Suspected Tuberculosis Patient Identification and Referral by Private Drug Retail Outlet Workers in South Wollo, Ethiopia

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Suspected Tuberculosis Patient Identification and Referral by Private Drug Retail Outlet Workers in South Wollo, Ethiopia

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# Acronyms and abbreviations

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Description</th>
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<tbody>
<tr>
<td>ANRSHB</td>
<td>Amhara National Regional State Health Bureau</td>
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<tr>
<td>ACSM</td>
<td>Advocacy, communication and social mobilization</td>
</tr>
<tr>
<td>AIDS</td>
<td>Acquired immune deficiency syndrome</td>
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<tr>
<td>CIA</td>
<td>Central intelligence of United States of America</td>
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<tr>
<td>DOTS</td>
<td>Directly observed treatment short course</td>
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<tr>
<td>DRO</td>
<td>Drug retail outlet</td>
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<tr>
<td>DROWs</td>
<td>Drug retail outlet workers</td>
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<tr>
<td>FDRE</td>
<td>Federal Democratic Republic of Ethiopia</td>
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<td>FEMOH</td>
<td>Federal Ethiopian ministry of health</td>
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<tr>
<td>EMOH</td>
<td>Ethiopian ministry of health</td>
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<tr>
<td>GDP</td>
<td>Gross domestic product</td>
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<tr>
<td>GPA</td>
<td>Grade point average</td>
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<tr>
<td>HIV</td>
<td>Human immune deficiency virus</td>
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<tr>
<td>KAP</td>
<td>Knowledge, attitude and practice</td>
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<tr>
<td>MDR TB</td>
<td>Multi drug resistant tuberculosis</td>
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<tr>
<td>MDGs</td>
<td>Millennium development goals</td>
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<tr>
<td>MSH</td>
<td>Management science for health</td>
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<td>Mtb</td>
<td><em>Mycobacterium tuberculosis</em></td>
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<tr>
<td>NTP</td>
<td>National Tuberculosis Program</td>
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<tr>
<td>PPM</td>
<td>Public private mix</td>
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<tr>
<td>TB</td>
<td>Tuberculosis</td>
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<tr>
<td>WHO</td>
<td>World Health Organization</td>
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<tr>
<td>XDR –TB</td>
<td>Extensively drug resistant tuberculosis</td>
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Abstract
BACKGROUND: Tuberculosis continues to be a major public health treat even with increasing resistance to available chemotherapies. Ethiopia ranks seventh among the 22 high tuberculosis burden countries in the world. Early diagnosis and treatment is a corner stone in combating TB. This has been facilitated by main stop tuberculosis strategy called public private mix by which all stake holders are engaged in tuberculosis control effort. In the last decade increasing number of private health providers are participating & playing their role. Unfortunately, one of the front line private providers, who are getting little attention are private drug retail outlets workers. Since a significant number of patients first consult private drug outlet workers. These private providers have a big role in identifying tuberculosis suspects and referring them to proper tuberculosis care facility. Moreover, they will be involved in patient counseling and follow up. Therefore, it is important to assess tuberculosis knowledge and referral practice of private drug retail outlets workers.

OBJECTIVE: The role of private drug retail outlet workers in tuberculosis suspect identification and referral to proper tuberculosis care facility.

METHODS: Quantitative cross-sectional survey was conducted in South Wollo, Ethiopia. All drug retail outlet workers found in South Wollo were included in this study. One person from each drug retail outlets was interviewed using semi-structured questionnaire. The questionnaire contained questions to assess tuberculosis-related knowledge (tuberculosis suspect identification) and practice of referring tuberculosis suspects. Data was analyzed using SPSS version 20.0 statistical software package.

RESULT: A total of 90 drug retail outlet workers were invited to take part in the study and 76 (84.4%) participated. Overall, 60.3% of the participants had good knowledge about tuberculosis. Among 55 participants who claimed coughing clients (tuberculosis suspects) had come to them, 43(78.2%) responded that they had referred the tuberculosis suspect client for tuberculosis diagnosis. Majority of the drug retail outlet workers (75.5%) claimed that most coughing patient approach drug retail outlet workers without prescription. 42.5% of drug retail outlet workers dispense different antibiotics or others drugs. Among drug retail outlet workers who were approached without prescription, only 52 (92.9 %) were able to identify correctly tuberculosis suspects. Only 41(73.2%) correctly identified at least 3 tuberculosis symptoms. Only 43 (76.8%)
correctly identified four main tuberculosis drugs. Only 32 (58.2%) mentioned at least 3 ways of tuberculosis prevention.

None of the participant had got tuberculosis training within the recent two years. Only 33 (63.5%) had sufficient knowledge on directly observed treatment short course. Pharmacists were more knowledgeable than nurses & druggists (OR = 0.038; CI 95% (0.08 – 0.93).

CONCLUSION: From our study majority of private drug retail outlet workers are approached by TB suspects and more than one third of drug retail outlet workers dispense different drugs including antibiotics for tuberculosis suspects without prescription. Moreover, only 52 (92.9 %) were able to identify tuberculosis suspects and only 43(78.2%) refer them. Therefore, tuberculosis suspects are delayed due to drug retail outlet workers causing transmission of tuberculosis in the community and increase tuberculosis drugs resistance. A higher education and work experience are determinant factors for good tuberculosis knowledge.

Recommendation: Therefore, drug retail outlet workers should be regularly updated and followed up in their dispensing practice of antibiotics without prescription in order to strengthen tuberculosis control effort. Interventions are needed to fill tuberculosis knowledge gap & improve their referral practice.

Key words: knowledge, practice, referral; tuberculosis, pharmacists, private providers.
Chapter one: Introduction

1.1. **Tuberculosis**

Tuberculosis (TB) is one of the most important public health problems causing significant morbidity and mortality globally. It is a chronic infectious disease caused by Mycobacterium tuberculosis. It typically affects the lungs but it could affect other parts of the body (such as the kidneys, bones and joints) as extra pulmonary TB. Tuberculosis is next to the human immunodeficiency virus (HIV) in causing death among young people and adults (Dye et al., 2006).

The disease is transmitted by infected droplet nuclei. When infected droplets (containing tubercle bacilli) disperse in the air from active pulmonary TB patients either through sneezing or coughing, they can easily enter to healthy person and cause infection. Transmission of TB is greatly enhanced by overcrowding and poorly ventilated living conditions (Marais et al., 2009, Clark et al., 2002, Delogu et al., 2013).

Symptoms of TB are complex and differ depending on the several factors. Majority of individuals who are infected with TB do not develop TB disease. The main symptoms of pulmonary TB include chronic cough sometimes with bloody sputum, fever, weight loss, night sweat and shortness of breath, among others. Symptoms of extra pulmonary TB are less obvious as no specific organs are targeted unlike pulmonary TB. Nevertheless, lymph nodes and the central nervous system are commonly affected in extra pulmonary TB (Fader et al., 2010).

There are several diagnostic approaches utilized for the diagnosis of TB. Examination of the bacilli in sputum smears together with clinical evaluations are the most commonly used instruments for TB diagnosis and treatment monitoring in developing countries, where majority of TB cases and deaths occur. In this technique the bacilli appear as acid fast in stained sputum specimens. Culture and detection of nucleic acid of the organism from clinical specimens are relatively new techniques in practice for the diagnosis of TB. Even though these techniques are
sensitive, it takes longer time to produce result. Tuberculin skin test is also used for detection of latent TB (TB infection without signs & symptoms) (Delogu et al., 2013).

Given that TB is diagnosed early and the anti-TB drugs are properly taken, the disease can be cured. It is necessary to take appropriate combination of drugs regularly as prescribed and for sufficient period of time. Previous treatment of TB is one of the predictors of development of multi-drug resistant TB (Faustini., 2006). The goal of treatment is beyond curing the patient, and includes prevention of development and transmission of drug resistance. Treatment of TB involves several anti-TB medications.

The first-line drugs include rifampicin, ethambutol, isoniazid, pyrazinamide and streptomycin. Fixed dose combinations are available which are more convenient to take. TB treatment has two phases called intensive phase and continuation phase. According to Ethiopian TB treatment guideline, for new cases of TB, a combination of four drugs is given for the first 8 weeks followed by a continuation phase in which a combination of two drugs is given for four months (FEMOH., 2012). Based on resistance pattern of the TB bacilli to the anti-TB drugs, TB can be further classified as drug resistant TB, multi-drug resistant TB (MDR-TB) and extensively drug resistant TB (XDR-TB). Drug resistant TB a form of TB that is resistant to one of first line anti TB drugs, whereas MDR- TB – is caused by strains that are resistant to at least isoniazide and rifampicin. Extensively drug resistant TB is MDR-TB plus resistance to fluoroquinolones and at least one second line injectable agent: amikacin, kanamicin or capreomycin (FEMOH., 2012).

