

Effectiveness of outreach chest camps in detection of missed TB cases in Pakistan

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Abstract

Objective: To determine the effectiveness of outreach chest camp intervention for detection of missed tuberculosis cases in Pakistan and to evaluate the demographic profile of those who are dependent on such doorstep healthcare services.

Methods: This retrospective study was carried out using data from the outreach chest camp intervention organised by Greenstar Social Marketing company from August 2015 till December 2016 in Lahore, Gujrat and Sheikhpura districts of Pakistan's Punjab province. The intervention involved a set of community mobilisation events in hard-to-reach areas and in healthcare facilities which are deprived of suitable settings, followed by free medical camps where medical consultation and tuberculosis diagnostic facility of sputum smear microscopy were provided to the camp attendees. The data was taken as per set variables and analysed using SPSS 23.

Results: A total of 399 chest camps were conducted, where 22,399 patients were clinically assessed for the presence or absence of tuberculosis. Overall, 12,319 (55%) of the attendees were females and 10,080 (45%) were males. Of the total, 5,226 (24.6%) had signs and symptoms of tuberculosis and were declared as tuberculosis presumptive cases. After diagnostic investigations, 831 (3.7%) individuals were declared confirmed tuberculosis patients. Amongst the total confirmed cases, 439 (52.8%) were diagnosed through sputum smear microscopy with percent bacteria positivity of 8. (95% confidence interval [CI] 7.54 - 9.02).

Conclusion: Chest camp intervention was found to have great potential to detect missed tuberculosis cases, thus limiting the spread of disease in the community.

Keywords: Tuberculosis, Age, Sex, Outreach camps, Missed TB cases. (JPMA 68: 835; 2018)

Introduction

Tuberculosis (TB) is a preventable and curable disease. Its diagnostic and treatment facilities are available for everyone at all public and selected private healthcare facilities in Pakistan. Despite that Pakistan bears a huge burden of the disease it ranks 5th amongst top six TB burdened countries of the world. World Health Organisation (WHO) reported that in Pakistan during the year 2015 only, 510,000 people developed TB and only 323,856 were diagnosed and started treatment under the national TB management protocols, leaving 186,000 that could not be diagnosed and/or started management under the national and international protocols.¹ Detecting missed TB patients is a public health challenge for national and international partners striving to end TB.² Among other interventions, a set of outreach activities, including doorstep diagnostic services through chest camps, are conducted by private non-governmental organizations (NGO) under the umbrella of national programmes across different districts of Pakistan for those having limited access to healthcare services.³ Use of advanced diagnostic tools for active case detection may

enhance case yield.⁴

Although these camps are organised for every member of the community without any age and gender discrimination but limited information is available for policymakers about the actual beneficiaries of the camps. This current study was planned to document the effectiveness of camps in finding missed TB cases along with age and gender distribution of people who actually availed the facility. It will provide evidence for planning future interventions catering to the needs of those special population segments who cannot visit a health facility and are dependent solely on the provision of TB diagnostics and treatment services in their reach.

Patients and Methods

This retrospective study was carried out using data from the outreach chest camp intervention organised by Greenstar Social Marketing company from August 2015 till December 2016 in Lahore, Gujrat and Sheikhpura districts of Pakistan's Punjab province. These camps were organised for detection of missed TB patients who had either remained undetected and untreated or due to delays in diagnosis ended up being means of transmission of disease in the community.⁵ This active case detection intervention included a set of events starting with the involvement of community influentials.

