1.1 COUNTRY PROFILE (ETHIOPIA)

1.1.1 Population and demography

Ethiopia is located in East Africa and it share borders with Somalia and Djibouti in the east, Eritrea in the north, Sudan in the west and Kenya in the south.

It is the third most populous country in Africa after Egypt and Nigeria with estimated population of 77 million, out of which over 85% live in the rural areas (1). Populations in the country are highly diverse with more than 72 different ethnic groups.

The Government of Ethiopia practices a federal system of administration with nine regional states and two special city administrations. Regional governments are empowered to plan regional policies with regard to management of natural resources, education and health, whereas the federal government's role is limited to security and foreign affairs as well as articulating to economy and social policies (2).

The Ethiopian economy is based on agriculture, which contributes 47% of Gross National Product (GNP) and more than 80% of exports. The major agricultural export is coffee, providing 35% of Ethiopia's foreign exchange income (1).

1.1.2 National health Profile

Regarding socio economic indicators, Ethiopia is low by any standard and about 80% of its people live on less than two US dollar per day (3). The adult literacy rate is 36% and only 33% of the population has access to safe drinking water.

The health system provides health care to about 52% of the population and most of the rural populations have limited access to health care services. Total fertility rate is reported to be 5.9 children per women. Antenatal coverage is estimated as 34.1% while institutional delivery is 9.4%. The infant mortality rate is 112 per 1000 live births while maternal mortality is 850 per 100,000 live births (3).

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About 51.5 % of the children between 6 to 59 months of age are stunted, 10.5% of them are wasted and 47.2% are reported to be underweight. The highest wasting prevalence in the country, 23.7%, is found in SRS (3). One out of every six Ethiopian children dies before the age of five for reasons linked to poverty, illiteracy, fast population growth and limited access to health services. The prevalence of HIV/AIDS among adult population is 4.4% and 5000 persons acquire the infection every week (4).

1.1.3 Tuberculosis in Ethiopia

Ethiopia ranks 8th among 22 countries with the highest burden of TB in the world and is one of the top three in Africa. In Ethiopia, incidence of all forms of TB was estimated to be 341 per 100,000 with prevalence of 546 per 100,000 persons (5).

The National TB and Leprosy Control Program (TBLCP) have been implemented in Ethiopia with the aim of bringing quality diagnostic and therapeutic services close to the community. The programme has adopted WHO recommended Directly Observed Treatment short course (DOTs) since 1992. High DOTs coverage of 90% was achieved in 2005 (5). However, such increased coverage was not accompanied with parallel rise of case detection rate. Treatment success of 70% and case detection of 36% was reported in 2004 (5).

Nevertheless, any successful TB control program addresses three major questions; what proportion of cases is detected? How early are the cases detected? And in what proportion are successfully treated?

The major obstacle to case detection is by the fact that about half of Ethiopians live more than 10 km from the health facilities (3;6) with resultant late presentation of patients for diagnosis (7). Large numbers of patients with active PTB remain undetected, or are detected very late, thus aggravating the transmission within the community. As a result TB continues to increase at 2.6% each year in Ethiopia.

1.1.4 Study area (Somali Regional State)

1.1.5 Population and demography

Somali Regional State is the second largest in terms of land area in Ethiopia, covering an area of 375, 000 km² in eastern and south eastern parts of the country (8). The altitude of the region varies from 150 and 1500 meters above sea level. The region can be classified as being predominantly dry, with annual rainfall ranging from 300mm in most of the zones to 500-800mm in some areas (9). The weather is very hot most of the time with temperatures ranging from 20 to 45°C.

Administratively the region is divided into nine zones, and it has an estimated population of four million people, of which 85.15% are rural, practicing either pastoral or agro-pastoral lifestyle (8;9). The most urbanized zones of the region are Shinile, Jigjiga, Liban and agricultural areas along Shabelle River of Gode Zone. The majority of the population in these zones are either urban or agro-pastoralists. However, Dhagaxbur, Afdher, Fiq, Qorexey and Wardher zones are nomadic pastoralists' territories.

About 86% of the regional economy is from livestock production (10). Small-scale farming of maize, millet and sorghum, as well as petty trade, generates additional income for the population. Since there is only 60km functional asphalt road in SRS and the majority of regional roads are seasonal (9), the major transportation in the region is by means of animals such as donkeys and camels.

The populations of SRS are religiously and linguistically homogeneous, with 98.7 % being Moslem. An estimated 54.5% of the populations are males whereas 45.5% are females. The average household size is 6.6, ranging from 5.3 in urban Jijiga to 8.6 in rural Qoraxey zone (8;11).

About 46% of the population in SRS are <15yrs compared to 35% in other developing countries, while 51% belong to the age group 15-59yrs compared to 59% in other developing countries and only 3% are over 60yrs compared to 7% in other developing countries (11).

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The life expectance of women in SRS is 55.4yrs which is much lower than that of males of 58.7yrs. This is not in consistence with the national life expectance of 53.4yrs for males and 55.4yrs for females (8).

Somali Regional State is one of the poorest among the regions in Ethiopia and the health status of the people in the region is one of the worst in the country. The main reason is primarily due to poor health infrastructure and shortage of skilled personnel in the region (8). In the year 2002 there were 4 hospitals, 11 health centers and 92 health stations, with many of them non-functional, which made the health coverage 30.6%, the lowest in the country. The same year only 3.2 % of pregnant women attended antenatal care and 2% of them delivered in the hands of a trained midwife (8;9;11).

An earlier report has shown that 96% of the rural communities in SRS did not have access to health care and median distance to nearest health facility was found to be 21Km (11). Compounded with shortage of trained human resource and poorly developed infrastructure might probably made TB control difficult in the SRS.

A regional health official quoted by an earlier study explains: '*We are focusing on building human resource especially in the health and education sectors. The region has few hospitals and health centers. All of them are understaffed. We have serious problem of health providers. The health posts are almost empty. There are 40 health posts without any heath provider and equipment. It is only the buildings standing. The infrastructure is poor. Some weredas are difficult to access. There is also security problem. Now, there is this idea of decentralization, the wereda being the focal point of government activities. But there is no human resource to work in these weredas. We started assigning people from the region to the weredas. Almost all left their jobs. The weredas have no facility to attract professionals or educated people'* (12).

