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Factors affecting tuberculosis case detection in Kersa District, South West Ethiopia

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ABSTRACT

Background: Tuberculosis is one of the deadly communicable diseases which claim the lives of millions in the world. Early case detection and prompt treatment cures the patients, breaks the transmission and improves the control program.

Objective: The aim of this study was to investigate the factors affecting tuberculosis case detection in Kersa District, south west Ethiopia.

Method: Facility based cross sectional study design was employed in four directly observed treatment short course service providing public health centers. Three hundred eighty four patient folders were reviewed. In-depth interviews was conducted with 18 health care workers including heads of health centers, tuberculosis focal persons, clinicians, laboratory technicians, tuberculosis program coordinator and head of health office.

Result: Significant number, 135(35.2%) of tuberculosis suspects were not requested for microscopic examination of sputum smear, the laboratory results 21(8.4%) of requested patients were not recorded in both patient folders and laboratory registers. Only 10 (4.4%) of those examined and recorded were smearing positive. Participants described that the shortage and irregular supply of acid fast bacilli reagents and consumable, inadequate infrastructures, frequent electricity interruption, shortage of trained care providers, negligence of care providers, weakness of laboratory quality assurance system and poor health information use culture were major factors for low case identification.

Conclusion: The resource shortage, electricity interruption, low commitment of care providers, weak quality assurance practice and poor health information use culture were major factors for low tuberculosis case identification and should be considered.

1. Introduction

Tuberculosis (TB) is bacterial disease caused by mycobacterium tuberculosis. It remains a deadliest health problem nevertheless extensive control efforts exerted. In 2015, approximately 10.4 million new cases and 1.8 million deaths were reported worldwide; of which 11% of new cases and 0.4 million deaths were people with human immunodeficiency virus (HIV). Likewise multidrug resistant tuberculosis (MDR-TB) has exacerbated the burden with the estimated 580,000 cases and 250,000 deaths in the same year [1–3].

In general TB is a public health problem of all countries while most cases occur in Africa and Asia. Particularly, there were 30 high-burden countries (HBCs) in the world which account for 87–92% of global load. Ethiopia is among these HBCs with annual estimated incidence of 192 per 10^5 (including HIV positive people), and death rate of $26/10^5$ among HIV negative and 4 per 10^5 HIV positive people, and the estimated incidence of MDR-TB was $6.2/10^5$ [1,3].

The world has not been silent to fight against this drastic health problem, and still is in hard struggle. Thus, in 1991 the world health assembly resolution recognized TB as a major global public health problem and aimed to achieve 70% case detection and 85% treatment success in 2000. As well world health organization (WHO) has recognized TB as a global public health emergence and launched direct observation therapy strategy (DOTS) in 1994 [1,4,5].

Rigorous efforts of TB control have brought about the significant progress in the worldwide. TB case detection and treatment successes were improved, and TB prevalence and mortality rate were declined in 42% and 47%, respectively between 1990 and 2015. In general the lives of 49 million people were saved throughout the world between 2000 and 2015 due to intensive control efforts [1].

Despite these remarkable improvements, it remained the leading cause of death from the infectious disease. One and half million people

Lists of abbreviations: TB, Tuberculosis; WHO, World Health Organization; MDR-TB, Multidrug Resistant Tuberculosis; AFB, Acid Fast Bacilli; HIV, Human Immune Deficient Virus; DOTS, Directly Observed Treatment Short Course; HCW, Health Care Workers; HC, Health Center

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died of TB per year, beside very sluggish decline of incidence rate. In addition, more than 3 million of globally estimated were not diagnosed, treated, registered or reported by national TB programme in 2014, and the figure raised to 4.3 million in 2015 [1,3,5,6]

In Ethiopia, 39% of estimated cases were missed; either not diagnosed, treated or reported to national tuberculosis program nonetheless improved health service coverage, accessibility to DOTS service [7] and increased engagement of private and public health facilities in TB control [8]. Those missed cases remain infectious agents and sustain the transmission of disease with in the community. Furthermore, different studies reported the high prevalence, even higher than globally estimates of 108/100,000 [9]; it was 13.5% in predominantly pastoralist area of northeast Ethiopia [10], 9.2% in South East Ethiopia [11], 10.9% in south west of the country [12], 6.8% in Northwest Ethiopia. [13]. Different factors can determine the performance of TB control program in general, and TB case notification particularly. Understanding these factors enables the evidence based planning of intervention for effective control. Hence, the aim of this study was to investigate facility based factors of low TB case detection in Kersa district, Ethiopia.