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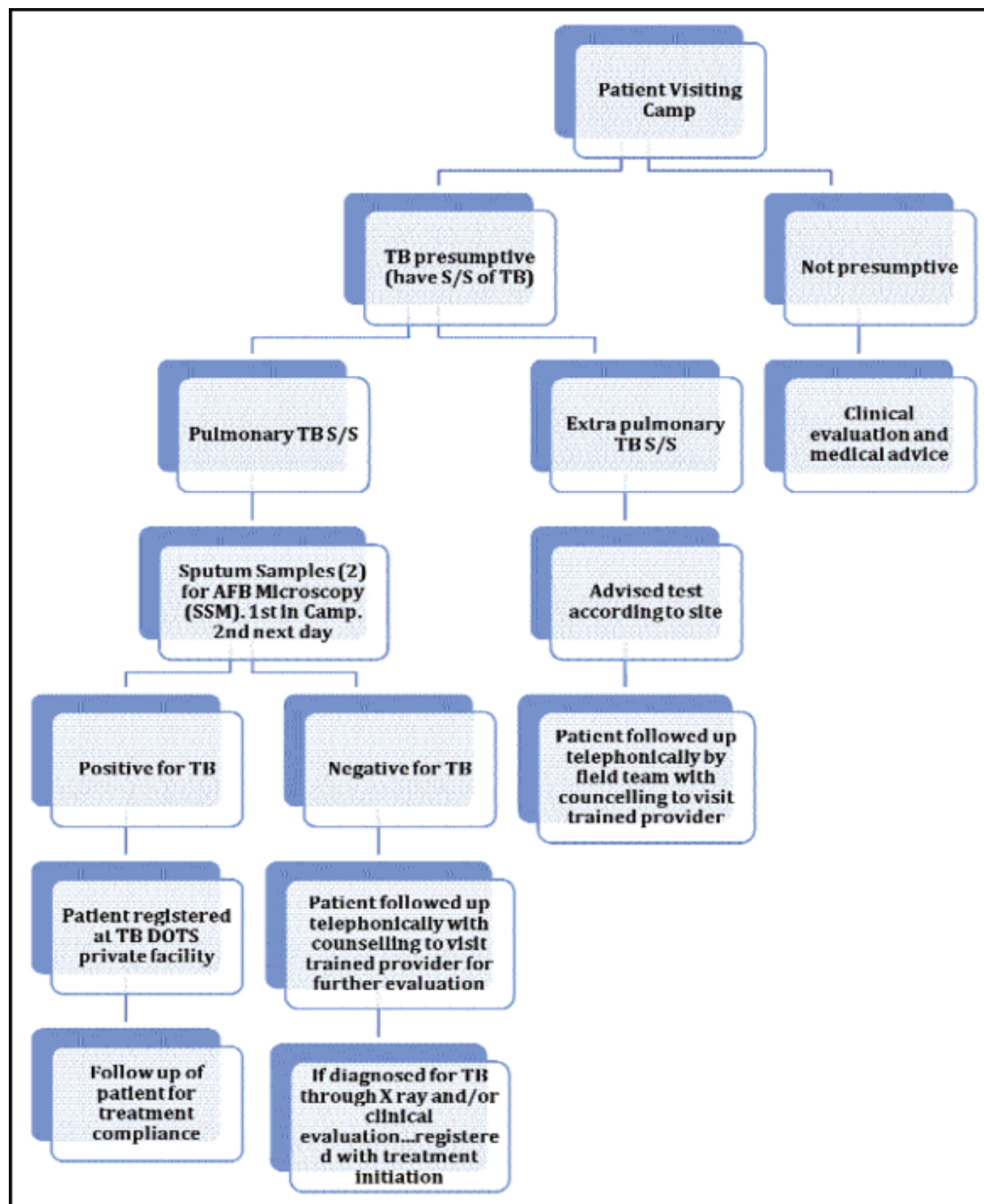


Figure-1: Sequence of procedures for diagnosis of TB disease status.

TB: Tuberculosis

With the meaningful support of community influencers, social gathering events were conducted through which the community was informed about TB disease, its signs and symptoms. Date, venue and timing of free chest camps where medical consultation and sputum smear microscopy (SSM) diagnostic service was to be provided free of cost to TB presumptive cases in that community were also announced. Chest camp intervention involved a set of community mobilisation events in hard-to-reach areas and in such healthcare facilities which were deprived of suitable settings, followed by free medical camps where medical consultation and tuberculosis diagnostic facilities of SSM were provided to the camp attendees.