1.2 Background information and statement of the problem

The TB incidence in African countries more than doubled from 1990 to 2005 (13). One of the main contributing factors for this rise is increasing transmission due to large number of contagious patients, serving as reservoirs of the infection within the community. Prolonged delay of such cases to diagnosis, leads to more advanced disease, continuous transmission in the community and high mortality. Reduction of time between onsets of TB symptoms to diagnosis is therefore a prerequisite for controlling the TB epidemic (14). However, traditional practices that deter people who are suffering of TB from seeking prompt diagnosis and treatment, remain a significant challenge to TB control (15;16). According to Rubel and Garru (17), TB control could improve considerably if emphasis were given to health culture of the people. Understanding how local cultures interpret causes, symptoms and treatment of TB might therefore help us understand why people delay seeking TB treatment.

Rural communities in Uasin Gishu, Kenya, attribute TB to witchcraft, consumption of alcohol and smoking which often delay TB patients from seeking medical care (18). In Botswana, certain communities attribute symptoms of TB to hard work in mines, drinking alcohol or smoking (19). Certain people in Malawi attribute TB to adultery, germs, alcohol abuse, dust and witchcraft (16). Certain nomadic pastoralists in Mauritania and Chad believe that TB is a disease inherited from ancestors and it can not be treated (20). Some people in Ethiopia believe that TB is caused by imbalanced diet and is best treated by herbal remedies and healthy foods (21). Such etiological believes may influence individual's behavior regarding when and where to seek help and hence could be one of the main factors for diagnostic delay among traditional African societies (22).

In Ethiopia, long delay in diagnosis was reported to be a huge problem in TB control (7;23-25). This has been attributed to number of factors, mainly long distance to health facilities (7;23;25), limited awareness of TB disease (7;25) and prevalent use of traditional healers (23;25).

Pastoralists, migratory people whose livelihood largely depends on livestock rearing, represent a large proportion of populations in the Horn of Africa; 70% in Somalia, 33%

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in Eritrea, 20% in Kenya and Djibouti, and 12% in Ethiopia (26). Although a lot has been said about the delay in diagnosis of TB patients and the reasons for the delay in the Horn of Africa, particularly in Ethiopia, no such study has been conducted among pastoral communities.

1.3 Literature Review

1.3.1 Epidemiology of TB

Tuberculosis is a chronic infectious disease with different clinical manifestations as diverse as pulmonary TB (PTB) which is subdivided into smear negative and smear positive and extra-pulmonary TB (EPTB). The infection is transmitted through airborne spread of droplets containing bacilli released through sneezing or coughing and then inhaled by healthy individuals. Moreover, consumption of un-pasteurized milk serves as a mode of transmission of bovine TB.

Once the bacteria get access into the body, specific CD4 T-helper cells normally recognize in mycobacteria and activate IFN-γ producing macrophages. The activated microphages kill the intracellular mycobacterium via generation of toxic nitric oxide. If microphages are not activated in proportion to the rapidly multiplying bacteria, the infection can overwhelm the immune system, and generate disease (27).

In a normal situation, around 10% of infected individuals may develop the disease once in their life time. If people with the disease fail to seek treatment, 50% of PTB+ may die within 5 years, whereas 25% may remain chronically ill with infectious TB and the rest 25% may get cured spontaneously.

Persons living in the same household or are in frequent contact with an infectious patients and those closely associated with livestock such as pastoralists have the greatest risk of being exposed to the bacilli. Tuberculosis can infect all individuals regardless of age and sex; however poverty and malnutrition are known to increase the risk of developing the disease.

1.3.2 Global burden of TB

Although TB is a curable disease, it constitutes a considerable health threat globally. An estimated 6 million people die each year due to TB, Malaria and HIV/AIDS, 2 million of them being due to TB alone (28). Approximately 95% of global TB cases and 98% of deaths due to TB occur in developing countries (29).

At the present, TB prevalence and death rates have considerably decreased in many countries but both indices have dramatically increased in the African continent (4). Of the 22 TB high burden countries (HBCs) responsible for 80% of total global TB burden, 9 are in Africa whereas among the 15 countries with the highest TB incidence rate per capita, 12 are in Africa (4).

Poverty and social deprivation are highly associated with the propagation of TB in the continent and within poor countries of Africa, the disease is often seen in the poorest section of the community (30). Compounded with inadequately managed and inaccurately designed TB control programs, and HIV pandemic have significantly contributed to the increase of the disease in Africa (31).

1.3.3 Management and control of TB globally

As the world became conscious on the steady increase of global TB, World Health Organization (WHO) declared TB a global emergency in 1993. As a result, the DOTs strategy was established in 1994, as a key intervention for TB control (29). The aim was to achieve early detection and treatment of the sources of the infection in the community (32). Prompt diagnosis and treatment of infectious patients interrupts the chain of transmission with subsequent reduction of TB incidence in the communities.

The global target of this strategy was to achieve 70% case detection and 85% cure rates by 2005 (28), nonetheless only 28% of new smear positive TB cases were detected in 2003 (32).

The reason for this disappointing result was probably that the current control strategy which is based on DOTs largely relies on passive case detection, for which its success is

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highly dependent on patient's access to health service for immediate self reporting and the awareness of the health providers of TB suggestive symptoms and their ability to respond (33). Unfortunately, this friendly environment seldom exists in sub-Saharan Africa, particularly in Ethiopia where almost half of the populations live over 10km distance from any health facility and negative traditional views on TB are prevalent.

1.3.4 Pastoralism: Global view

Pastoralists are the poorest of the poor and an estimated 50-100 million pastoralists in the developing world, 60 % live in sub-Saharan Africa (34). From Somalia in east Africa to Senegal in the west, from Algeria in the north and Kalahari desert in South Africa, pastoralism is a common source of livelihood where people migrate frequently or episodically with their livestock of cattle, goats, camels and sheep (35).

They inhabit a land which is either desert or semiarid where temperature exceeds 45 ºC in the desert and 38 ºC in the semiarid and annual rainfall is often below 300mm. In such climatically hostile environment, livestock rearing is the only opportunity for survival. To cope with their needs within this fragile environment, pastoralists move seasonally where they disperse into a large area of land during wet season when water and pasture are abundant and concentrate around wells and other water sources during dry season (20).