2. Method

2.1. Study area and period

The study was conducted at Kersa District from June to July 2012. Kersa, one of the 17 Districts in the Jimma zone, is located at 22 k.m to the southeastern part of Jimma town and 357 k.m from the capital city of the country, Addis Ababa.

2.2. Study design

Facility based cross sectional study design involving both quantitative and qualitative method was used. Quantitative method was used for medical record review and qualitative method was used to explore contemporary phenomenon of the service in its real-life context with multiple sources of evidence. Then, the findings of quantitative investigation was harmonized with and explained by qualitative findings.

2.3. Sample size and sampling techniques

The sample size for patient's folders review was determined using single population proportion formula. The assumptions: Level of confidence 95%, 5% margin of error, and P is the proportion of compliance of HCWs to national TB guideline to diagnose. Since there is no study done on compliance of HCWs on national TB guideline on study area, p = 50% was taken to have maximum sample size. Based on these assumptions the calculated sample size was 384. Consecutive patient's folders containing TB suggestive symptom were drawn from central card room retrospectively, until the required sample size met.

Qualitative data was collected with the in-depth interview. In general 18 in-depth interviews were conducted 16 in HCs and two in the District health office; 4 heads of HCs, 4 TB unit focal persons, 4 clinicians and 4 laboratory technicians, one TB unit coordinator and one head of the District health office

Analysis: quantities data was analyzed with the help of Microsoft excel 10, and qualitative data was analyzed in content wise and summarized thematically.

3. Result

3.1. Quantitative findings

Totally, 384 patient folders with TB suggestive signs were reviewed at central card room in three HCs; which were 182, 103 and 99 were at Serbo, Bulbul HC and Bala-Wajo respectively. All were at age of 15 and above; 183 male and 201 were female.

Of 384 folders with TB suggestive signs, only 249 (64.8%) were planned to have TB microscopic diagnosis. Of which, the result of 21 (8.4%) were not recorded in both patient folders and laboratory AFB register, so these patients were considered not have had microscopic TB diagnosis, or not recorded cases. So, the laboratory results of only 228 (59.4%) patients were reviewed in both patient folders and laboratory AFB registers. According to review finding only few, 10 patients (4.4%), were sputum smear positive.

The associated factors for this poor TB suspects screening, low AFB microscopic up taking, low AFB positivity rate and poor documentation were explored by qualitative methods and presented thematically below.

3.2. Qualitative findings

Shortage of laboratory equipment, reagents and consumables, inadequate trained human resource, absence of electricity, inadequate water supply, and poor laboratory information system were the major themes of analysis. Each was narrated with expressive quotes of participants.

Participants responded that the shortage and irregular supply of laboratory consumables, inadequate laboratory infrastructure, regular interruption and absence of electricity power, weak laboratory quality assurance system, the shortage of care provider with the frequent turnover and poor commitment of care providers as a significant problem of diagnosis. Thematically summarized quotes of participants were presented as follow.

3.2.1. Shortage of laboratory equipment, reagents and consumables

Health workers stated that there was inadequate and intermittent supply of AFB reagents and consumables from District health office. In addition, they have described that there was shortage of microscopy (only one microscopy in each HC) and inadequate infrastructures. These were among the factors for poor laboratory service provision in general and low TB case detection in particular.

