IOSR Journal of Dental and Medical Sciences (IOSR-JDMS)
e-ISSN: 2279-0853, p-ISSN: 2279-0861.Volume 20, Issue 1 Ser.11 (January. 2021), PP 30-33
www.iosrjournals.org

Active Case Finding strategy in Tuberculosis, A Bangladesh Country Prospective.

Nikita Raula, Priyakanta Nayak, Shankar Dapkekar, Deepak Kumar
Freelancing Public Health Expert

Abstract
Bangladesh is among the 30-high burden countries (HBCs) in the World for Tuberculosis (TB). Approximately 2,24,200 all forms of TB cases have been notified to National TB Control Program (NTP), however around 1,19,800 cases are estimated to be missed annually. The directly observed treatment short course (DOTS) strategy, based on passive case find strategy is successfully being practiced with 53% case detection and 92% treatment success rate. At present, no routine screening activity is ongoing among the slum dwellers or any other high-risk groups and also there is lack of improved diagnostic facility other than smear microscopy in the DOTS centers. Though passive case finding has been the focus of Tuberculosis control strategy, an epidemiological model developed by Murrrey et al has emphasised on an increase case detection with a combined approach with active and passive case finding as compared to passive case finding alone. In high TB prevalence countries, active case finding (ACF) not only will break the access barrier but also will be able to detect the cases those otherwise would have been left undiagnosed.

Keywords
"Tuberculosis", "epidemiology", "risk factors", "socioeconomic factors", "active case finding", "Tuberculosis Transmission"

Date of Submission: 05-01-2021 Date of Acceptance: 20-01-2021

I. Introduction

Tuberculosis remains one of the leading causes of death from infectious disease worldwide. In 2017, 1.6 million deaths occurred due to TB among an estimated 10 million incident cases worldwide. (1). According to World Health Organization (WHO) reports, globally 3.6 million cases were missing or under reported during the year 2017 (2). Bangladesh is among the 30 high burden TB countries (HBCs) in the world. Approximately 2,24,200 all forms of TB cases have been notified to National TB Control Program (NTP), however, 119,800 cases are estimated missed annually (2). WHO has prioritized "Integrated, patient centered care and prevention strategy" with key components of early diagnosis of TB including universal drug susceptibility testing, and systematic screening of contacts and high-risk groups under the goal to END TB by 2035 (3). Systemic screening, Early diagnosis and prompt treatment initiation not only will minimize the gap between estimated and notified number of TB cases but also will lead to improved outcome of the disease (4).

WHO defines "systematic screening for active TB" as the systematic identification of people with suspected active TB, in a predetermined target group, using rapid tests, examinations or other procedures (5)? A risk group for TB includes a group with significantly higher prevalence or incidence of TB than the general population or a group of people sharing a specific individual-level risk profile like close contacts of active TB case, specific disease conditions like HIV or diabetes; migrant, all people living in a specific geographical location associated with a high burden of TB like urban slum or institution prisoners etc **(5).**

II. Method

The area of study is the country Bangladesh. Literatures were searched from websites PubMed, Google scholar and Plos one, using the key words, "Tuberculosis", "epidemiology", "risk factors", "socioeconomic factors", "active case finding", "Tuberculosis Transmission". 45 journals were selected and a systemic literature review was done.

III. Discussion

About 60% of total population of Dhaka city lives in slum areas, however, only 13% TB cases were reported from the metropolitan cities and urban areas (6). The directly observed treatment short course (DOTS) strategy, based on passive case finding approach is successfully being practiced with 53% case detection and 92% treatment success rate. However, the frequent migration tendency and the inability of wage earner slum dwellers and the housewives to access DOTS facilities due to collision of their working hours with the opening

hours of DOTS altogether lead to delayed and interrupted treatment causing longer infectious period, uninterrupted transmission chain of TB and also increase the risk of developing multidrug resistant (MDR)-TB (6-8), and finally reduce the impact of DOTS among the urban slums dwellers.