 Pastoralists are important contributors to the economy and development of their respective countries (35). In Chad pastoralists constitute less than 6% of total population, but contribute around 15% of national gross domestic products (20).

 Nevertheless, health planners often do not include pastoralists in their plans. The 2004 WHO report on strengthening health systems considered the most unprivileged communities, but never mentioned pastoralist populations (20).

Although their mobile lifestyle is constantly used for justification of failing to develop health care system that is appropriate for their lifestyle, pastoralists in some parts of Africa are found to satisfactorily benefit from veterinary services which are designed successfully for them. Study in health intervention of nomadic pastoralists of Chad, Mali

and Mauritania found 75% of vaccination coverage among cattle and camels in area where no child was fully immunized (20).

Tuberculosis thrives in conditions of poverty and thus it's the leading cause of morbidity and mortality among pastoralists (36). Conditions such as social isolation, reduced access to health services, lack of trust in the health system and lack of a voice in the community make pastoralists even more vulnerable to the disease.

State health services including national TB control programmes are either absent or often not well adapted to pastoralists' mobile lifestyle with consequent negative traditional views on diseases and strong reliance of traditional medicine (20). However, the core of worldwide access to TB services means that TB control activities should be extended to all areas in a given country, including areas that provide exceptional challenges to health service provisions such as mobile communities. Tuberculosis is a disease of the poor and control activities may not succeed as long as the poor and marginalized communities are failing to access it (37).

1.3.5 Pastoralists in Ethiopia: Somali Region.
Approximately 12 % of Ethiopia's populations are pastoralists with the majority concentrated in Afar, Oromiya and SRS (26).

The population of SRS of over 4 million, 85% are pastoralists who earn their livelihoods through livestock rearing (10). They move seasonally from place to place in search of pasture and water. Their frequent movements serve not only as a major source of tribal conflict but also create an obstacle to provision of appropriate health care (11).

Like most pastoral areas in sub-Saharan Africa, successive governments in Ethiopia have continuously ignored the SRS in terms of the provision of social and infrastructure services. The excuses were that delivery of social services is difficult and costly due to mobility of recipient, low population density and enormity of the pastoral areas (38). The national health plan is based on a settled population model and it is planned without the participation of pastoralist communities. Although they are isolated from developments,

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as few existing banks, post offices and electricity power supply are all concentrated in major urban towns, 86% of regional economy comes from livestock, hence they serve major source of regional economy (10).

The most cited reasons for poor health coverage of the SRS is, indeed, the absence of strategies that properly addresses pastoralists' health care both at national and regional level. Health Sector Development Program II (HSDP II), a 20 year strategic plan for far reaching enhancement of the health system, failed to address health care needs for pastoralists (8). However, the success of national health programs are assessed by the services they allocate to disadvantaged populations such as pastoralists (34).

Tuberculosis constitutes a major health threat and by far the leading cause of morbidity and mortality in SRS (39). There has been no research on TB in the SRS and this has severely limited of what is known about the scale of the disease at regional level.

However, as majority of the regional population have limited access to TB diagnostic and treatment services, their vulnerability to the disease must be considerable. There are 17 laboratories for AFB examination in the SRS that serve for a population of over four million. However, these limited numbers of laboratories are not homogeneously distributed in the zones. For instance, 11 out of the 17 diagnostic facilities, are located in Jigjiga, Liban and Shinile, most urbanized zones of the region (39). Although TB especially affects the poorest and most vulnerable segments of the social order (29), regional TB control program seem to have failed to reach the poorest segments of its population (figure 1). Accordingly, TB case detection rate in SRS remains to be the lowest in the country. In order to improve the situation, however, a body of information about various aspects of TB, relevant to pastoralists' context is needed.

Figure 1. Progress in the expansion of DOTS in Ethiopia, 1992- 2002
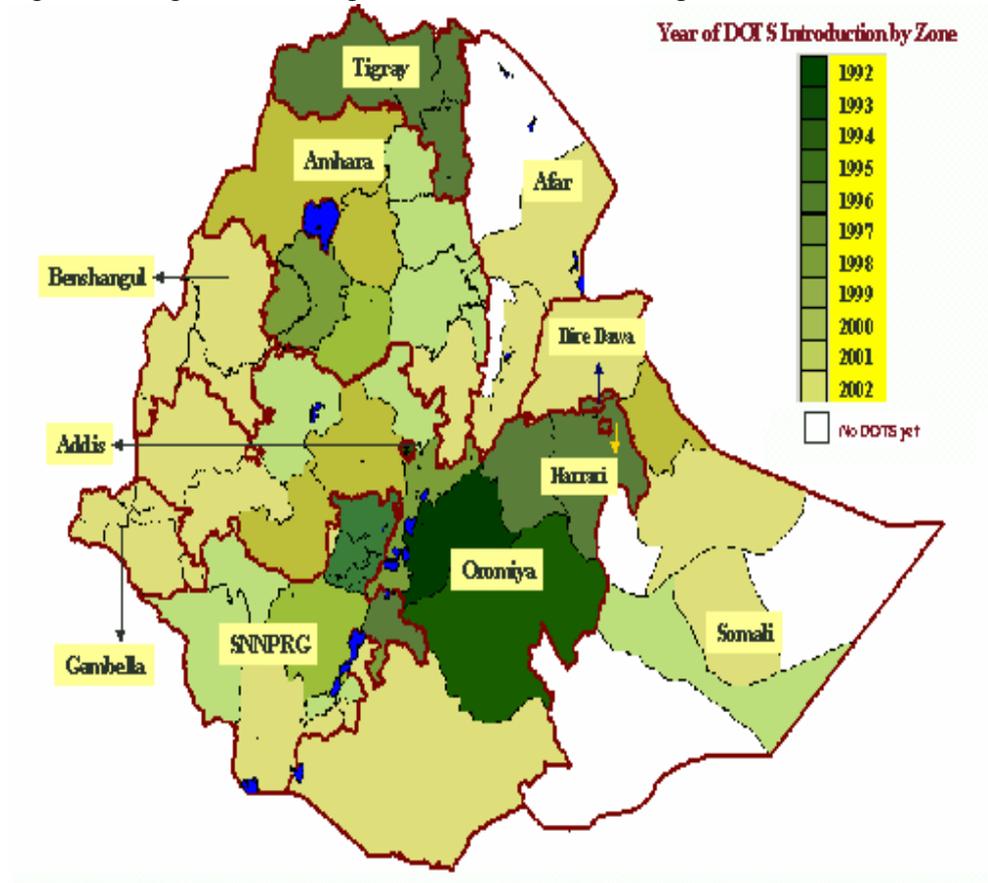
1.3.6 Diagnostic delay