1.1.1. Epidemiology of Tuberculosis

TB is caused by Mycobacterium tuberculosis complex. The main route of transmission is through dispersed infectious droplets from active pulmonary TB patient and sometimes transmission occurs from animal to human or human to animal. One third of the population is assumed to be infected by TB (WHO, 2013). However only few among infected develop a disease especially having associated risk factors. Important risk factors for the development of TB include HIV/AIDS, weakened immune system by immunosuppressive drugs, diabetes, smoking, malnutrition, alcoholism, crowded living conditions, indoor air pollution (Narasimhan et al., 2013).
1.1.2. Global TB burden

Globally, an estimated 8.6 million people had active TB disease in the year 2012. According to the WHO 2013 Global TB report, the burden of TB is highest in Asia (29%) and Africa (27%), with India (26%) and China (12%) accounting for nearly 40% of the world’s TB cases. Out of the total incident cases, an estimated 0.53 million were children (under 15 years of age) and 2.9 million occurred among women. About 13% of the 8.6 million TB incident cases were among people living with human immune deficiency virus (HIV). The proportion of TB cases co-infected with HIV was highest in countries in the African Region. Overall, 37% of TB cases were estimated to be co-infected with HIV in this region. Each year, approximately 80% of all new TB cases occur in 22 TB high-burden countries nearly, half of which are in Africa (WHO, 2013).

Even though, the overall incidence of TB is decreasing globally, there is huge variation in the incidence rate of TB, as lowest as 10 cases per 100,000 populations in high income countries to highest in Africa one in every one hundred people per year ex, in South Africa. Similarly, TB mortality has high variation one per 100,000 populations in high income countries to higher than 40 deaths per 100,000 in Africa and high burden countries. Unfortunately, by 2015 the Stop TB partnership target of halving TB prevalence on baseline 1990 would not be achieved (Glaziou et al., 2015).

1.1.3. Global TB control

The re-emergence of TB and new pandemic disease HIV led to TB be declared as main public health treats since 1991 (WHO, 2006). This led to initiation of global TB control efforts to address the situation. A global strategy called DOTS (directly observed treatment short course) was introduced by mid 1990s (WHO, 2013). Then, DOTS has been adopted by most WHO member countries. Since 1994 the implementation of DOTS enabled 85% treatment success rate and 53% case detection rate by 2005 (WHO, 2006).
Elements of DOTS

1. Political commitment with increased & sustained financing
2. Case detection through quality assured bacteriology
3. Standardized treatment, with supervision & patient support
4. An effective drug supply & management system
5. Monitoring & evaluation system & impact measurement

(WHO, 2013)

DOTS alone was not enough to achieve the global TB plan of halving the prevalence and mortality by 2015, then another strategy called Stop TB strategy implemented since 2006. This strategy has included DOTS and address strengthening of health system and human rights (WHO, 2006).

Stop TB strategy

Have six components

1. DOTs expansion
2. Address TB-HIV, MDR-TB & the needs of poor & vulnerable population
3. Contribute to health system strengthening based on primary health care
4. Engage all care providers
5. Empower people with TB & communities through partnership
6. Enable and promote research

www.who.int/tb/strategy/en/

New objectives included in this strategy are, wide spread access for TB care including TB/HIV and multidrug-resistant TB (MDR-TB) to achieve international targets to Stop TB. These targets are: detecting at least 70% of new sputum smear-positive TB cases, curing at least 85% of these cases and halting and reversing the incidence of TB by 2015 (WHO, 2006). Since 1995 to 2012, 22 million lives were saved by DOTS /Stop TB strategy worldwide (WHO, 2013).
For achieving the global TB targets, DOTS given in only government (public) institutions was not sufficient so WHO recommended involving all public and government health care providers through public-private mix (PPM) approaches (WHO, 2006). “This PPM approach embraces, care providers within the public sector, within the voluntary sector and within the private (formal and informal private practitioners including traditional healers, pharmacies and private hospitals) (WHO, 2010).

1.1.4. TB in Ethiopia

The WHO report of 2013, Ethiopia is included among 22 high- TB burden countries and 27 high burden multi-drug resistant tuberculosis (MDR-TB) countries (WHO, 2013). The TB prevalence was estimated to be 224 per 100,000 populations. Estimates of case detection rate for new and relapse cases by 2012 were 64% Ethiopia is highly affected by HIV/AIDS and the co infection of TB and HIV is high. Ethiopia is among the 28 countries in Africa with high TB and HIV co infection, 10% of TB patients are also infected by HIV/AIDS (WHO, 2013).

The varying magnitude of pulmonary TB in the general population is documented in studies undertaken in different parts of Ethiopia. Prevalences ranging from 76.1 to 216 per 100,000 adult individuals (Deribew et al, 2012; Berhe et al, 2013; Shargie & Yassin, 2006; Yimer et al, 2009) were reported. MDR/XDR- With respect to the epidemiology of MDR TB in Ethiopia, a review of studies done between 1984 to 2001 (Abate., 2002) indicate that MDR TB was reported in 1.2% of new cases and 12% of re-treatment cases. A recent review of literature on the epidemiology of MDR-TB including five East African countries documented prevalences ranging from 0.4% to 4.4% among new cases and 3.9 to 17.7% among recurrent cases (Kidenya et al, 2014).

While patients in general, and TB patients in particular, are expected to first undergo diagnosis followed by appropriate treatment, in many developing countries, a sizable proportion of patients first consult private drug retail outlets. Perhaps, few of these patients are referred for diagnosis before dispensing the drugs (Bell et al., 2011).
Currently, in almost all of the health centers, district and zonal hospitals in Ethiopia, the routine case detection of TB involves microscopic examination of two sputum specimens (spot-morning). Detection of acid-fast-bacilli in at least one of the samples is considered positive (FEMOH, 2012).

Ethiopia launched the WHO recommended DOTS strategy in 1995, which was implemented only in government health facilities. Since 2006, the service provision has started in private health facilities with the aim of improving the coverage of DOTS and increasing TB case detection rate (FEMOH, 2012).

In addition to the services given in the health facilities, the country has also established a community based health service delivery programs using health extension workers (HEWs).

Health extension workers:- are “specially trained cadres of community based health workers in Ethiopia since 2003, they involve in many health issues on vaccination, maternal health, sanitation and also TB suspect referral” (Medhanyie et al, 2012)

They spend most of their time conducting outreach activities by going house-to-house providing, Primary health care service including sensitization of the community. The program improves early referral of TB suspects reducing delay of TB diagnosis (Medhanyie et al, 2012).

In Ethiopia, selling of anti-TB drugs is legally prohibited and the medications are provided free of charge in all government health facilities and permitted private health institutions (FEMOH, 2012).
1.2: Literature review

1.2.1. Patient and health system delay in TB
Early diagnosis and treatment are needed for effective TB control as this potentially minimizes transmission, death and development of drug resistance (Storla et al., 2008). Understanding the causes of delay would help to reduce the delay by pointing to the possible prevention.

According to a systematic review on delay, the number of days elapsed from on set of symptoms of TB to initiation of treatment in most studies done in different countries ranges from 60 to 90 days. Generally, the agreed acceptable period from onset of symptoms till treatment initiation is 30 days (Storla et al., 2008). Patients get delayed for appropriate treatment due to different reasons. The delay period can be subdivided into health system delay and patient delay (Demisse et al, 2002, Hussain et al, 2012, Mesfin et al, 2005, Cambanis et al, 2005)

Patient delay
Patient delay is defined as the time from symptom onset to first consultation with a health provider. Symptom onset refers to the time at which the first symptom of the illness (i.e. persistent cough, fever, weakness, and weight loss or chest pain) for which a patient seeking care began (Mesfin et al, 2005, Lin et al, 2009). Patient delay contributes significantly to the overall delay in TB treatment in most studies (Gele et al, 2009, Demisse et al, 2002, Hussain et al, 2012, Cambanis et al, 2005).

Health systems’ delay
Health system delay may also contribute to the delay in treatment of TB patients. It is defined as delay from the date of the patient’s first contact with formal health provider to the date of appropriate diagnosis.