At present, no routine screening activity is ongoing among the slum dwellers or any other high-risk groups and also there is lack of improved diagnostic facility other than smear microscopy in the DOTS centers. The clinicians very often face difficulties to treat the symptomatic patients having chronic cough and negative smear microscopy with confusing chest X-ray (9). Acid fast bacilli (AFB) microscopy and conventional culture in Lowenstein-Jensen (L-J) medium remain the cornerstone of the diagnosis of TB since long. Smear for AFB microscopy is the cheapest and commonly used laboratory method for TB diagnosis in TB endemic zones (10). Even in resource poor settings and it is highly specific but the sensitivity varies from 20-80% (11). Conventional culture is the gold standard test which can detect *Mycobacterium tuberculosis* (MTB) from the specimen with low bacterial load but takes 4-8 weeks to get result. On the other hand, WHO recommended rapid PCR GeneXpert MTB/RIF assay (X-pert) is capable to identify MTB with rifampicin resistance within same day and is highly sensitive and specific compared to gold standard. Different studies have shown House-to-house screening is a more comprehensive ACF strategy to detect more TB case where resources are available (17).

Though passive case finding (PCF) has been the focus of Tuberculosis control strategy, an epidemiological model developed by Murrrey et al has emphasised on an increase case detection with a combined approach with ACF and PCF as compared to PCF alone. Also, it can contribute a reduced mortality as well (18,19). A high prevalence of TB among the urban slum setting may be contributed by overcrowding, poor housing and poor living conditions (12,20). ACF conducted in three urban slums of Uganda has shown prevalence as high as 6.4% among the 16743 screened population (21). In a Similar survey conducted in poor urban settlements of Phnom Penh, Cambodia, 783 cases were detected among 315874 screened population (274.8/100000) (22). Among the 695 presumptive cases, 134 (134/100,000) were confirmed to have tuberculosis which is very high as compared to routine passive case detection. ACF conducted in a region of Central India with isolated tribal and non-tribal villages has shown a prevalence of 129/100000 (24) Including Gene X-pert in the diagnostic algorithm of ACF will lead to an elevated case detection number. Intensified Case finding activity conducted in Nepal including the high-risk groups (145 679 individuals), 26 447 underwent sputum microscopy. Among which only 9716 (37%) sputum-negative samples were tested on X-pert, which gave additional 716 (7%) positive cases (27). , X-pert which has shown to have a high sensitivity and specificity for both pulmonary and Extra pulmonary tuberculosis can be practiced in local DOTS centre among smear negative PTB suspects who are more suggestive to be TB patients and whose CXR cannot give any conclusive inference(25,26).

Direct and indirect costs including out of pocket expenditure, wedge loss incurred during the diagnosis and treatment are among the major barriers to TB services in different settings and contexts. Among the low socioeconomic group limited knowledge about the disease and the free TB treatment policies are the other contributing factors. (28,31-34). In middle income and low-income countries male are prioritized and given preferential access to health care. Financial dependency, social status, low literacy level; and household deterrent women from accessing TB care. (28, 29,30). In high prevalence countries, Active Case Finding not only will break the access barrier but also will be able to detect the cases those otherwise would have been left undiagnosed (35,36).

It is evident that Strategizing Active case finding in high risk groups towards elimination of Tuberculosis is highly essential. This will reduce morbidity, mortality due to the disease and also break the transmission chain (35-38). It is also important to understand the mode of TB transmission to prevent TB spreading among high risk population.

TB genotyping is a laboratory-based approach used to analyze the genetic material (e.g., DNA) of *Mycobacterium tuberculosis*, which is important for the epidemiological studies of TB. The most frequent genotyping methods used for transmission dynamics of *Mycobacterium tuberculosis* strains are restriction fragment-length polymorphism (RFLP), spoligotyping and mycobacterial interspersed repetitive unit of variable number tandem repeat (MIRU-VNTR). Deletion analysis is effective to differentiate *Mycobacterium tuberculosis* strains phylogenetically whether it is ancestral (TbD1 intact) or modern (ΔTbD1). Usually the ancestral strains predominantly originated from endemic foci whereas modern *M. tuberculosis* strains that have lost TbD1 may represent epidemic MTB strains.