Diagnostic delay means patient delays in seeking health care, health providers delay in making prompt and correct diagnosis and initiation of treatment or both (40) . Prolonged delay leads to more advanced disease, continual transmission in the community and increased mortality. Undiagnosed patient with active pulmonary TB can create transmission foci within the community, and in TB endemic areas; each infectious case may result between 20 to 28 secondary infections (41).

There is no agreed definition of what is considered as acceptable diagnostic delay but this differs based on local epidemiological situations (42). In certain studies a panel of experts agreed on 30 days as an acceptable delay (43;44) whereas other studies used

median delay of the observed data as a cut-off point (23;25). The present study adopted the later.

Diagnostic delay was associated with several causes. In Vietnam long patient delay was associated with living long distance to health facility, being a female, coming from an ethnic minority and being a rural resident (40). Female sex, spending over 30 minutes to reach health facility and stigma were mentioned in Yemen as risk factors for long patient's delay (45). Those who sold personal belongings to cover the cost, being rural, transport time over 2 hours, overnight travel and use of traditional medicine were associated with the patient delay in Southern Nations Region of Ethiopia (23). Old age, distance to health facility and self treatment were reported from Amhara Regional state of Ethiopia as a risk factors for long patient delay (25). Living in the rural areas and seeking care from non-medical providers were reported from Somalia as a risk factors for long patient delay (45).

Although much is being written about diagnostic delay and its impact on control of TB in sub-Saharan Africa, no such studies have been conducted in pastoral communities in the Horn of Africa. Therefore, to fill this gap, the following cross sectional study has been formulated and implemented.

1.4. Research question, hypothesis and objectives
1.4.1. Research question
1. What is the length of patient's delay, health provider's delay and total delay among Somali pastoralists in Ethiopia?
2. Do socio-cultural aspects of pastoralists have any influence on the delay in diagnosis of pastoralist TB patients, and the apparent low case finding in SRS of Ethiopia?

1.4.2 Hypothesis
1. There is a significant delay in diagnosis of TB patients in SRS of Ethiopia.
2. Socio-cultural aspects of the pastoralist communities serve as important barriers for early diagnosis of TB patients.

1.4.3 Objectives

1.4.3.1. Overall objective

To determine socio-cultural influences on management and control of TB among Somali pastoralists in Ethiopia.

1.4.3.2 Specific objectives

1. To evaluate patient's biomedical knowledge on TB

2. To measure the length of delay in diagnosis and analyze factors that influence diagnostic delay among Somali pastoralist patients in Ethiopia.

3. To determine migration pattern of pastoralists and their perception on TB and to analyze the impact of these on early diagnosis of TB.

4. Based on our findings, to recommend TB control measures appropriate for pastoralist community in Ethiopia.

2.1 Study area

Our study site was the SRS of Ethiopia, which is inhabited by Somali pastoralists, the target group in this study.

2.2 Study design

This study adopted cross sectional design. The aim of this design is to quantify distribution of certain variables in a given population at one point in time. The measure of exposure and disease are made at the same time (46). However, this design is sometimes employed to investigate association between exposure and outcome and therefore is nearly as informative as longitudinal studies (46). Besides, cross sectional design is faster and can cover a large number of patients at minimum cost or effort. Moreover, this design reduces the chance of patients dropping out during the course of the study. However, it is vulnerable to recall bias.

2.3 Inclusion criteria

All TB patients under intensive phase of treatment course with pastoralist identity, who were >15yrs old, mentally fit, and willing to participate was included into the study.

2.4 Exclusion criteria

All persons who were ≤15yrs old, treatment failures, relapse cases, defaulters and non pastoralists were excluded from the study.

2.5 Study population

Our study population was selected from pastoralist TB patients attending TB management Units (TBMUs) in Jigjiga and Shinile zones of SRS. These two zones were selected due to their accessibility in terms of infrastructure and security. However, almost 50% of current TB diagnostic centers in the region are found within these two zones. As a result, large numbers of pastoralists from other zones come for diagnosis and treatment there. All pastoralist patients who were eligible for the study according to inclusion criteria were selected until the chosen sample size was accomplished within the study period.

2.6 Data collection methods

We have employed both quantitative and qualitative methods of data collection. The aim was to establish the relationship of delay in diagnosis of TB patients to number of exposure variables. By using quantitative technique alone, may not be well enough to explore the relationship among the variables (47). We, therefore, incorporated it with qualitative methods to help explain more on the relationship of exposure and outcome variables (47;48).

2.7 Sample selection

The sample population was selected from TB patients attending TBMUs operating in Jigjiga and Shinile zones of SRS. Since we were dealing with mobile people who dispersed into large areas of land, where availability of TBMUs were very limited, we were unable to select TMBUs randomly. Instead, we selected them purposely based on the number of pastoralist patients available in the center as well as the accessibility of the center in terms of infrastructure and security. We have also considered time and cost effectiveness. Finally, we have reached ten TBMUs. All of the eligible TB patients (according to inclusion criteria) attending the selected centers were consecutively interviewed until the calculated sample size was obtained within the study time.

For qualitative part of the study, we selected those who were knowledgeable to pastoralists' way of life. To get the right individuals, we had been in each center for quite number of days until we became familiar with most of pastoralist patients in the center. In the process, we created environment conducive for open conversation through building up mutual trust between researchers and pastoralists. Through that friendly approach, we came to know those who were knowledgeable to pastoralist's way of life. During the selection of our respondents we also considered recommendations from members of the pastoralist patients who gave us useful tips of those they believed were knowledgeable about pastoralists' way of life. Finally we agreed on 12 patients with different sexes, different pastoralist status and different ages as respondents for participatory rural appraisal (PRA) technique. Among them were 6 individuals from agro-pastoralist community dwelling in the east of Qabribayax District. All were Abaskul tribe. We also selected 6 individuals from nomadic pastoralist community from pastoral area of Dhuxun

District of Fiq Zone. All of them were from Ogaden tribe. We further selected 4 out of the 12 (two from nomadic pastoralists and two from agro-pastoralists) for informal interview.