1.2.2. Risk factors of diagnostic delay
Several studies conducted in Ethiopia and elsewhere documented different factors associated with patient delay. For example, A study done in Ethiopia has showed that patient delay were associated with smear positive pulmonary TB, illiteracy and lack of a wareness about TB,
distance to health facility (Demisse et al, 2002, Gele et al, 2009). Similarly a study in Kenya found that patient delay was associated with distance to a health facility and lack of knowledge about TB (Ayuo et al, 2008, Yimer et al, 2005). Adverse health behaviors of the patients such as alcoholism and smoking (Kiwuwa et al, 2005) and the type of TB (Belay et al., 2012) were also associated with delay in the diagnosis of TB.


1.2.3. Private providers
Some of the literatures in the area identified rural drug vendors, private practitioners (Mesfin et al, 2009), long waiting in the health facility (Belay et al., 2012) and repeated visit to the same health practitioner (Ukwaja et al., 2013; Storla et al., 2008, Yimer et al, 2005) as cause of delay. Lack of knowledge for proper diagnosis by private providers (Odusanya et al, 2004, Kiwuwa et al, 2005).

Moreover, low quality diagnostic facility (Yimer et al, 2005, Rospibulstit et al, 2006, Bai et al, 2004, Okur et al, 2005), frequent antibiotic treatent (Belay et al, 2012), self treatment and traditional healers (Yimer et al, 2005, Cambanis et al, 2005) also contribute to delay. Providers’ lack of knowledge in TB diagnosis, treatment or referral; wrong use of laboratory services; wrong diagnosis and thus treatment and type of health facility were the most common reason for the delay (Belay et al., 2012).

Significant number of studies in Ethiopia has shown the common reason for diagnostic delay were visit to private providers including drug retail outlets (Abebe et al, 2010, Mesfin et al, 2009, Yimer et al, 2005)
1.2.4. The role of private providers in TB control

The fact that the private sector is the most accessible and convenient for most people and, unfortunately, not in a position to deliver the required TB care initiated implementation of the public-private mix (PPM) approach as WHO main Stop TB strategy (WHO, 2006). Private providers play a pivotal role in TB control.

According to WHO, PPM has contributed for new case detection of 10 to 40% in high burden countries (WHO, 2013). In Bangladesh DOTs alone had only achieved 59 % to 71% case detection (Hossain et al, 2010). PPM together with DOTS have contributed significantly to case detection (18% increase) in Ho chi Minh City (Quy et al, 2003) and 57% increase in Myanmar (Maung et al, 2006). Moreover, avoid diagnostic delay in addition to improving access and care for TB patients (WHO, 2010, Malmborg et al., 2011). Therefore, this has improved DOTs utilization, both by increasing knowledge and performance of public & private providers (Lei et al, 2015)

Moreover, it helps to cut the chain of transmission at an early stage.

In addition, PPM can improve access to treatment and help overcome barriers such as stigma, by engaging health care givers from whom the underprivileged and most susceptible look care. In Pakistan, private sector had increased case notification from 0.1% to 14.1% (Chughtai et al, 2013). In a study conducted in Ethiopia by Yimer and colleague showed that if private health care providers were engaged in NTP it would result in 22% increase in detection of smear positive TB cases ( Yimer et al., 2012).

There are different factors which facilitate and hinder the effective collaboration between public and private sector. Some of them are obtaining incentives either in (money, training, obtain drug without cost, reduced need for laboratory facilities), political will and get respect for their service (Jacobs, 2009). Moreover, not having regulation, standards and certification for their work, and lack of committed and participatory administration from NTP are mentioned barriers for collaboration (Lal et al, 2011)

Improve cure rate
In New Delhi, India, PPM project increased the cure rate by a factor of 69% compared to non-DOTS treatment in private sector and treated more than twice the public sector DOTs alone. (Floyd et al, 2006). According to the review the PPM has achieved the first objectives but was not enough for assuring reduction of financial burden for the patients. In Vietnam, treatment success rate among private providers improved from 19% to 62% through PPM implementation (Malmborg et al., 2011). The treatment success rates among 39 PPM projects, has shown 60% increment as well reducing default rates (Lei et al, 2015).

Moreover, decrease costs of treatment. Studies have shown that PPM programs have reduced cost in some projects (Lei et al, 2015). For example, PPM-DOTs program has reduced the cost by more than twice US$ 24–33 than DOTs alone in public sector (US$ 63) (Floyd et al, 2006). Access and equity improved in which poor people have benefited by PPM projects (Malmborg et al., 2011, Floyd et al, 2006).

1.2.4. Private drug retail outlets role in TB control
It is common for patients to consult private pharmacies before doing proper diagnosis of TB, because private DROWs are near and easily accessible for most people. In a study conducted in Ethiopia 26% (Abebe et al.,2010) and 7% (Mesfin et al, 2009) went to drug vendors, In a Vietnamese survey half of the TB suspects first made contact with private providers, mainly pharmacists (Hoa et al., 2011). In a study from Bangladesh among TB suspects who seek for care only 16% went to DOTs facility but others 84% went to private providers. At least 2.5 visits was made to each provider before coming to a proper TB facility. Among them 23% of the patients went to drug vendors (Hossain et al., 2010).

In a study from Uganda, out of 247 TB patients interviewed 39% reported visiting a pharmacy or drug shop as their first health seeking action (Kiwuwa et al., 2005). In another study conducted in Nigeria recently, drug shops were the main facilities where newly TB diagnosed patients visited after onset of symptoms (Ukwaja et al., 2013).

In Amhara Region in Ethiopia, first visit of TB patients to non-formal health providers and self-treatment were associated with patient delay. The majority of the patients (61.7% ) initially
visited non-formal health providers such as traditional healers and private drug retail outlets (Yimer et al., 2005).

According to a systematic review, among 29 PPM programs, TB case management has increased together with suspected TB cases referral. Suspected TB cases are referred more from PPM areas than non PPM areas (Lei et al, 2015).

1.2.5. A policy on referral
A private practitioner, unless they are granted license to deliver DOTS service, are required to refer the TB suspects to a public facility. The sale of TB drugs is prohibited in private facilities in Ethiopia, but some of them are allowed to supply the drug free of charge for TB patients in their facility (FEMOH., 2012, Yimer (b) et al., 2011).

1.2.6. Enabling and discouraging factors for TB suspect identification and referral
Enabling factors for referral
Private practitioners referred TB suspects when they have information on DOTs, when there are TB suspect referral forms and a nearby TB diagnostic laboratory within 5 km. Moreover getting feedback from government health institutions, increases the referral of TB suspects by private institutions (Putra et al., 2013). In South Africa, the enabling factors for referral for PPM were financial incentives and refreshing training (Jacobs, 2009).

In a study from Vietnam, work experience, being pharmacy assistant and awareness about free TB treatment were associated for referral of TB suspects to a relevant facility among DROWs (Vu et al., 2012). A review paper by Bell and colleague showed that knowledge about national TB program varies in different countries and among different professionals. The study showed that providers were having poor understanding of DOTs strategy and NTP of their countries. This would lead to poor quality of care and treatment. In addition, there was a knowledge gap among TB care providers about the national treatment guidelines. Knowledge about NTP and about TB were associated with age, sex and giving DOT service (Bell et al., 2011).
A study conducted on pharmacists in Vietnam by Vu and colleague showed that the theoretical knowledge of pharmacists on TB was good, but identifying TB suspect was poor on fictitious cases. 53% of pharmacists dispensed drugs for the simulated client patient (Vu et al., 2012).

A systematic review by Smith on quality of private pharmacies showed that there was common practice of dispensing antibiotics without prescription (Smith, 2009). A study in Vietnam showed that more than half of the private pharmacists dispensed antibiotics and anti-inflammatory drugs to TB suspects (Vu et al., 2012).

The quality of service in developing countries’ dispensing practice is poor with regard to labeling and information giving. This raises the question about their knowledge. Advice and follow up was poor in most pharmacy services (Smith, 2009).

Discouraging factor for referral
According to a systematic review the referral practice varies and depends on specific situations. The private providers often did not believe the public sector was of good quality, so they do not refer. They give treatment first. Then if it is not resolved, they refer to public or other treatment places. This practice is associated to variables such as age, employment sector (private/public) and qualification. Higher age and qualification are associated with good practice (Bell et al., 2011).

Lack of referral forms, and the clinic being more far than 5km from the diagnostic laboratory, were associated with poor referral practice (Putra et al., 2013).