Bangladesh although is an endemic and high prevalent country for TB, very few epidemiological studies have been regarding TB transmission. In rural Matlab, TB was prevalent with reactivation of latent infection with ancestral East African Indian (EAI) strain and with recent emergence of modern Beijing strain (ref). In urban setting, EAI was found the predominant strain for TB disease (12). The Beijing, Haarlem, and African M. tuberculosis clusters belong to Modern Strain and associated with epidemics and are widespread (39, 40). Beijing strain is more ubiquitous and indicates recent transmission among this population. (41,42). Study in urban area and prison setting also have shown same finding. (44,45)

Most of the modern and ancestral strains prevail from working age group people who are very vulnerable in terms of transmission. Most of the MDR-TB strains were also of modern type in previous study conducted in Bangladesh (43). It is very difficult to draw a conclusion from this study results as the study period was short to observe the transmission pattern.

IV. Conclusion

Controlling airborne infection like tuberculosis requires early detection of cases, prompt initiation of treatment. This will not only make the cases non-infectious at the earliest but also break the transmission chain. Implementing Active case finding at least biannually as a component of the National Tuberculosis Program can reduce the burden of the disease, mortality and morbidity due to the same in long run with use effective diagnostic methods and algorithms among the key population including Urban slums, PLHIV, various congregate settings (Prisons, shelter homes, Hostels, schools), mining industries and silica industries etc.

Knowledge and access barriers to the TB care services can be minimised through active household visits and various IEC activities concerning the disease. To confirm the evidence of transmission found in this study, large scale molecular epidemiological studies should be conducted in such settings.

References

[1]. WHO. (2018). Top-Ten Priority Indicators for Monitoring Implementation of the End Tb Strategy At Global and National Levels Indicator Recommended Target Level Tb Treatment Coverage ≥ 90% Tb Treatment Success Rate ≥ 90% Percentage of Tb-Affected Households That Experie. Retrieved from http://www.who.int/tb

[2]. World Health Organisation. (2018). *Global Health TB Report*.

[3]. Azim, N. H., Subki, A., & Yusof, Z. N. B. (2015). The End TB Srategy. *World Health Organization*. https://doi.org/10.1017/CBO9781107415324.004

[4]. Asres, A., Jerene, D., & Deressa, W. (2018). Delays to treatment initiation is associated with tuberculosis treatment outcomes among patients on directly observed treatment short course in Southwest Ethiopia: A follow-up study. *BMC Pulmonary Medicine*, *18*(1), 1–11. https://doi.org/10.1186/s12890-018-0628-2

[5]. LONNROTH, K., & LONNROTH, K. (2013). Systematic screening for active tuberculosis, 1–146. Retrieved from http://www.who.int/tb/publications/Final_TB_Screening_guidelines.pdf%5Cnpapers2://publication/uuid/08A76D05-FB96-49D1-BEF3-8875B6841F30

[6]. Tuberculosis Control in Bangladesh, Annual Report. National Tuberculosis Control Program, Services DGoH; 2015.

[7]. Kuznetsov VN, Grjibovski AM, Mariandyshev AO, Johansson E, Bjune GA. A comparison between passive and active case finding in TB control in the Arkhangelsk region. International journal of circumpolar health. 2014;73.

[8]. Obermeyer Z, Abbott-Klafter J, Murray CJ. Has the DOTS strategy improved case finding or treatment success? An empirical assessment. PLoS One. 2008;3(3):e1721.