In the course of the qualitative study, a lot of important questions emerged that could not be answered by pastoralist respondents. As a result, we supplemented the study with three senior government officials that specifically deal with pastoralists in the region. Among them were 1 senior manager and 2 medical doctors.

2.8 Sample size

We calculated the sample size using the formula necessary for determination of sample size required for estimating single proportion.

$N = Z^2 * P (1-P)/E^2$

Where Z = 1.96

P = prevalence of delay more than 30 days

E = allowable error

By using previous study on patient and health service delay in the diagnosis of pulmonary TB in Ethiopia which obtained a proportion delay of 82% of more than one month (7) with 95% confidence interval and margin of error of 5%, we find sample size of 226.

2.9 Procedure for data collection

On arrival in Ethiopia, we contacted the staff of Addis Ababa University where we discussed our intended research with officials at the department of Pathobiology including our partners in NUFU project. We made short presentation of research protocol and methodology. After discussion we were given a support letter for conducting the research in SRS.

In SRS, we contacted the head of Regional Health Bureau (RHB) in person and discussed about the intended research. We subsequently contacted the directors of different sections in RHB as well as heads of hospitals and health centers. We also contacted the United Nations Refugee Agency (UNHCR), for permission to use their hospital in Qabribayax

District. It was a hospital run by UNHCR that serve both for refugees and for pastoral communities in the area.

After securing official permission for the research, we communicated with different health facilities in the region by phone to inform about our intended research and request them for information concerning the number of patients with pastoralist identity in their health facilities. As most of the regional roads were rough, we decided to use telephone means to get the number of patients attending different health facilities and choose those with at least 10 pastoralist patients.

After we decided the health facilities, we began training research assistants. We selected them from 2nd and 3rd year nurse students in Jigjiga Health Science College. They underwent two days of intense training about interview techniques, importance of the study and how to fill questionnaires.

The reliability of the questionnaires was tested to see if it exactly measures what it supposed to measure. The task was performed in two ways. First, the questionnaire was reviewed by two local health officers; one of them being a researcher who conducted TB research earlier in Jigjiga. They identified areas which were not easily understood and as a result few items were either changed or modified.

Secondly the questionnaires were pretested. This was conducted in two health facilities. Six patients were interviewed from each facility. We also used this opportunity for ensuring the competence of research assistants for conducting interviews. As a result we slightly modified the questionnaires for the best understanding of research subjects. Questionnaires were translated to Somali language, the mother tongue of the researcher, interviewers and participants.
Finally, we began data collection in Jigjiga health center where there was relatively good number of pastoralist patients.

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2.10 Recruitment of the study participants

We recruited patients by contacting each patient individually. We asked them about their status as nomadic pastoralist, agro-pastoralist or urban. Those who were in the first two categories were selected. Objectives of the study were explained to them, duration of interview was made clear as not longer than 30 minutes. Their freedom to withdraw from the study at any time was granted and finally the confidentiality of their answers was assured to them. During recruitment, patients were fully explained about the people involved in the study. We made clear to them that this study was independent from their health providers, such that they take free decisions regarding their participation without fear of negative consequence. This process was performed in a private room in the health facilities. The idea was to ensure the secrecy of the patients throughout the process. Similar procedure was applied to the patients who participated in qualitative study.

Regarding recruitment of the government officials, we friendly approached their respective offices and secured their consent for participation of informal interview. We explained about the aim of the study to each of them. We made clear that the information they give us will be used in the study. Once we obtained their consent (documented consent), date and place for the interview was discussed and agreed. We met them in different places at different times. Some of them were met a couple of times while others were met on several occasions based on their importance regarding the questions. In addition to the stated research methods, we also used observation on different important issues.

Qualitative data was conducted in two health facilities namely Qabribayah Health Center and Jigjiga Health Center.

2.11 Data description

To collect data required for this study, we used structured questionnaires for quantitative data collection tool whereas we employed mapping (PRA) and informal interviews as qualitative data collection instruments. The questionnaire included socio-demographic, lifestyle and health related variables. Among them were age, sex, marital status, education, occupation, form of TB, major symptoms of TB, distance to health facility where patient sought care first for current illness and type of pastoralist (nomadic or agro-pastoralists). Questions that assess people‚s awareness on TB were also included in the

questionnaire. In this case, we evaluated subjects' biomedical knowledge on TB and their first health seeking action. This was done by raising questions about causes of TB, if TB is curable disease, if patients were aware that TB treatment is available free of charge and their awareness of mechanisms for transmission of TB with special emphasis on bovine TB. Awareness of causes, treatment and risk factors for transmission was reported to be the core knowledge element of relevance to TB control (49).

First health seeking actions of patients were explored by asking questions on their care seeking action after onset of current illness (whether they sought traditional help first or medical help). In this case, we hypothesized if patient sought traditional help first, that might serve as source of delay in diagnosis.

The socio-demographic and health related variables were collected and considered as exposure variables. On the other hand, variables about diagnostic delay, described as time between onsets of illness to diagnoses was collected and considered as outcome variables. Duration of illness was expressed as persistent cough over three weeks, haemoptysis, chest pain, weight loss, swollen glands, back pain and fever. Diagnostic delay was divided in to three stages which were defined as follows.

Patient delay: time interval between the onset of the disease and the first visit to medical provider.
Medical providers delay: Time interval between the first visits to medical provider to the date of diagnosis.
Total delay: The sum of the patient delay and the medical providers delay.

The estimation of exact date of onset of the disease could be liable to recall error, however we used qualitative probing to facilitate the recall of the patients using seasonal and relegious fastivals.