Lack of awareness about national TB guidelines contributed for low referral and detection. In Yimer and colleagues’ study 69% of private practitioners in Ethiopia referred TB suspects to a government facility, but most of them did not get any feedback. This was mentioned as discouraging for referral. Half of the practitioners who had referred were involved in follow up of the patients on treatment and only 31.5% of them were having a TB registry book (Yimer et al., 2012). This affects the reporting and case notification for the NTP (Yimer et al., 2012). An intervention on pharmacist professionals referral practice and TB suspect identification contributed to increased TB suspects referral from 22 to 58% in Bolivia (Lambert et al., 2005).
1.3. Rational of the study

Globally a large number of people go first to private providers when they are sick. Private DROWs is among the private providers most frequently visited. They are mostly near, convenient and timely choice for sick individuals (Smith, 2009). TB suspects are among the clients visiting private drug retail outlets and could get delayed for treatment (Olarewaju et al., 2013, Vu et al., 2012, Lambart et al., 2005, Lonnroth et al., 2003). As different studies showed, that these patients often obtain antibiotics, other than TB drugs, or simple cough syrups or anti allergic drugs. Among the possible consequences of delayed diagnosis are increased severities of disease and increased transmission in society (Mitchellet et al., 2013, Vu et al., 2012, Lambart et al., 2005, Lonnroth et al., 2003).

Ethiopia is among the high TB burden countries in the world (WHO, 2013). According to Amhara Regional State Health Office (ARSHO) report the number of TB cases is high (280 per 100,000) while case detection is very low 29% (Amhara Regional State Health Office (ARSHO, 2013). There are ninety private drug retail outlets, which are found on nearly every corner of the Dessie town (ARSHO, 2013). Most drugs accessed even without a prescription including all nonprescription drugs and prescription drugs as well. Therefore, the knowledge and practice of private DROWs on TB case detection and referral might have a significant impact in TB control. Currently there is no data available on the knowledge and practice of private drug retail outlet workers in Ethiopia in general and as well in Dessie. Therefore, this research will show the magnitude of the problem to initiate intervention by the concerned authorities and the community as well.
1. Objectives

1.4. General objective

- To assess the role of private DROW in TB control.

1.4.2. Specific objectives

1) Determine the level of TB knowledge among DROW

2) Assess TB suspect identification and referral practice by DROW.
CHAPTER TWO: Methods and Materials

2.1. Study area

This study was carried out in South Wollo Zone, located in Amhara region of Ethiopia. Dessie is the capital city of the zone, which is located 400 kms north of Addis Ababa. South Wollo is divided in to 23 woredas (equivalent of districts) and 534 kebeles (smallest administrative units in Ethiopia). According to Amhara Regional Health Bureau report, South Wollo Zone has a total population of 3,420,153 million. Dessie town has 16 kebeles. Geographical coordinates of Dessie town are approximately 11°8′N 39°38′E, with an elevation between 2,470 and 2,550 meters above sea level. Figure 1 shows map of the study area. A total of 644 public health institutions are found in the zone during the study period, which include referral hospitals, district hospitals, health centers and health posts. There are 90 DROWs in South Wollo Zone, 45 of which are in Dessie town. The study was conducted from July to October, 2014.

Figure 1. Study area Amhara region specifically South Wollo, Dessie
2.2. Study design

Cross-sectional study design was used to assess knowledge of the DROWs towards TB and referral practice of suspected TB patients

2.3. Population

Source population
The source population includes all private DROWs, including pharmacists, health assistants and druggists.

Study population
The study population constitutes selected DROWs for the study.

Inclusion
Inclusion criteria
All private DROWs working in the private DROs who were voluntary to participate in the study were included.

2.4. Sample Size determination and Sampling Technique

Sample Size Determination
All the 90 private DROs found in Dessie town and the districts in the zone were included in the study.

Sampling Technique
From each DROW, one professional was represented. If there are more than one DROWs actively working, only one of them was selected. The one with higher level of education was interviewed in the case of more than one professional working in the DRO. For example, if a pharmacist and a druggist are working together, the pharmacist was interviewed. In cases in which more than one pharmacist was working together, the one who have most supervising role in the dispensing was interviewed.
2.5. Study variables

Dependent variables
TB knowledge
Referral practice of TB suspects to proper TB care facility

Independent variables
– Sex
- Age
- Profession
- Service years
- Training on TB

2.6. Data collection and processing

Semi structured questionnaire was used to collect data on socio-demographic variables, and other variables including perceived severity of the disease, perceived barriers for early diagnosis and ways of transmission. It was first developed in English and translated to Amharic (the regional language used by most people in Dessie) by the principal investigator and back translated to English by another person to check for its consistency. The data were collected by the principal investigator and two assistants. The two assistants were trained staff of Dessie Health Science College.

2.7. Knowledge score

Eight item questions were used to assess knowledge of the DROWs about TB. These were definition of TB, Transmission of TB, symptoms of TB, list TB drugs, treatment duration, and ways of TB prevention, knowledge on DOTs and cause of TB. The reliability coefficient (chronbach’s alpha was 0.7).

Based on normality plot and kolmogorov- smirnov test p=0.00 as shown below p< 0.01 it deviates from normality (the data not normally distributed).

Therefore, the knowledge score median is 6 within the range (minimum, 0 and maximum,8).
2.8. Ethical consideration
Ethical clearance was obtained from Norwegian Regional Committee for Medical and Health Care Research Ethics (REC). After obtaining approval from REC, the protocol was submitted to Amhara Regional State Health Bureau Research Ethics Review Committee. Finally, Research Ethics Review Committee has given full approval for the research in the region.

2.9. Participant confidentiality
Participants were informed about the purpose and procedure of the study. Voluntary participation of the study participants was guaranteed. Consent was obtained before answering any question. The response of each study participants was kept confidential. Neither individual study participants nor specific DROs are referred to in the report writing.

2.10. Data quality control
The data collection instrument was pre-tested on five drug retail outlets from the study area and necessary modifications were made on the instrument. There were some repeated and confusing questions and they were corrected. Because there were only minor modifications on the instrument following the pre-test, the five piloted data were included in the analysis.

2.11. Data Processing and analysis
The collected data were checked for completeness, entered into a computer, and analyzed using SPSS version 20.0 software package. Descriptive statistics were used to summarize the data. The median of knowledge score was taken because it was not normally distributed. Then, any knowledge scores above and below the median were considered as satisfactory or unsatisfactory, respectively. Chi square and p-value were used to assess the association of independent variables with knowledge score. Kruskall wallis was used for comparing knowledge score among the different professions.
In addition, multivariable analysis was employed to analyze associations between independent and dependent variables. P. values < 0.05 was considered statistically significant during the analysis.

2.12. Operational definitions

Private DRO is a place where selling of drug is performed outside the public health institutions. In Ethiopia, there are three levels of private DROWs who practice in the work of delivering drug:

1. Health assistant are trained health personnel at certificate level and practice as drug vendors.
2. Druggists are pharmacy personnel trained at diploma level who practice as drug vendors.
3. Pharmacists are trained pharmacy professional at bachelor degree level and practice in pharmacies.

TB suspects- are individuals who show signs and symptoms of TB especially cough for more than two weeks (FEMOH, 2012).

TB suspect referral- means the practice of sending TB suspects to where they can find proper TB diagnosis and treatment. TB symptoms- when active TB affects the lungs the main symptoms are persistent cough (sometimes with bloody sputum), fever, night sweat, chest pain, exhaustion, loss of appetite and shortness of breath.

TB knowledge- in this study TB knowledge was measured based on respondent’s ability to answer to eight questions (define TB, how TB spreads, TB symptoms, list TB drugs, treatment duration, ways of TB prevention, knowledge of DOTS and TB cause). Based on this, individuals who correctly answered at least six of the eight questions were considered to have good knowledge of TB.

Practice of respondents- measured by the intended actions of DROWs by referring or giving drugs.

Non-formal health providers includes traditional healers and illegal drug seller.

Formal health providers includes professionals in modern health facilities such as drug retail outlets, hospitals, clinics and health centers and clinics.
CHAPTER THREE: RESULTS

There were 90 drug retail outlets in Dessie and surrounding south Wollo woredas. Among these 19 were pharmacies and 71 were drug stores. Mainly in Dessie 45 drug retail outlets are found and the rest 45 were in woredas around Dessie including rural drug vendors.

In this study, 76 DROWs working in in Dessie town and south Wollo Woredas were included, giving response rate of 84.4%. Among these 14 were pharmacies and 62 were drug stores. The number of drug outlets included from Dessie and the surrounding districts was 42 (55.3%) and 34 (44.7%), respectively. Out of the 14 drug retail outlets not voluntary to participant in the study, 3 were in Dessie and the remaining 11 were from the surrounding districts. The reasons for refusal could be fear of the consequences of participating, being non-positive to the study.