> "*There is frequent laboratory reagent shortage in all health centers. AFB service was interrupted for two weeks for the absence of sputum cup in all health centers in the last month. Even now there is no microscope cleaning tissue paper right now." (Participant)*

> *"There is the shortage of microscopy. On top of this there are no biomedical technicians in all HCs to maintain impaired equipment." (Participant)*

> *"There is inadequate laboratory infrastructure. Only one room designated for laboratory services, which even not well furnished." (Participant)*

Heads of HCs and program manager at district health office have also expressed their concern regarding inefficient resource utilization at HCs. Thus, as they have described, shortage of resource coupled with unwise utilization continued the diagnosis problem for long, and needs great attention.

> *"Poor and inefficient utilization of laboratory supply can be the main reason for frequent supply of reagents. Sometimes there is inappropriate utilization of supply, for example they use sputum cup for collection of urine specimen." (Participant)*

3.2.2. Pharmaceutical logistics information system

According to participants expression there was poor logistic information regulation in all HCs. Logistic management information system was not strong. Pharmacy store keepers were not using bin cards, internal facility report and resupply form, report and requisition form. Thus, it was difficult to recognize and request additional supply from health office ahead of stock out at HCs.

"It is the responsibility of pharmacy technicians rather laboratory technicians to purchases keep and control whole medical supplies including laboratory consumables. Laboratory technicians request the laboratory consumables from pharmacy store on daily bases. Due to this the pharmacy store keepers are not well scheduled to realize the types and time of reagent/supply going to be stocked out." (Participant)

"There is no internal consumption reporting system within the facility. Pharmacy store keepers give laboratory reagents as per request rather than based on consumption report. Therefore, there is poor supply management system and hence avoiding unexpected and frequent shortages are very difficult." (Participant)

3.2.3. Health workers shortage

Number of participants claimed the shortage of health workforce and subsequent attribution to poor health service quality in general and low case detection particularly.

"There is only few number of health workers in this health center; only one health officer, five clinical nurses and one laboratory technician. Therefore, in my opinion this shortage of health work force can be one of the great challenges for low case detection." (Participant)

"The number of health workers is very few and far below national standard. For example, there is only one laboratory technician in my health center and now he is in sick leave. Therefore, AFB microscopic service is interrupted. In addition to this there is no health officer and the whole diagnosis process is being undertaken by clinical nurses. This by itself has a great impact in quality of care." (Participant)

"If there are adequate health workers then the service quality can get better and the reverse is true for inadequate human resource related with work load. For instance, all routine laboratory tests including AFB examination are conducted by only one laboratory technician, even not get special AFB microscopic training." (Participant)

"There is a great turnout of care providers. One health officer works no more than one year in one HC. This is similar for almost all care providers." (Participant)

Factors related with health workers' attitude were also expressed as a great problem of health care services. Health workers have a great role in accessibility, provision and attainment of anticipated objectives of health services, but negligence and low commitments reverses the results. The consequences of participants were illustrated here as follow.

"Sometimes health workers neglect screening TB suspects as per National Tuberculosis Program *guideline. They treat patients with different antibiotics rather requesting AFB examination; even patients present with TB suggestive sign." (Participant)*

"Occasionally laboratory technicians would not orient patients about the type and amount of sputum specimen. Therefore sometimes patients bring saliva instead of sputum, and/or bring inadequate sputum, consequently resulting in incorrect laboratory diagnosis." (Participant)

3.2.4. Health information system

Heads of HCs and TB program coordinators have also expressed their concern regarding poor recording and reporting culture of health workers at service delivery point. This was also due to negligence of care providers and stated as follow.

"There is poor recording system and consequently there is poor health information use culture in some HCs. Therefore, gaps of recording by its self might cause under reporting of diagnosed cases and consequently low case detection." (Participant)

3.2.5. Electricity and water power related factors

Participants have described frequent interruption of electricity and absence of an alternative power sources (generator and solar light) as a big problem of routine laboratory service. Thus patient treatment was mainly relied on clinical history. Therefore most diagnosis were based on clinical history of the patients and otherwise referred to other facilities for AFB diagnosis. They have expressed the situation as follow.