As we intended to find concrete explanation about factors underlying delay in diagnosis of TB patients, we have collected qualitative information that allows a more in depth understanding of the topics than a survey by structured questionnaire. Migration pattern

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of pastoralists was explored. This was done by employing PRA technique where patients mapped their seasonal migration route. Participants also marked the area (village) they can easily access both during dry and wet seasons. As part of the qualitative study, we investigated pastoralists' perception on TB by using informal interview. In this case, we explored how people perceive TB, how they tend to it and traditional believes associated with biomedical treatment of TB. The aim was to evaluate and discuss the influence of these cultural practices and believes on apparent diagnostic delay of TB patients. We also used observations to explore health information flow between health workers and pastoralists. Data was collected from June to September.

2.12 Quantitative data collection

In order to collect data required for quantitative part of the study we used structured questionnaire with close- ended questions (appendix 1) which is predominantly used for quantitative cross sectional studies. It is simple and cheap. However, as most questions are close ended, respondents may give short answers, hence, loss of valuable information is inevitable (46). We collected information in the form of variables which are divided into dependent and independent variables.

2.12.1 Operational definitions of variables

2.12.1.1 Independent Variables

Type of pastoralists   Defined as lifestyle of the people,

                                        (Nomadic pastoralists or agro-pastoralists)

 Form of TB   Site of the TB disease

Distance to health facilities   Distance in KM from patients dwelling to the

                                        facility where patients sought help first for

                                        current illness.

Biomedical Knowledge on TB.   The facts that an individual is aware of. In this study,

                                        its defined based on the awareness of patients on

                                        causes, treatment and mechanisms for transmission

                                        of TB.

Medical provider   A professional medical practitioner licensed to treat

                                        illnesses and acting within the scope of that license.

First health seeking action   Type of help sought first by patients for current

                                        illness

Traditional provider   Local healer often without formal education.

Pastoralists   People whose source of livelihood is livestock with

                                        which they move seasonally in search of pasture and

                                        water.

Nomadic pastoralists   Mobile community that exclusively depend on

                                        livestock rearing

Agro-pastoralists   Semi mobile community who rear livestock and also engage in small scale farming

2.12.1.2 Dependent variables

Patient delay   Time from the onset of major symptoms of TB to first consultation with medical provider.

Medical provider's delay   Time from first consultation with medical provider until the date of diagnosis

Total delay   Sum of the patient delay and the medical providers' delay.

2.12.2 Quantitative data analysis

Data were entered into SPSS version 14.0 statistics program and subsequently cleaned by series of cross checking.

We expressed the delays of the patients as median, mean and range. Different cut-off points were used earlier in evaluating time delay. Certain studies, a panel of experts agreed on 30 days as an acceptable delay (44;50), while majority of studies used median of the observed data as a cut-off point (23;25;51). The present study adopted the later.

Frequencies were used for calculating proportions. Group differences were calculated using Chi-square and Mann-Whitney test. If groups were more than two, we employed Kruskal-Wallis test. These statistical methods were employed because they are appropriate for analysis of categorical variables. In order to adjust confounding effect of several identified determinants of diagnostic delay and to finally establish factors that are independently associated with the delay in diagnosis of pastoralist TB patients, logistic regression analysis was performed. The association was assessed by using ninety five percent confidence interval (CI) and adjusted odd ratio (ORadj). Level of significance was determined at P-value <0.05.

When assessing biomedical knowledge of the patients on TB, we posed 12 questions on causes, treatment and transmission mechanisms of TB. Afterwards, we calculated inter quartile scores and means of the answers that categorized patients into high knowledge and low knowledge, as previously described (25;45). The philosophy was that if patients are aware that TB is caused by a transmissible germ and also aware that TB is a curable disease and its treatment is available free of charge, they probably seek medical care earlier.

2.13 Qualitative data

Different techniques were employed for qualitative data collection. The commonly used techniques are; Observation, interview, focus group discussion and mapping and scaling (52). Each technique has its advantages and disadvantages; however, they can complement each other. The use of combination of different techniques reduces the chance of bias information collection, and provides more comprehensive understanding of the subject under investigation (52). Mapping and scaling is a way of data collection in participatory rural appraisal (PRA) and is one of the commonly used data collection approaches in participatory health research (52;53). Participatory rural appraisal and informal interview techniques were chosen for this study. The aim was to generate vital information that could only be optimally achieved by understanding pastoralists' seasonal movements and their health seeking behavior.

2.13.1 Participatory Rural Appraisal (PRA)

This technique is a valuable because it gives the researcher a good information about pastoralists seasonal movement by using visual display (53).

Participatory rural appraisal has several advantages. It is resource productive because research participants collect the data with minimum assistance from the researcher. This enhances their independence and creates atmosphere suitable for participants to generate a rich knowledge of the theme under study without external influences (53). However, it requires some extra training for researchers (52).

2.13.1.1 Data collection and analysis

During PRA implementation, we have selected two groups of patients. Each group was comprised of 6 individuals from the same tribe with same pastoralist status. The first group was nomadic pastoralists, from Ogaden tribe living around Dhuxun District of Fiq Zone and group of agro-pastoralists from Abaskul tribe that breed cattle and engage small scale farming around Qabribayax district. We made the decision of grouping through consultation with members of pastoralists. The idea was that pastoralists live in tribes and their grazing land is divided accordingly. Tribesmen migrate together; they support each other in every angle of life, and more over tribesmen share common cultural values. On top of that, tribesmen often know each other which provides the advantage that the opinion they formulate together resemble their everyday reality (54).

We introduced the topic and discussed the way they can visually demonstrate their seasonal migration. An earlier study in Kenya has reported that Somali pastoralists in North-Eastern Kenya were good in demonstrating their seasonal migration route through drawings (53). We handed out small green branches and dry branches as visual aids according to their demand. They marked green branches in wet season grazing area and dry ones in dry season grazing area. They also erected small dry branches to indicate where there is a town or a village. They marked mountains and rivers as lines drawn on the sand. As they were knowledgeable on the ecology of their land, they discussed the season they migrate, the reason why they migrate and where they migrate to. In addition to their seasonal movements, they indicated the nearest health facility and also villages where they would like to have health centers which could easily be accessed in every season. We noted down all their discussions and comments on the spot. We transferred their drawings on a paper and discussed the content with research assistants in the same day. We located the gaps of information, missing points and those needed further explanations. The aim was to review data critically as it comes in, so as to locate gaps of information early. Frequent group meetings were held where every point in our notes was further discussed for clarification. As a result, a clear and transcribed data were obtained.   As soon as every point was clarified, data were transferred into PowerPoint, and then Microsoft word program. The PRA for both nomadic pastoralists and agro-

pastoralists was done in the same way.