3.1. Socio demographic characteristics of the study participants

Among the 76 participants, the majority was males (69.7%). Age of the study participants ranged from 21 to 56 years with mean age of 34 years. The mean service year was 6 years. By profession, most of the study participants were druggists (68.4%), followed by pharmacists (27.6%).

In this study, 76 DROWs working in in Dessie town and south Wollo Woredas were included, giving a response rate of 84.4%. Among these 14 were pharmacies and 62 were drug stores. The number of drug outlets included from Dessie and the surrounding districts was 42 (55.3%) and 34 (44.7%), respectively. Out of the 14 drug retail outlets not voluntary to participant in the study, 3 were in Dessie and the remaining 11 were from the surrounding districts.
Table 1. Socio demographic characteristics of participant DROWs.

<table>
<thead>
<tr>
<th>Socio-demographic variables</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sex</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>23</td>
<td>30.3</td>
</tr>
<tr>
<td>Male</td>
<td>53</td>
<td>69.7</td>
</tr>
<tr>
<td>profession</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nurse</td>
<td>3</td>
<td>3.9</td>
</tr>
<tr>
<td>Druggist</td>
<td>52</td>
<td>68.4</td>
</tr>
<tr>
<td>Pharmacist</td>
<td>21</td>
<td>27.6</td>
</tr>
<tr>
<td>age</td>
<td></td>
<td></td>
</tr>
<tr>
<td>20-30 yr</td>
<td>27</td>
<td>35.5</td>
</tr>
<tr>
<td>31-40 yr</td>
<td>35</td>
<td>46.1</td>
</tr>
<tr>
<td>41-above</td>
<td>14</td>
<td>18.4</td>
</tr>
<tr>
<td>Service yr group</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1-5 yr</td>
<td>49</td>
<td>67.1</td>
</tr>
<tr>
<td>6-10 yr</td>
<td>15</td>
<td>20.5</td>
</tr>
<tr>
<td>11- above</td>
<td>9</td>
<td>12.3</td>
</tr>
<tr>
<td>Missing</td>
<td>3</td>
<td>100.0</td>
</tr>
</tbody>
</table>

On taken when confronted with a person with cough

3.2. Actions taken by DROWs when confronted with a client with cough

For those coughing patients, 42.5% of the DROWs dispense antibiotics, most frequently amoxicillin, augmentine (amoxacillin with clavulanic acid), and 41.1% of DROWs said they would dispense cough syrups. In spite of these, 61 (81.3%) participants said they will refer if they encounter a client with cough of two weeks and more and the remaining 18.7% responded they will give drug for such clients.

The type of drug given for a patient with cough presenting with prescription and without prescription is shown in figure 2 below.
3.3. TB suspect identification

Participants were asked to mention a disease first coming to their mind of a patient with cough of more than two weeks. The vast majority (92.9 %) of the DROWs responded that they would suspect TB for such clients. Some answered they will guess typhus. Most of these professionals perceived that place of treatment for TB patients was health institutions, but only 67.1 % could correctly described the right place of the nearest TB facility center. Some of the DROWs suggested traditional medicines like steam inhalation.
The survey demonstrated that 60 (89.6 %) of participants know that TB treatment is provided for free at national level. None of the study participants had received training on TB in the past two years prior to data collection. Nine of the study participants (11.8%) received TB related training before four years, and all of them mentioned the training was provided by a non-governmental organization.

Most of the study participants (76.3 %) mentioned that their main source of knowledge about TB was the formal education they obtained from university or college.

### 3.4. TB knowledge among the drug retail outlet workers

Various responses were given for the questions assessing knowledge of TB. Over half of the study participants (52.7%) correctly mentioned that TB is caused by the bacterium *M. tuberculosis*. The responses include wind, intestinal ulcer, poverty, living in crowded condition and allergies. Moreover, some of the DROWs said lack of sanitation, culture and close contact with coughing person. Responses of the study participants about the cause of TB are presented in figure 3.
All of the study participants responded that TB can be treated and prevented, but there was a knowledge gap about how to treat and prevent it. Moreover, all of them said they do not have TB drugs and they do not sell it.

### 3.5. Knowledge score

To assess the knowledge 8 items were used, which include questions: define TB, how TB spread, TB symptoms, list TB drugs, treatment duration, ways of TB prevention, knowledge on DOTs and cause of TB. The reliability coefficient (chronbach’s alpha was 0.7).

Based on normality plot and kolmogorov- smirnov test $p< 0.01$ test, it deviates from normality (the data not normally distributed). Therefore, the knowledge score median is 6 within the range (minimum, 0 and maximum, 8).
Based on median of 6, as the study participants have been classified to have sufficient TB knowledge if they correctly answer at least 6 of the 8 questions, and insufficient if the score is below 6. Accordingly, 41 (60.3%) of the DROWs had sufficient knowledge of TB. The remaining 39.7% had insufficient TB knowledge.

3.6. TB referral practice
Among the respondents 61 (81.3%) said they would refer the clients and 18.7% said they would give drugs for clients. But actually 62(85%) they were giving medicines including cough syrups and other antibiotics even without prescription. The following analysis is done for participants who handle coughing patients coming without prescription. Because they have customers who comes without prescription, this shows their TB suspect identification, knowledge and referral practice and reflect the existing gap.

3.7. Socio demographic characteristics of study participant who handle TB suspect patients coming without prescription
It was important to classify participants based on what they answered if a coughing patient comes to them without prescription. Because the answer given by them can show what is their TB suspect identification capacity and practice of referring to proper TB facility. Among 76 study participant 56 of them said that coughing patients with acute or chronic cough come to them. The following table shows the socio-demographic status of this participant and their answer for TB related knowledge. One third of these participants lack knowledge in mentioning at least three correct symptoms, how TB spread and ways of prevention. More than one third (41%) lack knowledge about DOTs, with regard to their practice 21.1% said they would give drugs including cough syrups, antibiotics or bronchodilators.
Table 2. Socio demographic characteristics of DROWs who handle clients coming without prescription.

<table>
<thead>
<tr>
<th>Coughing patients without prescription</th>
<th>frequency</th>
<th>percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>42</td>
<td>75</td>
</tr>
<tr>
<td>Female</td>
<td>14</td>
<td>25</td>
</tr>
<tr>
<td>Age group</td>
<td></td>
<td></td>
</tr>
<tr>
<td>20 to 30 yr</td>
<td>21</td>
<td>37.5</td>
</tr>
<tr>
<td>31 to 41 yr</td>
<td>24</td>
<td>42.9</td>
</tr>
<tr>
<td>41 and above</td>
<td>11</td>
<td>19.6</td>
</tr>
<tr>
<td>Profession</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nurse</td>
<td>2</td>
<td>3.6</td>
</tr>
<tr>
<td>Druggist</td>
<td>37</td>
<td>66.1</td>
</tr>
<tr>
<td>Pharmacist</td>
<td>17</td>
<td>30.4</td>
</tr>
<tr>
<td>Service year</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 to 5yr</td>
<td>36</td>
<td>65.5</td>
</tr>
<tr>
<td>6 to 10yr</td>
<td>12</td>
<td>21.8</td>
</tr>
<tr>
<td>11 and above</td>
<td>7</td>
<td>12.7</td>
</tr>
</tbody>
</table>

Eight knowledge indicating items frequency, for drug retail outlet workers handling patients coming without prescription. Based on their response there is significant gap in defining ways of TB prevention and TB cause defining.
Table 3. Responses of DROWs about TB who handle clients without prescription

<table>
<thead>
<tr>
<th>8 knowledge variables</th>
<th>Responses of participants who handle TB suspects</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Correct</td>
</tr>
<tr>
<td>TB suspect definition</td>
<td>52 (92.9 %)</td>
</tr>
<tr>
<td>TB symptoms explanation</td>
<td>41 (73.2 %)</td>
</tr>
<tr>
<td>How TB spread defining</td>
<td>43 (78.2 %)</td>
</tr>
<tr>
<td>Listing of drugs</td>
<td>43 (76.8 %)</td>
</tr>
<tr>
<td>Ways of TB prevention</td>
<td>32 (58.2 %)</td>
</tr>
<tr>
<td>Knowledge on DOTs</td>
<td>33 (63.5 %)</td>
</tr>
<tr>
<td>TB cause definition</td>
<td>29 (51.8 %)</td>
</tr>
<tr>
<td>TB treatment duration</td>
<td>40 (71.4 %)</td>
</tr>
</tbody>
</table>

 Majority of the DROWs dispense antibiotics 26 (47.3%) instead of referring to proper TB treatment place.

