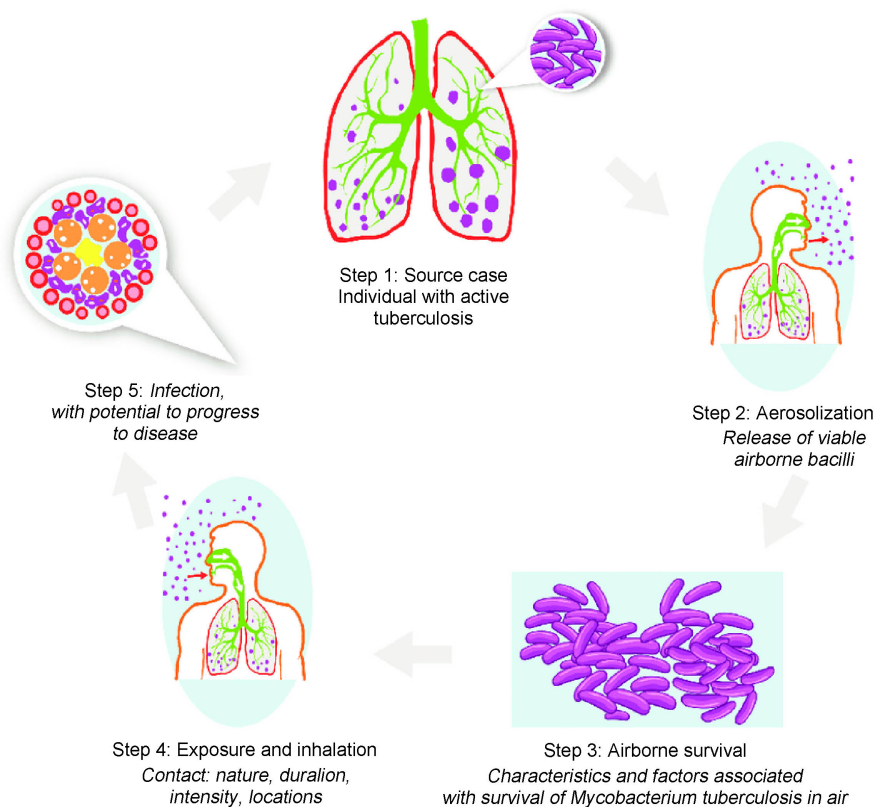


Figure 1. Diagrammatic Representation of the infection process of Tuberculosis.

Caihong *et al.* [24] assessed the treatment pathway of tuberculosis in China and agreed that the long delays in the diagnosis of tuberculosis decrease the effectiveness of its treatment. This eventually leads to treatment delays and a poor dose response relationship outcome. Applying the conclusion of this study to displaced persons, it can be deduced that delays which abound in the identification and treatment of tuberculosis cases provide poor dose-response outcomes. The time to act can never be more than right now.

6.3. Exposure Assessment

Martinez *et al.* [25] agreed that tuberculosis is mainly contracted through sharing a room with an active TB infested individual and breathing infected droplets from their respiratory system. Their study further utilized a random-effects analysis to determine that households with an active tuberculosis case in their homes were about 4 times at risk of having TB infection than an age-matched individual in the same community but without an active tuberculosis case in their home.

Population based exposure has generated mixed results from researchers. While research conducted in South Africa by Middelkoop *et al.* [26] concluded that community based exposure was more common for the prevalence of cases, another research done in Uganda by Whalen *et al.* [27] inferred that household transmission was commoner. The fact remains that there are underlying factors that facilitate the transmission of the disease and a mere exposure may not necessari-

ly be the main determinant of an infection with a tubercle bacilli. Considering the duration of exposure, the infectiousness of the disease and the level of immunity could be other important factors to analyze.

6.4. Characterization of Risk

Understanding the context of this paper would be a place to start in characterizing the risk of infectious diseases like tuberculosis among displaced persons. Tuberculosis is interestingly one of the highest causes of mortality worldwide according to a 2018 WHO report [28]. The report further highlighted that 10 million people worldwide has the disease and 1.6 million people died as a result of the disease.

The UNHCR 2017 report stated that about 44,400 people are displaced from their homes daily and about 68.5 million people are currently displaced globally [29]. The report further explained that 40 million people are internally displaced and 25.4 million are refugees. This report understates the huge burden the international community has and the longer we wait, the worse the outcome expected based on the dose-response relationship earlier stated.

6.5. Vaccination and Screening as a Protection Tool

Mangtani *et al.* [30] stated that the BCG which was produced in 1921 is currently globally used in the prevention against tuberculosis but the debate of its propensity to protect from tuberculosis has been an ongoing international conversation. Vaccination with BCG is mostly done at birth to proffer immunity to the tuberculosis disease but with the current upsurge of cases, other options for protection are sought.

Early detection of cases and institution of therapeutic interventions remain the best form of management of tuberculosis. The use of community extension workers for active case finding of tuberculosis within communities was proposed by Bilal *et al.* [31], where they stated its effectiveness.

Active surveillance has been proven severally by different researchers, to be an effective measure in minimizing the spread of the disease [6] [15] [16].

7. Tuberculosis Risk Communication Strategies

7.1. Community-Based Surveillance Decreases the Prevalence of Tuberculosis

Bilal *et al.* [31] reported how a community-based approach adopted in Ethiopia increased their early detection of TB cases and eventually decreased the prevalence of the disease in their location.

7.2. Regular Training and Re-Training of Health Workers and Strategic Community Members Would Improve the Early Case Detection

Shrestha *et al.* [32] conducted a study in Ethiopia that tested the knowledge of health workers and administrative staff. They concluded that regular skill-based

training of health workers and orientation of staff are effective measures in the control of TB. Temesgin and Demissie [33] concluded a study that stated that a good TB infection control knowledge is 10 times more likely to have a good TB infection control practice than others with poor knowledge.

7.3. Constant Evaluation of Risk Management Measures

Regular reviews of risk management plans would ensure that high level of quality is maintained in program execution.

7.4. Training of Risk Communicators with an Updated Best TB Infection Control Protocols

Tuberculosis risk Communicators are people trained within an identified context to educate identified at-risk communities on the prevailing causes, effects, treatment and prevention of tuberculosis infection.

7.5. Communication of Risks Utilizing Multiple Culturally-Acceptable, Cost-Effective Methods

The utility of different methods and culturally understandable and appropriate language, precise and feasible plans, and the exploration of culturally popular applications in a well-timed approach would all entirely improve the reach of tuberculosis risk communication.

For instance, pictures and images convey messages faster and better to majority of at-risk population but individuals with poor sight would obviously require other means of communication. Covello *et al.* [34] stated that the communication of risks leads to improved trust and confidence by the public in important emergency conditions. Culturally competent means of communication of risks should be adopted by international partners and methods of personal and environmental protection should be incorporated into key messages.

This study would have benefited more from a meta-analyses study design. There was not much research work recruited for this paper hence limiting the scope of the study, more could have been incorporated.

8. Conclusions

Emphasis on the provision of a common worldwide perspective in the prevention of tuberculosis among displaced persons should be a task to be performed with a sense of urgency.

International community needs to engage in regular risk communication to ensure the public is informed and can enhance their contribution to and execution of enacted health policies. Surveillance remains the key to proper case finding and truncation of community transmission of the disease. Government should find better ways to work with agencies to ensure active case finding of tuberculosis.

Conflicts of Interest

The author declares no conflicts of interest regarding the publication of this paper.

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