[9]. Hossain S, Larson C, Quaiyum M, Khan A, Zaman K, Begum V, et al. Adults with chronic cough in urban Bangladesh: healthcare utilization and management of cases by private practitioners. World health & population. 2009;12(1):5-17.

[10]. Negi S, Khan SF, Gupta S, Pasha S, Khare S, Lal S. Comparison of the conventional diagnostic modalities, bactec culture and polymerase chain reaction test for diagnosis of tuberculosis. Indian journal of medical microbiology. 2005;23(1):29.

[11]. Steingart KR, Henry M, Ng V, Hopewell PC, Ramsay A, Cunningham J, et al. Fluorescence versus conventional sputum smear microscopy for tuberculosis: a systematic review. The Lancet infectious diseases. 2006;6(9):570-81.

[12]. Banu S, Rahman MT, Uddin MKM, Khatun R, Ahmed T, Rahman MM, et al. Epidemiology of tuberculosis in an urban slum of Dhaka City, Bangladesh. PloS one. 2013;8(10):e77721.

[13]. Petroff S. A new and rapid method for the isolation and cultivation of tubercle bacilli directly from the sputum and feces. The Journal of experimental medicine. 1915;21(1):38-42.

[14]. Uddin MKM, Chowdhury MR, Ahmed S, Rahman MT, Khatun R, van Leth F, et al. Comparison of direct versus concentrated smear microscopy in detection of pulmonary tuberculosis. BMC research notes. 2013;6(1):291.

[15]. Banu, S., Mahmud, A. M., Rahman, M. T., Hossain, A., Uddin, M. K. M., Ahmed, T., … Brosch, R. (2012). Multidrug-resistant tuberculosis in admitted patients at a tertiary referral hospital of Bangladesh. *PLoS ONE*, *7*(7). https://doi.org/10.1371/journal.pone.0040545

[16]. Canetti G, Fox W, Khomenko A, Mahler HT, Menon N K, et al. (1969) Advances in techniques of testing mycobacterial drug sensitivity, and the use of sensitivity tests in tuberculosis control programmes. Bull World Health Organization 41.

[17]. Riaz, N., Wolden, S. L., Gelblum, D. Y., & Eric, J. (2016). *HHS Public Access* (Vol. 118). https://doi.org/10.1002/cncr.27633.Percutaneous

[18]. Abebe, M., Doherty, M., Wassie, L., Demissie, A., Mihret, A., Engers, H., & Aseffa, A. (2012). TB case detection: Can we remain passive while the process is active? *Pan African Medical Journal*, *11*, 50.

[19]. Murray, C. J., & Salomon, J. A. (1998). Modeling the impact of global tuberculosis control strategies. *Proceedings of the National Academy of Sciences of the United States of America*, *95*(23), 13881–13886. https://doi.org/10.1073/pnas.95.23.13881

[20]. Braden CR, Templeton GL, Cave MD, Valway S, Onorato IM, et al. (1997) Interpretation of restriction fragment length polymorphism analysis of Mycobacterium tuberculosis isolates from a state with a large rural population. Journal of Infectious Diseases 175: 1446

[21]. Ogbudebe, C. L., Chukwu, J. N., Nwafor, C. C., Meka, A. O., Ekeke, N., Madichie, N. O., … Oshi, D. C. (2015). Reaching the underserved: Active tuberculosis case finding in urban slums in southeastern Nigeria. *International Journal of Mycobacteriology*, *4*(1), 18–24. https://doi.org/10.1016/j.ijmyco.2014.12.007

[22]. Lorent, N., Choun, K., Thai, S., Kim, T., Huy, S., Pe, R., … Lynen, L. (2014). Community-based active tuberculosis case finding in poor urban settlements of Phnom Penh, Cambodia: A feasible and effective strategy. *PLoS ONE*, *9*(3), 1–12. https://doi.org/10.1371/journal.pone.0092754

[23]. Tuberculosis Control in Bangladesh, Annual Report. National Tuberculosis Control Program, Services DGoH; 2017.