TB suspect referral practice of participants for patients coming without prescription

Table 4. Drug dispensed by DROWs who handle coughing patients without prescription.

<table>
<thead>
<tr>
<th>Coughing patients without prescription</th>
<th>frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Drug sold for TB</td>
<td></td>
<td></td>
</tr>
<tr>
<td>suspects</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Antibiotics</td>
<td>26</td>
<td>47.3</td>
</tr>
<tr>
<td>Cough syrups</td>
<td>22</td>
<td>40</td>
</tr>
<tr>
<td>No drug given</td>
<td>6</td>
<td>10.9</td>
</tr>
<tr>
<td>Other drug given</td>
<td>1</td>
<td>1.8</td>
</tr>
<tr>
<td>Reffering practice</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>43</td>
<td>78.2</td>
</tr>
<tr>
<td>No</td>
<td>12</td>
<td>21.2</td>
</tr>
</tbody>
</table>
52 (92.9 %) able to identify TB suspects correctly and only 52 % able to identify the causative agent for TB.

Table 5. DROWs responses’ who handle clients without prescription.

<table>
<thead>
<tr>
<th>Coughing patients coming without prescription</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>treatment place valid</td>
<td>Other places</td>
<td>18</td>
</tr>
<tr>
<td>perceived by drug outlet workers</td>
<td>TB diagnostic places</td>
<td>36</td>
</tr>
<tr>
<td>Missing</td>
<td>Total</td>
<td>54</td>
</tr>
<tr>
<td>Missing</td>
<td>System</td>
<td>2</td>
</tr>
<tr>
<td>Missing</td>
<td>Total</td>
<td>56</td>
</tr>
<tr>
<td>free treatment knowhow</td>
<td>yes</td>
<td>47</td>
</tr>
<tr>
<td></td>
<td>no</td>
<td>4</td>
</tr>
<tr>
<td>Missing</td>
<td>System</td>
<td>5</td>
</tr>
<tr>
<td>Missing</td>
<td>Total</td>
<td>56</td>
</tr>
<tr>
<td>TB training</td>
<td>yes</td>
<td>8</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>48</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>56</td>
</tr>
<tr>
<td>TB cause</td>
<td>bacteria</td>
<td>29</td>
</tr>
<tr>
<td></td>
<td>virus</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>immunity</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>others</td>
<td>22</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>56</td>
</tr>
</tbody>
</table>

Only 43% able to define TB suspects and 29 (52%) of them able to define correctly the causative agent for TB was bacteria.
A comparison of professions (nurse, druggist and pharmacists) since only two nurses the data pooled with druggists. Therefore, a comparison done between nurse plus druggists and pharmacists.

Among 8 knowledge variables only listing of drugs and DOTs knowledge has shown significant difference between the professions. Pharmacists were more knowledgeable about TB.

*Table 6. A comparison of TB knowledge among three professions Nurses, Druggists & Pharmacists.*

<table>
<thead>
<tr>
<th>Knowledge variables</th>
<th>Nurse + Druggist</th>
<th>Pharmacists</th>
<th>P value (fishers exact test)</th>
</tr>
</thead>
<tbody>
<tr>
<td>TB suspect identification</td>
<td>35 (89.7 %)</td>
<td>17 (100 %)</td>
<td>0.303</td>
</tr>
<tr>
<td>TB symptoms</td>
<td>26 (66.7 %)</td>
<td>15 (88.2 %)</td>
<td>0.114</td>
</tr>
<tr>
<td>Listing of TB drugs</td>
<td>26 (66.7 %)</td>
<td>17 (100 %)</td>
<td>0.005</td>
</tr>
<tr>
<td>TB treatment duration</td>
<td>26 (66.7 %)</td>
<td>14 (82.4 %)</td>
<td>0.339</td>
</tr>
<tr>
<td>DOTs knowledge</td>
<td>18 (51.4 %)</td>
<td>15 (88.2 %)</td>
<td>0.014</td>
</tr>
<tr>
<td>Ways of TB prevention</td>
<td>21 (55.3 %)</td>
<td>11 (64.7 %)</td>
<td>0.567</td>
</tr>
<tr>
<td>How TB spread</td>
<td>31 (81.6 %)</td>
<td>12 (70.6 %)</td>
<td>0.482</td>
</tr>
<tr>
<td>TB cause answer</td>
<td>17 (43.6 %)</td>
<td>12 (70.6 %)</td>
<td>0.084</td>
</tr>
</tbody>
</table>

Among independent variables (age, gender, profession and TB training) hasn’t shown significant relationships with knowledge and only service years have shown correlation (p=0.04) with TB knowledge. Increase in service years has a significant association with TB knowledge score.

Among the eight questions listing of TB drugs and DOTs knowledge has significant role in explaining the different roles among three professions.
Table 7. Knowledge score association with independent variables for handlers of TB suspect clients who approach them.

<table>
<thead>
<tr>
<th>Independent variable</th>
<th>Knowledge score</th>
<th>Odds Ratio</th>
<th>95% confidence interval</th>
<th>P - value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Unsatisfactory</td>
<td>Satisfactory</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sex</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>19 (38.8%)</td>
<td>30 (61.2%)</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>8 (42.1%)</td>
<td>11 (57.9%)</td>
<td>0.87(0.3 – 2.56)</td>
<td>0.8</td>
</tr>
<tr>
<td>Age</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>20 to 30</td>
<td>6 (27.3%)</td>
<td>16 (72.7%)</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>31 to 40</td>
<td>17 (51.5%)</td>
<td>16 (48.5%)</td>
<td>1.185 (0.3 – 5.34)</td>
<td>0.825</td>
</tr>
<tr>
<td>41 and above</td>
<td>4 (30.8%)</td>
<td>9 (69.2%)</td>
<td>0.42 (0.11 – 1.63)</td>
<td>0.21</td>
</tr>
<tr>
<td>Profession</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Druggist+</td>
<td>23 (47.9%)</td>
<td>25 (52.1%)</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Nurse</td>
<td></td>
<td></td>
<td>0.272 (0.08 – 0.93)</td>
<td>0.038</td>
</tr>
<tr>
<td>Pharmacist</td>
<td>4 (20%)</td>
<td>16 (80%)</td>
<td>0.39 (0.074 – 2.03)</td>
<td>0.26</td>
</tr>
<tr>
<td>Service year</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 to 5</td>
<td>21 (48.8%)</td>
<td>22 (51.2%)</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>6 to 10</td>
<td>3 (20%)</td>
<td>12 (80%)</td>
<td>0.35 (0.063 – 1.93)</td>
<td>0.23</td>
</tr>
<tr>
<td>11 and above</td>
<td>2 (25%)</td>
<td>6 (75%)</td>
<td>1.33 (0.17 – 10.25)</td>
<td>0.78</td>
</tr>
<tr>
<td>TB training</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>25 (42.4%)</td>
<td>34 (57.6%)</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>2 (22.2%)</td>
<td>7 (77.8%)</td>
<td>0.39 (0.074 – 2.03)</td>
<td>0.26</td>
</tr>
</tbody>
</table>

Among all independent variables profession (being pharmacist or druggist) has shown association with TB knowledge. Pharmacists have high knowledge compared to nurses and druggists.

The next table shows the association of independent variables for DROWs who handle TB suspects coming without prescription.
Knowledge score association with independent variables for only handlers of non-prescription TB suspects that approach them

Table 8. Knowledge score association with independent variables for only DROWs who handle nonprescription TB suspects that approach them.