2.13.2 Interview

Interview is a data collection technique which involves in oral questioning of single or group of respondents and it varies according to degree of structure ranging from well organized interview which fellows series of standard question formulations to open interview where particular topic is in focus but without predetermined sequence and formulation of questions (55). Informal interview is in the later category. In this study, it is found to be the best method to supplement PRA, mainly because of its advantages. It is suitable for both literates and illiterates. It permits collection of in-depth information and exploration of spontaneous remarks by respondents (52). However, presence of interviewers may influence the response.

2.13.2.1 Data collection and analysis

A good relation between respondents and interviewer was established through organizing several discussions and informal talks between the researcher and participants before the ultimate interview began. The sites of the interview were chosen by respondents. Pastoralist groups were interviewed in different teashops of their choice. One of the health officials was interviewed in his home while the other two were interviewed in their offices. Each respondent was interviewed once to several times. The interview was conducted as normal conversation with its specific purpose (55).

We had interview guide, contained with some topics of interest but there was openness for change of sequence and form of the questions so as to follow up the answers given by the respondent. We avoided asking leading questions and we phrased questions in a very clear way that respondents fully understood. Diary books were used for noting down the interview. Interview was decoded immediately after each interview. The resultant transcribed version of data was again discussed with respondents. The idea was to grasp the real meaning of the concept behind the response and also to ensure that the final transcript represent the original response of study subjects.

Finally, the already transcribed interviews were translated from Somali to English. Each interview was read and reread such that the related units, key words and stories with particular meanings are identified. All related stories were coded under one code name and described in a coherent manner in relation to study objectives. The main findings were further analyzed and compared to other studies in discussion part.

2.14 Data quality

Quality of data was assured through;

- Translations of the questionnaire from English to Somali (the mother language of both researchers and participants)
- Pretesting of the questionnaire
- Proper training of research assistants
- Extensive supervision during data collection
- Thorough check ups of patient's registration cards and registration books.
- Discussion of distances from one area to another with regional geographic experts.
- Transcription of data immediately after collection.

2.15 Communication of results

The result of this study will be presented at the Institute of General Practice and Community Medicine at the University of Oslo, Norway. At least two articles will be submitted to international journals. Detailed report of the result and subsequent recommendations will be presented to the Health Bureau of the SRS and Aklilu Lemma Institute of Pathobiology, Addis Ababa University.

2.16 Ethical considerations

Ethical clearance was obtained from Norwegian Ethical Committee and Ethiopian Science and Technology Commission. Moreover, before we began data collection, we made sure that every subject fully understood the purpose of the study and risks associated (if any). We gave freedom for the patients to either participate or not to participate and we granted them that there would be no harm in any case (appendix 2).

As there was high level of illiteracy in the study population, we appointed some local health workers as witnesses and after patient's acceptance of participation was secured, they signed informed consent form on behalf of the patients (appendix 3). We also limited the interview time with maximum of 30 minutes and we ensured the confidentiality of the study subjects by cording all names and other identifying features.

3.1 Results of quantitative study

In this section we will first illustrate the socio-demographic characteristics of study population. Thereafter, we will describe patient's awareness of TB and their first health seeking action. We subsequently demonstrate delay of TB patients in diagnosis. This will be presented in three stages; patient delay, health providers' delay and total delay.

3.1.1 Demographic characteristics of the study population

Two hundred and twenty six TB patients with pastoralist identity were interviewed using structured questionnaire during June to September 2007. Socio-demographic characteristics of study population are summarized in table 1. Among study subjects, the number of males was relatively higher than that of females with ratio of 1.21:1. The mean age of study population was 32.2 ± 13.0 SD, while the median age was 30 yrs ranging 16-70yrs. However, 85% of sample populations were between 16-45yrs old.

As shown in table 1, the vast majority of study populations (200, 88.5%) were illiterates, whereas only 26 (11.5%) were literates. The number of agro-pastoralists exceeded that of nomadic pastoralists (58.8%/41.2%). The median distance of subjects' dwelling to health facilities where patients sought care first for current illness was 24km with mean of 50.45km. Over two third (72%) of the study population lived a distance over 10km from health facilities.

Regarding form of TB, 175 (77.4%) patients had pulmonary TB and 51 (22.6%) had extra-pulmonary TB (EPTB). Among pulmonary TB patients, 124 (71%) were smear positive and 51 (29%) were smear negative. The majority of pulmonary TB patients (74.5%) had high sputum grading (3+) while only 3.2% had scant (1+) and 28 (22.3%) had moderate (2+).

The symptoms reported by pulmonary TB patients were weight loss (94.3%), persistent cough (92%), fever (90.3) chest pain (70.9%) and haemoptysis (40.6%), whereas the extra-pulmonary TB patients reported weight loss (100%), fever (94.1%) swollen glands (47%), pain at the back (40%) and scrotum (0.9%).

Table 1. Socio-demographic characteristics of study population_____

Population characteristics	Number	Percent %
Sex		
Male	124	54.9
Female	102	45.1
Age		
≤25	87	38.5
26-45	104	46
46+	35	15.5
Marital status		
Single	79	35
Married	129	57
Divorced/widowed	18	8
Education		
Illiterate	200	88.5
Literate	26	11.5
Type of pastoralist		
Nomadic pastoralists	93	41.2
Agro-pastoralists	133	58.8
Form of TB		
Pulmonary TB	175	77.4
Extra-pulmonary TB	51	22.6
Distance to health facility		
0-10km	63	28
≥11km	163	72
Biomedical knowledge on TB		
Low knowledge	145	64.2
Good knowledge	81	35.8
First health seeking action		
Traditional health care	197	87
Medical health care	29	13

Differences between nomadic pastoralist and agro-pastoralist patients regarding distance to health facilities, biomedical knowledge on TB, first health seeking action, form of TB, and level of education were investigated (table 2). The two pastoralist groups didn't differ with regard to form of TB, education, knowledge on TB and first health seeking action. However, higher proportion of nomadic-pastoralists (84%) lived over 10km radius from health facilities compared to agro-pastoralists (64%). Median distance for nomadic pastoralists to nearest health facility was 36km with mean of 79.2km. For agro-pastoralists however median distance to nearest health facility was 16.8km with mean of 30.3km. This difference in distance to health facility between the two pastoral groups was significant (P<0.002).