In the vicinity of planned venue for the chest camp, TB information material was distributed which included messages in written and pictorial forms regarding symptoms of TB, significance of diagnosis and treatment, free medical check-up and screening for TB during the camp, and free drugs for full course of treatment for diagnosed TB patients. During this mobilisation campaign, patients with signs and symptoms of TB were identified and counselled for TB diagnosis in chest camps.⁶

Site selection for camp in the events during the chest camp interventions were done through data review for identification of areas having high number of TB cases. Meetings with district health authorities to identify healthcare facilities deprived of the services were identified then meetings with key stakeholders in the district for finalization of site were done. Meetings were held with community notables for liaison and coordination to get support for a successful camp. Dates, time and venues were selected in those meetings. Help from lady health workers were sought to find the likely patients of TB in the areas.

Social mobilization activities included display of banners prior to the activity, distribution of brochures, visits were made to TB patients currently under treatment to act as local ambassadors. Announcements in schools, seminaries and mosques were made to invite locals to the camps. Distribution of information, education and communication (IEC) material was ensured. At the chest camp doctors trained in TB directly observed treatment, short-course (DOTS) examined all the attendees with support from paramedics, laboratory technicians and project implementation staff. Sputum was taken from patients with signs and symptoms of pulmonary TB and all sputum samples were sent to nearby trained laboratories for acid fast bacilli (AFB), microscopy, while extra-pulmonary TB presumptive for other laboratory

tests were referred to nearby facilities after counselling.

On the day of the camp, private DOTS-trained doctors evaluated all patients in the camp for the presence of signs and symptoms suggestive of TB. All the presumptive TB patients underwent further evaluation. Pulmonary TB presumptive patients were requested to give sputum sample, which was transported to trained lab for SSM. If result of SSM was negative then patients were advised for chest X-rays and/or other relevant investigations. All extra-pulmonary TB presumptive cases were advised diagnostic tests according to the site and type of TB. If by any means SSM or any other test, a presumptive TB case was declared as TB patient, then his free-of-cost treatment started by Greenstar's TB DOTS-trained doctors at their health facility. Patients who were diagnosed either during the camp or later on during follow-up were registered with DOTS-trained private doctors for treatment of TB (Figure-1).

District name, number of patients examined, age, gender, number of presumptive TB patients, bacteriologically positive cases (B +), bacteriologically negative cases (B -) and extra-pulmonary patients (EP) were the used variables in the study. Data was taken from the activity reports of chest camps and analysed using SPSS 23.

Results

A total of 399 chest camps were conducted in which 22,399 patients were clinically assessed. On an average, 56.1 patients were examined per camp. Overall, 12,319 (55%) attendees were females and 10,080 (45%) were males (Figure-2). Of the total, 5,226 (24.6%) patients had signs and symptoms of TB and were declared tuberculosis presumptive cases. After diagnostic investigations, 831 (3.7%) patients were declared as confirmed TB patients. Of the confirmed TB patients, 439 (52.8%) were diagnosed through SSM with percent bacteria positivity of 8 (95% confidence interval [CI] 7.54 - 9.02).

Of the TB patients, 727 (87.4%) had pulmonary TB and 104 (12.6%) had extra-pulmonary TB. Among the pulmonary cases, 439 (60%) were diagnosed through SSM as B+ cases while 288 (40%) were diagnosed via X-ray and/or other tests.