<table>
<thead>
<tr>
<th>In dependent variable</th>
<th>Knowledge score</th>
<th>Odds Ratio</th>
<th>95% confidence interval</th>
<th>P - value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Unsatisfactory</td>
<td>Satisfactory</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sex</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>16 (40%)</td>
<td>24 (60%)</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>2 (18.2%)</td>
<td>9 (81.8%)</td>
<td>3.0 (0.57 – 15.74)</td>
<td>0.194</td>
</tr>
<tr>
<td>Age</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>20 to 30</td>
<td>4 (23.5%)</td>
<td>13 (76.5%)</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>31 to 40</td>
<td>11 (47.8%)</td>
<td>12 (52.2%)</td>
<td>1.22 (0.215 – 6.92)</td>
<td>0.823</td>
</tr>
<tr>
<td>41 and above</td>
<td>3 (27.3%)</td>
<td>8 (72.7%)</td>
<td>0.4 (0.086 – 1.94)</td>
<td>0.261</td>
</tr>
<tr>
<td>Profession</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Druggist+ Nurse</td>
<td>15 (44.1%)</td>
<td>19 (60%)</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Pharmacist</td>
<td>3 (17.6%)</td>
<td>14 (82.4%)</td>
<td>0.27 (0.07 – 1.122)</td>
<td>0.072</td>
</tr>
<tr>
<td>Service year</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 to 5</td>
<td>15 (48.2%)</td>
<td>16 (51.6%)</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>6 to 10</td>
<td>1 (8.3%)</td>
<td>11 (91.7%)</td>
<td>0.43 (0.072 – 2.54)</td>
<td>0.35</td>
</tr>
<tr>
<td>11 and above</td>
<td>2 (28.6%)</td>
<td>5 (71.4%)</td>
<td>4.4 (0.32 – 60.61)</td>
<td>0.268</td>
</tr>
<tr>
<td>TB training</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>17 (39.5%)</td>
<td>26 (60.5%)</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>1 (12.5%)</td>
<td>7 (87.5%)</td>
<td>0.22 (0.025 – 1.94)</td>
<td>0.17</td>
</tr>
</tbody>
</table>

None of the variables has shown association with knowledge score except profession.
CHAPTER FOUR: Discussion and Recommendation

4.1. Discussion

In this descriptive study the knowledge and practice of DROWs about TB was measured. Specifically, TB suspect identification from clients and referral to proper TB facility by DROWs was determined.

Engagement of private DROs has many benefits by increasing case detection; reduce diagnostic delay and patient information access. Moreover, it will have a role in prevention of emerging drug resistance. Private DROWs had significant number of TB suspects coming to them without prescription. Some of them have many TB suspects, up to more than hundred per week. This has a high impact on their role for controlling TB by identifying TB suspects and referring infectious TB cases early to proper treatment place.

Even though, it is difficult to conclude, only 75.7% of respondents are actually handling TB suspects without prescription based on what they report. So the following discussion is for respondents who reported to handle TB suspects coming without prescription. Based on profession two were nurse, 37 were druggist and 17 were pharmacists.

Our study indicates most DROs has TB suspect clients, a minimum of two to a maximum of hundred in a week. 52 (92.9 %) of DROWs who handle coughing patients without prescription, suspect TB mainly for a client complaining for more than two weeks of persistent cough. This result is higher than another study in Ethiopia that was (88%) (Yimer et al, 2012) and a study in India where 52.7% (Basu et al, 2013) of private practitioners able to define aTB suspect participants who claimed coughing clients (TB) suspects come to them. This result is similar with the study in Vietnam on private DROWs where 40% of respondents guess TB for a fictious case on a questionnaire (Vu Dh, 2012). Their ability to correctly identify TB suspect is very important for referring TB suspects since if they do not identify they will tend to give drugs including antibiotics which leads to drug resistance.
Only 43 (78.2%) of DROWs reported that they would refer TB suspects to a proper TB care place which is lower than a similar study in private practitioners in Ethiopia 77 (69%) (Yimer et al., 2012) and another study all physicians referred TB suspects (Shimeles et al, 2006). This is much higher than the finding in India where 58.3% (Basu et al, 2013) and 35.5% (Greaves et al, 2007) of private practitioners referred TB suspects for TB diagnosis. Contradicting this report 26 (47.3%) DROWs have reported that they would dispense medicines for TB suspect patients. Our result is nearer to a result from Vietnam study on private pharmacists where 46% of respondents said that they referred TB suspects for proper TB facility. In spite of this, in the same study, only 10% of the simulated TB suspects were actually referred to a proper TB care facility (Vu Dh, 2012). More or less close to a study in Bangladesh 79% of un-licensed practitioners referred TB suspects to proper TB care. Therefore, more work is required to increase the number of TB suspects referred to proper TB care place.

Knowing about national free treatment policy is one of the factors enabling referral of TB suspects. From our study 47 (92.2%) of DROWs know national free treatment policy which is higher than a similar study on medical students in China where only 30% knew about free treatment (Zhao et al, 2013). Moreover, 66.7% of DROWs could correctly describe the places of TB care facilities. A similar study on private pharmacists in Vietnam showed that 80% of the respondents knew about national treatment policy (Vu et al, 2012). Hence, our participants had good knowledge about national free treatment policy. It is advantageous for timely referral but the actual practice of dispensing drugs rather than referring the TB suspect is causing TB diagnostic delay.

Among the respondents 26 (47.3%) of DROWs dispense antibiotics for TB suspects without prescription and 23 (40%) dispense cough syrups and other drugs without prescription. This result corresponds with a similar study on private pharmacists in Vietnam where 41% of pharmacists dispensed antibiotics without prescription and 25% sold anti TB drugs in Bolivia (Lambart et al, 2005). A study in Georgia showed that 100% of private pharmacies sold anti TB drugs (Kobaidze et al 2009). A similar study in Kenya found that 98.8% sold at least one anti TB drug. This is in contrast to what was expected as their duty according to the national treatment
PPM- DOTs implementation guideline for TB suspect identification and referral, TB suspects need to be referred timely to proper TB care treatment place (FMOH, 2012, EFMOH, 2006).

In our study 29 (51.8%) of DROWs who handle coughing patients without prescription, correctly define the cause of TB which is much less than a similar study on private pharmacists in Nigeria where among 47 participants all (100%) correctly defined *Mycobacterium tuberculosis* as the cause of TB (Olarewaju, 2013). It is also lower than a study in India where all private practitioners able to explain the cause of TB (Basu et al, 2013).

The mode of TB transmission was correctly described by 43 (78.2%) of DROWs who handle coughing patients without prescription, which is higher than a similar study in Nigeria on private pharmacists where only 33 (70.2%) stated air born route of transmission (Olarewaju, 2013). A study in India has shown lower figure than our study only 75% (Basu et al, 2013) and 38% in Philippines (Auer et al, 2006) of them have sufficient knowledge about transmission of TB. Increasing the knowledge about mode of transmission is important to improve the diagnostic delay resulting from DROWs. Our study has shown that only 41 (73.2%) knew the symptoms of TB which is higher than a study in India where 56.7% of the private practitioners were able to define TB symptoms correctly (Basu et al, 2013).

Our study indicates that 40 (71.4%) of DROWs knew the duration of TB treatment, higher than a study on medical students in China where (30%) knew the the length of treatment (Zhao et al, 2013) and only 5 (10.6%) knew about treatment duration in a study on private pharmacists in Nigeria (Olarewaju, 2013). Our finding is higher than the finding in India that is 53.3% (Basu et al, 2013). The result is consistent with their knowledge about anti TB drugs.

In our study only 43 (76.8%) of DROWs correctly described the main first line four drugs for TB treatment. This is higher from a similar study on private pharmacists in Nigeria where only 3 (6.3%) could correctly described all the drugs (Olarewaju, 2013). This is also a correspondent with results from a similar study in Ethiopia were only 37 (33%) of private practitioners correctly list the recommended TB drugs (Yimer, 2012) and much higher than another study in Ethiopia where only 9.7% of private physicians know all NTP regimens (Shimeles et al, 2006). It
is higher than a study in Kenya, which showed that 38.7% of private practitioners knew the drug regimen for TB treatment (Chakaya et al, 2005) and 60% in Philippines (Auer et al, 2006). Trainings and courses are needed to improve the knowledge of DROWs.

The average knowledge score for the eight items TB knowledge questions was 41 (60.3 %). The remaining 39.7% has no sufficient TB knowledge. Even though, there is no similar study done on DROWs in Ethiopia, a study done on private practitioners by Yimer and colleagues had a similar result as only 60.7% private health care providers had basic knowledge on DOTs (Yimer et al, 2012). A similar study in India only 56.7% (Basu et al, 2013) and 84.4% (Greaves et al, 2007) know about DOTs. Another study in China on medical students revealed that the students had less knowledge compared to our study subjects that is only 24 % had acceptable knowledge (Zhao et al, 2013). Our study has shown that TB knowledge was associated only with profession where pharmacists had higher TB knowledge than the other professions.

The main source of TB knowledge for DROWs was through education alone for 45 (80.4%). This is similar to a study in Ethiopia where 70% of private practitioners’ source of TB knowledge was medical textbooks (Shimeles et al, 2006). This result is different from that of Yimer and colleagues’ study on private practitioners in which 83 (74%) of private practitioners mentioned the national TB and leprosy control manual as main source of knowledge (Yimer et al, 2012). From this result, we can conclude that the national TB and leprosy manual did not reach DROWs since only 7.1% mentioned it as knowledge source. Media was mentioned by 10.7 % of respondents. This indicates a significant role played by the media, so strengthening its use and message is important.