[24]. Narang P, Tyagi NK, Mendiratta DK, Jajoo UN, Bharambhe MS, Nayar S. Prevalence of sputumpositive pulmonary tuberculosis in tribal and non-tribal populations of the Ashti and Karanja tahsils in Wardha district, Maharashtra State, India. Int J Tuberc Lung Dis. 1999; 3:478–482. [PubMed: 10383059

[25]. Ioannidis, P., Papaventsis, D., Karabela, S., Nikolaou, S., Panagi, M., Raftopoulou, E., … Kanavaki, S. (2011). Cepheid geneXpert MTB/RIF assay for Mycobacterium tuberculosis detection and rifampin resistance identification in patients with substantial clinical indications of tuberculosis and smear-negative microscopy results. *Journal of Clinical Microbiology*, *49*(8), 3068–3070. https://doi.org/10.1128/JCM.00718-11

[26]. Saeed, M., Ahmad, M., Iram, S., Riaz, S., Akhtar, M., & Aslam, M. (2017). GeneXpert technology: A breakthrough for the diagnosis of tuberculous pericarditis and pleuritis in less than 2 hours. *Saudi Medical Journal*, *38*(7), 699–705. https://doi.org/10.15537/smj.2017.7.17694

[27]. Goel, S., & Chinnakali, P. (2016). Public Health Action, *I*(2), 136–141.

[28]. Wei, X., Chen, J., Chen, P., Newell, J. N., Li, H., Sun, C., … Walley, J. D. (2009). Barriers to TB care for rural-to-urban migrant TB patients in Shanghai: A qualitative study. *Tropical Medicine and International Health*, *14*(7), 754–760. https://doi.org/10.1111/j.1365-3156.2009.02286.x

[29]. Ensor, T., & Cooper, S. (2004). Overcoming barriers to health service access: influencing the demand side. *Health Policy and Planning*, *19*(2), 69–79. https://doi.org/10.1093/heapol/czh009

[30]. Krishnan, L., Akande, T., Shankar, A. V., McIntire, K. N., Gounder, C. R., Gupta, A., & Yang, W.-T. (2014). Gender-Related Barriers and Delays in Accessing Tuberculosis Diagnostic and Treatment Services: A Systematic Review of Qualitative Studies. *Tuberculosis Research and Treatment*, *2014*, 1–14. https://doi.org/10.1155/2014/215059

[31]. Long, Q., Li, Y., Wang, Y., Yue, Y., Tang, C., Tang, S., … Tolhurst, R. (2008). Barriers to accessing TB diagnosis for rural-to-urban migrants with chronic cough in Chongqing, China: A mixed methods study. *BMC Health Services Research*, *8*, 1–10. https://doi.org/10.1186/1472-6963-8-202

[32]. Mauch V, Woods N, Kirubi B, Kipruto H, Sitienei J, & Klinkenberg E. (2011). Assessing access barriers to tuberculosis care. *BMC Public Health*, 18–21.

[33]. Zhang, T., Tang, S., Jun, G., & Whitehead, M. (2007). Persistent problems of access to appropriate, affordable TB services in rural China: Experiences of different socio-economic groups. *BMC Public Health*, *7*, 1–12. https://doi.org/10.1186/1471-2458-7-19

[34]. Laokri, S., Drabo, M. K., Weil, O., Kafando, B., Dembélé, S. M., & Dujardin, B. (2013). Patients Are Paying Too Much for Tuberculosis: A Direct Cost-Burden Evaluation in Burkina Faso. *PLoS ONE*, *8*(2). https://doi.org/10.1371/journal.pone.0056752

[35]. Lönnroth, K., Tomlin, K., Afnan-Holmes, H., Schaap, A., Golub, J. E., Shapiro, A. E., … Corbett, E. L. (2013). The benefits to communities and individuals of screening for active tuberculosis disease: a systematic review [State of the art series. Case finding/screening. Number 2 in the series]. *The International Journal of Tuberculosis and Lung Disease*, *17*(4), 432–446. https://doi.org/10.5588/ijtld.12.0743