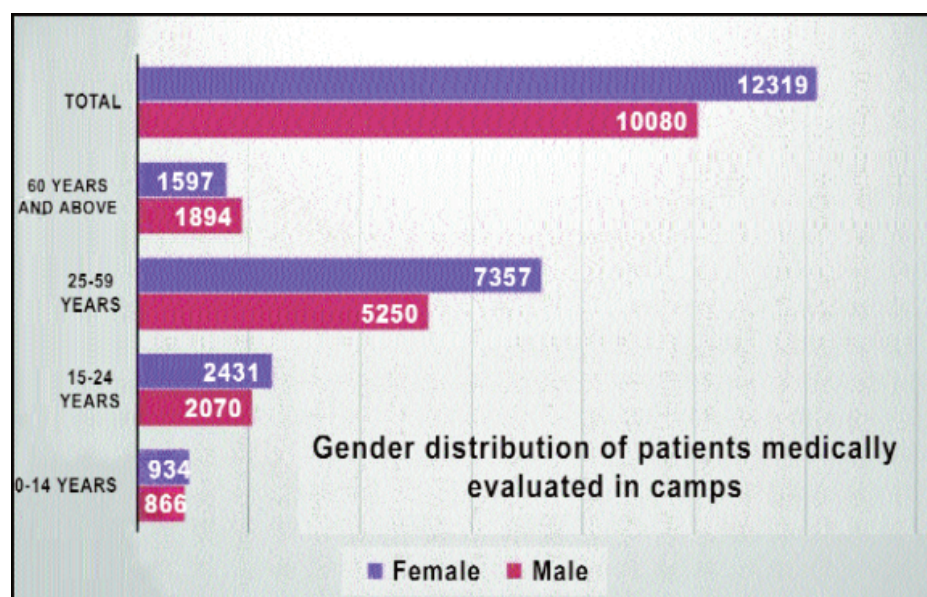
In 43 (10.7%) camps, no TB patient was diagnosed, in 97 (24.3%) camps only one TB case per camp was registered, in 146 (36.59%) camps 2 TB cases per camp were registered and in 57 (14.29%) camps 3 cases per camp were registered (Table). Diagnosis of B+ case through SSM revealed that 103 (26%) of the camps could not find any B+ case while 192 (48%), 72 (18 %) and 21 (5.3

Table: Number of TB patients registered per camp.

Indicator	Lahore	Sheikhupura	Gujrat	Total
Camps (n)	291	59	49	399
Patients examined (n)	16647	3058	2694	22399
Patients per camp	57.21 (95% CI, 56.34-58.08)	51.83 (95%CI, 50.02-53.69)	54.98 (95%CI, 52.93-57.08)	56.14 (95%CI, 55.41-56.88)
Patients (n) with TB S/S (presumptive TB)	3843	767	616	5226
Percent TB presumptive among total patients examined in camp	23.08% (95%CI, 22.45-23.73)	25% (95%CI, 23.57-26.64)	22.86% (95%CI, 21.31-24.48)	23.33% (95%CI, 22.78-23.89)
Number of presumptive TB patients/camp	13.21 (95%CI, 12.79-13.63)	13 (95%CI, 12.1-13.94)	12.57 (95%CI, 11.61-13.59)	13.1 (95%CI, 12.75-13.46)
Pulmonary TB patients (n) diagnosed through SSM (Bacteria +, B+)	366	56	17	439
Pulmonary TB patients (n) diagnosed on X ray or other tests (Bacteria -ve)	214	67	7	288
Extra Pulmonary TB diagnosed	98	6	0	104
All TB cases (n) registered through camps (All type)	678	129	24	831
All cases per camp	2.33	2.19	0.49	2.08

TB: Tuberculosis.

SSM: Sputum smear microscopy.

**Figure-2:** Age and gender distribution of patients evaluated in camp.

%) camps found 1, 2 and 3 B+ cases respectively.

Discussions

In 399 camps, 22,399 patients had been assessed for presence of signs and symptoms of TB. Amongst the total evaluated, 12,319 were females and 10,080 were males; indicating that more females utilised doorstep healthcare services compared to males. Population Welfare Department of Punjab (PWD) states that in 2016, the number of males was greater than female (M:F ratio = 1.04).⁷ Further, TB prevalence survey conducted by

national TB control programme indicated that prevalence of TB was 1.8 times higher among males compared to females.⁸ Despite the higher population of males and high prevalence of TB among males, it is observed in this study that number of female patients visiting the camp were more than males (M:F ratio= 0.82). This finding is consistent with another similar intervention in neighbouring Nepal where female beneficiaries were more than male in chest camps.⁹ The probable explanation of this deviation is the cultural context of the countries where females have limited access to healthcare and are comparatively deprived of healthcare facilities as compared to males. In all age groups except the 60 years and

above, the percentage of female visiting the camps was higher than males.