"Two days are enough to get AFB result as per National Tuberculosis Program *guideline, but in our setting sometimes it takes more than one week due to frequent power interruption." (Participant)*

"We refer TB suspects to nearby HCs for there is no electricity in our HC this is not comfortable to many patients and even can't afford the transport. Therefore they prefer to go private clinics where there is no microscopic FAB service." (Participant)

In addition, participants expressed about their concern regarding absence of adequate water supply in all health center.

3.2.6. Laboratory quality related factors

Internal quality control practice was weak in all HCs. Furthermore, laboratory technicians explained that they didn't received quality control trainings on microscopic sputum smear examination. Health workers including laboratory technicians expressed that the reliable laboratory test should pass through regular quality control system, unless it became doubtful.

"Sometimes the results of highly suspected patients became AFB negative and become positive after requested for the second or third request. This indicates that the repeated occurrences of false result. So, I am not confident enough with TB diagnostic laboratory." (Participant)

4. Discussion

All patients with TB suggestive signs and symptoms were recommended to have microscopic TB diagnosis, and 10% of them were estimated be AFB positive [1,4,5,14]. However, according to this study significant number of TB suspects didn't have microscopic AFB examination, and very few of them were AFB positive; only 64.8% were diagnosed microscopically and 4.4% got AFB positive. Serious constraints of laboratory equipment, reagents and other supplies, inadequate infrastructures, frequent electricity and water supply interruption, poor laboratory information system, insufficient diagnosis quality, inadequate human resource and weak commitment were main underlining factors low microscopic up take and low case detection.

There was a remarkable shortage and irregular supply of AFB reagents and consumables in health facilities. In addition, there was only one microscopy in each health facility, no escort at all. The similar challenges have also been reported from different resource limited countries, and eventually had resulted in poor case notification and treatment outcome [15–23].

There was also a significant shortage of trained human power in study health facilities. In addition, participants expressed relatively poor commitments of care providers at service delivery points. Thus, as all participants expressed the shortage of care providers coupled with low commitment contributed to poor service quality in general and affected TB case identification particularly. Different studies presented the similar findings in resource limited countries. [21,22,24]. However, it was well recognized that sustainable disease prevention depends on adequate allocation and equitable distribution of health work force. Thus, good governance and strategic management of the providers were highly recommended [25–30], and health care providers were expected to be more dedicated to their work and show compassion, respect and better care to their patients [31,32].

Proper management and effective utilization of health information is crucial for evidence based planning and need based allocation of

health resource and for efficient and effective utilization as well. This can be ensured if medical and administrative data recorded completely and accurately at health facilities and submitted to respective bodies in timely basis. [33]. Contrary, the finding showed that there was a significant gap of recording, reporting and utilization of health information, and logistic information as well. This finding was comparative with studies in different developing countries due to poor structural factors, undesired organizational behavior, gaps in technical expertise and poor information use culture [34–38].

Adequate working space, clean running water, electricity, back-up power (generator or solar energy), ventilation, drainage systems, sanitation facilities and adequate furniture are some of the basic requirements in Smear microscopy laboratory [39,40]. Contrary, all laboratories have inadequate work place (only one room to perform laboratory activities), no electricity, no running water, no adequate infrastructure and no adequate sanitation and safety facilities. This was comparable with finding in other resource limited countries [16].

In conclusion, there was shortage and intermittent supply of resource coupled with inefficient utilization. In addition laboratory infrastructures were not adequate; no electricity, running water, safety and sanitation facilities. Furthermore, inadequate human resource and weak commitment were also major problems of service provision.

Therefore, adequate and timely allocation and wisely utilization of laboratory consumables, adequately equipped and furnished laboratory facilities, adequate staffing and timely provision of refreshment trainings on TB diagnosis, and strengthening laboratory quality assurance system should be considered. Dedication of care providers is the presidential asset for quality health service provision and to meet the targeted goals.

Competing interests

The author has no competing interests.

Author's contribution

Dangiso DD has designed the study, analyzed, interpreted the data and drafted the manuscript.

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