4.2. Conclusion

From our study TB suspects approach the majority of private DROWs and more than one third of DROWs dispense different drugs including antibiotics for TB suspects without prescription. Moreover, 52 (92.9 %) were able to identify TB suspects but only said they would 43(78.2%) refer them to the right facilities. Therefore, TB suspects are delayed due to DROWs causing transmission of TB in the community and increase TB drugs resistance. More than one third of the DROWs had relatively in sufficient TB knowledge & more than one third had poor referral
practice. A higher education and work experience are determinant factors for good TB knowledge.
DROWs causes diagnostic delays. Interventions are needed to fill TB knowledge gap & improve their referral practice. Further study is recommended for DROWs.

4.3. Benefits of the study
The study shows the DROWs TB knowledge by TB suspect identification. It can also indicate what factors contribute for DROWs good TB suspect identification and referral. The study can contribute by showing the main problems discouraging referral of TB suspects to proper TB facility and give an indication of the malpractice of dispensing antibiotics without prescription. Moreover, it may serve as base line information for further study on the area.

4.4. Limitations of the study
The main limitations of the study are
1. The research is mainly based on the response of the DROWs so this may cause information bias because the DROs workers may modify their answers according to the required standard not the actual practice.
2. DROWs were always busy with customers and not have time to give detailed interview may affect the quality of data collected.
3. Many of my participants were bored with the length of our interview.
4. Because of the fear of criminal doings, many DROWs were not free to openly discuss some of sensitive questions. This would limit the extent of exposing the problem perspectives.
   Despite these limitations, the selection of a representative participant based on higher education and supervisory role strengthen the data representativeness.

4.5. Future recommendation
➢ For future more in depth, studies are required to search for the main problems. Using simulated client method is for the only way to actually expose malpractice of DROWs.
➢ It will be beneficial if it is done on large scale because if the sample size is increased it will enable to specifically identify the predictors for poor TB knowledge and additional covariates.

➢ The government and the Amhara regional office have to give emphasis and attention on DROWs role by engaging them in TB training and distributing updated TB control manuals. This will improve TB suspect identification and timely referral.

➢ The government has to apply the WHO guidelines for properly engaging the neglected private DROs in order to get a significant change in TB control.

➢ Regional health bureau should do regular follow up with respect to dispensing of antibiotics without prescription for controlling dispensing of antibiotics and the resulting drug resistance.

➢ More work is needed to increase collaboration and working together with private DROWs in order to improve TB suspect referral.
References


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dispensing in private pharmacies in Ho Chi Minh City, Vietnam. The international journal of tuberculosis and lung disease, 4(11), 1052-1059.


Xu, B., Jiang, Q. W., Xiu, Y., & Diwan, V. K. (2005). Diagnostic delays in access to tuberculosis care in counties with or without the National Tuberculosis Control Programme in rural China. The International Journal of Tuberculosis and Lung Disease, 9(7), 784-790
Annex 1

Request for participation

Introduction

My name is KalkidanYilma. I am doing a master in international community health in Norway and this research is part of my study.

TB is a major health problem in Ethiopia. In TB control drug resistance and delay are major problems. TB requires early diagnosis and treatment. Contrary to this a delay in diagnosis and treatment has a significant contribution for transmission. Private providers are one of the suggested reasons for delay and drug resistance. Private drug retail outlets are one of them. The private DROWs have a big role in TB control by identification of suspected TB patients and referring them to proper TB facility. Since for early identification and referral their knowledge has a big contribution then it is important to study. While there is no study that was done until, now then this study will be important for documenting and conveying important message. So I am collecting data on TB related knowledge and practice of private drug retail outlet workers in Dessie, Ethiopia.

You are kindly requested to participate in the study and answer the questionnaire it is about TB, takes about 20 minutes. If you like, we can discuss on the questions, which are not clear to you. The information you give will used for the purpose of study only and your identity will be treated confidential.

Information related to your name will be treated strictly confidential. Names and identifiers will be coded and deleted after data collection and therefore data will be treated anonymously for communication of results. Informed consent forms and questionnaires will be left behind in locked cabinet in Ethiopia and will be destroyed after a year. You only participate if you agree and you can refuse if you do not want to participate in the study.

If you do not participate or withdraw has no any consequence on you. If you give all the information’s it will be helpful to address problems associated with TB suspect identification referral practice.

I would like to thank you for responding for all questions.
Annex 2: consent form
I have been informed about the purpose of the study. I have understood that the information I provide will be used for research purpose. I am informed that the information that I will give will not have any consequence on me and my work.
I have been informed that my answers are used for the study and my identity will be treated with confidentiality. I am fully aware that participation in the study is fully voluntary and I can withdraw anytime without giving reason. Moreover, I am informed that if I would not involve in the research would not have any consequence on me. I confirm that I understand the information given to me.
Name of participant……………………………………………………………
I agree to participate
Signature ______________
Date ----------------
Note: this form has been translated to Amharic language which is the official language in the study areas.
Annex 3 Questionnaire

Participant number_____________________
Address___________________________
Date of data collection________________
Age____________________ sex________________

1. Category:
   a. Health assistant
   b. Nurse
   c. Druggist
   d. Pharmasist
   e. Other, please describe________

2. How long have you served as a drug dispenser? ____________________

3. Do all patients come to your pharmacy/ drug store/rural drug vender to buy drugs with prescription?
   a. yes____ no_____

4. If no, how do you estimate the proportion of those patients that come without prescription in a day_____________________

5. What would you do if a patient with cough first come and ask you to help him/her treat his/her cough?
   ___________________________________________________________________________
   ___________________________________________________________________________
   ___________________________________________________________________________

6. List one disease that would first come to your mind if a patient comes to you with cough of more than 2 weeks duration___________________________________________________

7. How many patients with cough on average visit your facility to buy drugs?
   Per day? ______per week? _________

8. What type of drugs would you sell to a patient who comes and ask you to sell him a drug that helps him to treat his/her cough?
   ___________________________________________________________________________
9. Why do you think patients come to your facility without prescription? ____________________________________________________________

10. Have you ever attended a training/workshop/seminar about TB? Yes______

No______
   a. If yes, when did you attend the last workshop/seminar__________
   b. If yes, who were the organizers? __________

11. How did you get information about TB? ________________
    College/university______
    NTCP manuals______
    Other please describe____________

12. What do you think is the cause of TB? Please describe______________

13. Please list the symptoms of TB? ______________________
    College/university______
    NTCP manuals______
    Other please describe____________


   no____
   a. If yes, how is TB treated______________________
   b. Please list the types of anti TB drugs_________________________________________________________
                                                                                             ______________________
   c. How long does TB treatment last? Please describe____________

15. Is TB preventable? Yes____

   no____
   a. If yes, please describe methods of TB prevention and control______________________________

16. Have you ever heard about DOTS? Yes________

   no________
   a. If yes, please describe what it is__________________________________________________________

17. Do patients with TB come to your facility and ask you to sell them anti-TB drugs?
    Yes___
    No___

18. If yes, how many of such patients have you encountered in the past,
One Week? ___
Month? _____
year? _____________________

19. Do you dispense anti-TB drugs in your facility? Yes____no_____
20. If no, why not?__________________________________________

21. Do you dispense anti-TB drugs such as rifampicin to patients coming with prescriptions to your facility?
   a. Yes_____
   b. No____ If no, why? __________________________

22. Where do you think most patients with cough first go to get help for their symptom?
   _______________________________________________________

23. From your experience, how much time elapses from onset of symptoms of TB till the patient first report to a medical provider? ________

24. Is this delay acceptable? _____________

25. From your experience, how much time elapses from first visit of a TB patient to a medical provider till diagnosis and start of treatment?_____________________

26. What do you think are the reasons for the delay of TB patients in seeking health care?_________

27. What do you think are the reasons for the delay of making diagnosis and treatment start for TB patients? _________________________

28. From your experience, how much time elapses from onset of symptoms of TB until first start of treatment? ____________________

29. What actions do you think should be taken to reduce delay in diagnosis and treatment of TB?____________________________________________________________________
________________________________________________________________________
________________________________________________________________________

30. How do you think you can contribute to the TB control effort in your locality?
________________________________________________________________________
________________________________________________________________________