[36]. Lönnroth, K., Corbett, E., Golub, J., Godfrey-Faussett, P., Uplekar, M., Weil, D., & Raviglione, M. (2013). Systematic screening for active tuberculosis: rationale, definitions and key considerations [State of the art series. Active case finding/screening. Number 1 in the series]. *The International Journal of Tuberculosis and Lung Disease*, *17*(3), 289–298. https://doi.org/10.5588/ijtld.12.0797

[37]. Yuen, C. M., Amanullah, F., Dharmadhikari, A., Nardell, E. A., Seddon, J. A., Vasilyeva, I., … Becerra, M. C. (2015). Turning off the tap: Stopping tuberculosis transmission through active case-finding and prompt effective treatment. *The Lancet*, *386*(10010), 2334–2343. https://doi.org/10.1016/S0140-6736(15)00322-0

[38]. Borgdorff, M. W., Floyd, K., & Broekmans, J. F. (2002). Interventions to reduce tuberculosis mortality and transmission in low- and middle-income countries. *Bulletin of the World Health Organization*, *80*(3), 217–227.

[39]. Chernick, V. (2004). Commentary. *Pediatric Pulmonology*, *38*(1), 1–1. https://doi.org/10.1002/ppul.20085

[40]. Saelens, J. W., Viswanathan, G., & Tobin, D. M. (2019). Mycobacterial Evolution Intersects With Host Tolerance. *Frontiers in Immunology*, *10*(March), 528. https://doi.org/10.3389/fimmu.2019.00528

[41]. BañUls, A. L., Sanou, A., Van Anh, N. T., & Godreuil, S. (2015). Mycobacterium tuberculosis: Ecology and evolution of a human bacterium. *Journal of Medical Microbiology*, *64*(11), 1261–1269. https://doi.org/10.1099/jmm.0.000171

[42]. Brudey, K., Driscoll, J. R., Rigouts, L., Prodinger, W. M., Gori, A., Al-Hajoj, S. A., … Sola, C. (2006). Mycobacterium tuberculosis complex genetic diversity: Mining the fourth international spoligotyping database (SpolDB4) for classification, population genetics and epidemiology. *BMC Microbiology*, *6*, 1–17. https://doi.org/10.1186/1471-2180-6-23

[43]. Banu, S., Gordon, S. V., Palmer, S., Islam, R., Ahmed, S., Alam, K. M., … Brosch, R. (2004). Genotypic Analysis of Mycobacterium tuberculosis in Bangladesh and Prevalence of the Beijing Strain. *Journal of Clinical Microbiology*, *42*(2), 674–682. https://doi.org/10.1128/JCM.42.2.674-682.2004

[44]. Banu, S., Gordon, S. V., Palmer, S., Islam, R., Ahmed, S., Alam, K. M., … Brosch, R. (2004). Genotypic Analysis of Mycobacterium tuberculosis in Bangladesh and Prevalence of the Beijing Strain. *Journal of Clinical Microbiology*, *42*(2), 674–682. https://doi.org/10.1128/JCM.42.2.674-682.2004

[45]. Banu, S., Rahman, M. T., Uddin, M. K. M., Khatun, R., Khan, M. S. R., Rahman, M. M., … Heffelfinger, J. D. (2015). Effect of active case finding on prevalence and transmission of pulmonary tuberculosis in Dhaka Central Jail, Bangladesh. *PLoS ONE*, *10*(5), 1–15. https://doi.org/10.1371/journal.pone.0124976

Nikita Raula, et. al. "Active Case Finding strategy in Tuberculosis, A Bangladesh Country Prospective." *IOSR Journal of Dental and Medical Sciences (IOSR-JDMS)*, 20(01), 2021, pp. 30-33.