In 399 camps, 5226 patients were identified as presumptive TB cases; having signs and symptoms of TB, and further evaluated for presence or absence of TB disease. This study found 23.33% (CI 95%, 22.78-23.89) of the examined patients as presumptive of TB by the trained doctor in the camp compared to 12.7% presumptive cases identified in another study involving

camps in Pakistan.³ Focused social mobilisation was conducted for 3 to 4 days before conducting chest camps, where all patients with signs and symptoms related to TB were encouraged to visit. This might have resulted in higher proportion of TB presumptive cases as compared to the trend in the area.

Out of these 5226 presumptive TB patients, 439 were diagnosed as (B+) patients with bacteria positivity of 8% (95% CI 7.54 - 9.02). This positivity varies across cities. Lahore, a metropolitan city had the highest 10% positivity whereas Gujrat had the lowest smear positivity ratio. Lahore had highest smear positivity rate as the strategy is being implemented in the city for the last 11 years while Sheikhpura is on the second number since it was implementing this from last 6 years only and Gujrat having the lowest positivity rate was conducting the same from last 1 year only. Experience in focused social mobilization and trained medical staff including lab technicians might have played a key role in this regard.

SSM is largely dependent on operational techniques and diagnostic equipment including the type of microscope, smearing techniques, skills of lab technicians and the quality of samples.^{10,11} With all standard practices, SSM is less sensitive than the latest tools like Xpert testing; therefore, use of more sensitive instruments might enhance smear positivity.¹² Further evaluation of all presumptive cases who came negative on sputum is a challenging task in hard-to-reach areas resulting in lack of follow-up of many sputum smear negative patients; less clinically diagnosed cases. Therefore, use of X-ray during the camps in high prevalent areas may increase clinically diagnosed case detection and help to diagnose the missing TB cases in the community, which are not only suffering from the illness but are also a cause of its spread.⁸ All extra-pulmonary TB presumptive cases identified were referred to some diagnostic facility and/or healthcare facility for further evaluation as no diagnostic facility was available in the camp for these cases. From these referrals, 103 extra-pulmonary cases were registered at DOTS trained facilities.

Besides, 26% of the camps could not be able to detect any sputum positive case, whereas 48% of the camps had one positive patient and 18% of the camps had 2 positive patients. 5.3% of the camps conducted had 3 positive patients, 2% of the camps had 4 positive cases detected while in only 0.2% of the camps 5 positive cases were detected. This variation in positive case through camp varies across districts. 78% of the camps conducted in Gujrat, 22% of the camps conducted in Sheikhpura and 17% of the camps in Lahore could not find a single

positive case. Provided the fact that AFB microscopy was the only technique used during the camp to diagnose positive TB patients, 26% of the camps overall could not find any positive case.

During this intervention, 43 camps did not detect any TB case. It is observed in cultural context of the country that on healthcare facilities when the result of AFB microscopy is negative, the patient collects the report from lab and visits private provider for further evaluation. However, when during outreach camp, if the result of AFB microscopy is negative then it is hard to find and convince patients to visit far-flung health facilities for further evaluation despite of the fact that sputum test is negative. Only very few of the patients actually visit a health facility for further evaluation, resulting in less clinically diagnosed cases who are B-.

Among all pulmonary cases registered through camps, only 40% were bacteriologically negative (B-). In the same year, national TB control programme data found 49% negative (B-) cases among all registered pulmonary cases. A more simple, easy to manage, more sensitive and reliable way of diagnosing TB can produce greater outcome in high TB prevalent and healthcare deprived settings¹³ during chest camps.

All patients with signs and symptoms of TB were advised laboratory tests. However, only SSM was provided on the spot and free of cost. All sputum-negative and extra-pulmonary cases needed further laboratory investigations on self-payment, which was a challenge for low socioeconomic communities which were essentially the target audience for camps. It had impact on the outcome of this study as TB sufferers who had limitation of resources for other tests might have missed out on being diagnosed.

Advanced and sensitive diagnostic tools including Xpert testing would be of more value and should be used during the chest camps to minimize the impact of false negativity and missed diagnosis. Provision of diagnostic services for detection of extra pulmonary cases in the camp may enhance case detection. Female focused community interventions might be able to detect TB cases from the segment of community that would otherwise be missed. Skilled and experienced field staff might produce promising outcomes of chest camps in terms of high case yields.

Conclusions

Chest camps are an effective tool for reaching the missed TB cases and putting them on treatment. This early case detection would limit the spread of disease. Higher

proportion of females in camps as compared to males despite of fact that prevalence of TB is relatively low among females as compared to males indicates that these free services are more needed for females since they are dependent of their counterparts considering the cultural context of the country.

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References

1. World Health Organization: Pakistan Tuberculosis Profile. [Online] 2016 [Cited 2017 August 11]. Available from: URL: https://extranet.who.int/sree/Reports?op=Replet&name=%2FWHO_HQ_Reports%2FG2%2FPROD%2FEXT%2FTBCountryProfile&SO2=PK&LAN=EN&outtype=pdf.
2. Lönnroth K, Corbett E, Golub J, Godfrey-Faussett P, Uplekar M, Weil D, et al. Systematic screening for active tuberculosis: rationale, definitions and key considerations [State of the art series. Active case finding/screening. Number 1 in the series]. *Int J Tuberc Lung Dis* 2013; 17: 289-98.
3. Fatima R, Qadeer E, Enarson DA, Creswell J, Stevens R, Hinderaker SG. Success of active tuberculosis case detection among high-risk groups in urban slums in Pakistan. *Int J Tuberc Lung Dis* 2014; 18: 1099-104.
4. Corbett EL, Bandason T, Duong T, Dauya E, Makamure B, Churchyard GJ, et al. Comparison of two active case-finding strategies for community-based diagnosis of symptomatic smear-positive tuberculosis and control of infectious tuberculosis in Harare, Zimbabwe (DETECTB): a cluster-randomised trial. *Lancet* 2010; 376: 1244-53.
5. Den Boon S, Verver S, Lombard CJ, Bateman ED, Irusen EM, Enarson DA, et al. Comparison of symptoms and treatment outcomes between actively and passively detected tuberculosis cases: the additional value of active case finding. *Epidemiol Infect* 2008; 136: 1342-9.
6. Datiko DG, Lindtjörn B. Health extension workers improve tuberculosis case detection and treatment success in southern Ethiopia: a community randomized trial. *PloS one* 2009; 4: e5443.
7. Population Welfare Department Government of the Punjab: Summary Demographic Indicators. [Online] 2016 [Cited 2017 August 11]. Available from URL: <http://www.pwd.punjab.gov.pk/system/files/Population%20Projections%20Punjab%202007-2020.pdf>.
8. Qadeer E, Fatima R, Yaqoob A, Tahseen S, Haq MU, Ghafoor A, et al. Population based national tuberculosis prevalence survey among adults (> 15 years) in Pakistan, 2010-2011. *PloS one* 2016; 11: e0148293.
9. Harper I, Fryatt R, White A. Tuberculosis case finding in remote mountainous areas-Are microscopy camps of any value? Experience from Nepal. *Tuber Lung Dis* 1996; 77:384-8.
10. Mundy CJ, Harries A, Banerjee A, Salaniponi F, Gilks C, Squire S. Quality assessment of sputum transportation, smear preparation and AFB microscopy in a rural district in Malawi. *Int J Tuberc Lung Dis* 2002; 6: 47-54.
11. Selvakumar N, Prabhakaran E, Murthy BN, Sivagamasundari S, Vasanthan S, Govindaraju R, et al. Application of lot sampling of sputum AFB smears for the assessment of microscopy centres. *Int J Tuberc Lung Dis* 2005; 9: 306-9.
12. Opota O, Senn L, Prod'homme G, Mazza-Stalder J, Tissot F, Greub G, et al. Added value of molecular assay Xpert MTB/RIF compared to sputum smear microscopy to assess the risk of tuberculosis transmission in a low-prevalence country. *Clin Microbiol Infect* 2016; 22: 613-9.
13. Foulds J, O'Brien R. New tools for the diagnosis of tuberculosis: the perspective of developing countries. *Int J Tuberc Lung Dis* 1998; 2: 778-83.