Table 2. Differences between nomadic pastoralist and agro-pastoralist patients

Characteristics N=226	Nomadic pastoralist N (%)	Agro-pastoralists N (%)	P-value
Distance to health facility			
>10KM	78 (83.9)	85 (63.9)	< 0.00 2
<10KM	15 (16.1)	48 (36.1)	
Knowledge			
Low knowledge	67 (72)	78 (58.6)	0.054
High knowledge	26 (28)	55 (41.4)	
First health seeking action			
Traditional means	83 (89.2)	114 (85.7)	0.562
Modern medical care	10 (10.8)	19 (14.3)	
Form of TB			
EPTB	24 (25.8)	27 (20.3)	0.416
PTB	69 (74.2)	106 (79.7)	
Education			
Illiterate	87 (93.5)	113 (85)	0.075
Literate	6 (6.5)	20 (15)	

As shown in Table 2, longer distance to health facility was found among nomadic pastoralists compared to agro-pastoralists.

3.1.2 Biomedical knowledge of study participants on TB

Biomedical knowledge of TB, defined as understanding of the cause, treatment and mechanisms for transmission of TB, was cross tabulated with socio-demographic, health and cultural characteristics of study population. Table-3 summarizes group differences with regard to knowledge on TB.

There was no significant difference between males and females with regard to biomedical knowledge on TB (P= 1.000). However, significant difference with regard to knowledge on TB was observed between the young age group (<25) and older age groups (>26) (P=0.015).

Higher proportion of nomadic pastoralists (67, 72%) had low biomedical knowledge of TB compared to agro-pastoralists (78, 58.6%). Even though there's comparatively higher proportion of nomadic pastoralists with low biomedical knowledge on TB, this difference was not statistically significant (P= 0.054).

Distance to health facility was cross tabulated with patients' biomedical knowledge of TB. Higher number of those who lived over 10km radius from health facilities had low biomedical knowledge on TB (119, 73%) compared to those who lived within 10km radius (26, 41%). This difference was statistically significant (P< 0.001).

Difference with regard to biomedical knowledge on TB was also found between literates and illiterates. In this regard 69.5% of illiterates had low knowledge on TB compared to literates (23%). This difference was significant (P<0.001).

Table 3. Group differences with regard to knowledge on TB.

Variable	Low knowledge(%)	High knowledge(%)	Total	P-value
Sex				
Male	80 (64.5)	44 (35.5)	124	1.000
Female	65 (64)	37 (36)	102	
Total	145 (64.2)	81 (35.8)	226	
Age				
0-25	46 (53)	41 (47)	87	0.015
26-45	76 (73.1)	28 (26.9)	104	
46+	23 (66)	12 (34)	35	
Total	145 (64)	81 (36)	226	
Education				
Illiterate	139 (69.5)	61 (30.5)	200	<0.001
Literate	6 (23)	20 (77)	26	
Total	145 (64.2)	81 (35.8)	226	
Occupation				
Pastoralists	137 (67.8)	65 (32.2%)	202	<0.002
Supplementary Job	8 (33.3)	16 (66.7)	24	
Total	145 (64.2)	81 (35.8)	226	
Type of pastoralists				
Nomadic pastoralists	67 (72)	26 (28)	93	0.054
Agro-pastoralists	78 (58.6)	55 (41.4)	133	
Total	145 (64.2)	81 (35.8)	226	
Distance to health facility				
≤ 10km	26 (41)	37 (59)	63	<0.001
> 10km	119 (73)	44 (27)	163	
Total	145 (64)	81 (36)	226	

*As shown in table 3, poor knowledge on TB was found among older ages, illiterates, those who had no job other than pastoralism and those who live longer distance to health facility.

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Regarding awareness of study participants on bovine TB, 186 (82%) subjects had never heard that TB is transmitted by livestock, or through its products, whereas only 40 (18%) had heard about it.

One hundred and sixty three (72%) patients reported to share accommodations with livestock, only 63 (28%) reported otherwise. Those who shared accommodations with livestock were more likely nomadic pastoralists than agro-pastoralists (P= 0.037).

The majority of study subjects (91%) reported to consume raw milk while few (9%) reported to boil it before use. The proportion of nomadic pastoralists who consumed milk in raw (97%) exceeds that of agro-pastoralists (87%). This difference was statistically significant (P= 0.024).

3.1.3 First health seeking action of study populations

First health seeking action of study population and underlying characteristics was investigated. A total of 197 (87%) subjects sought traditional help first for their current illness whereas only 29 (13%) subjects sought medical help first. Data on group differences with regard to first health seeking action was summarized in table 4.

There was no significant difference with regard to patients' first health seeking action by age, gender, pastoralist status and form of TB. However, distance to health facilities was found to significantly influence patients' first health seeking action. The result shows that 75% of those who lived within radius of 10km to health facilities sought traditional help first for their current illness, whereas the corresponding proportion of those who lived over 10km radius to health facilities was 92%. This difference was significant (P< 0.002). Similarly, patients' biomedical knowledge on TB had significant influence on their health seeking action. Higher proportion (93%) of those with low knowledge on TB sought traditional help first for their current illness. The corresponding percentage with high knowledge on TB who first sought traditional help was 76.5%. This difference was statistically significant (P< 0.002).

Table 4. Group difference with regard to health seeking action of study participants

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Variable	Traditional care (%)	Medical care (%)	Total	P-value
Gender				
Female	90(88)	12(12)	102	0.814
Male	107(86)	17(14)	124	
Total	197(87)	29(13)	226	
Age				
0-25	74(85)	13(15)	87	0.614
26-45	91(87.5)	13(12.5)	104	
46+	32(91.4)	3(8.6)	35	
Total	197(87)	29(13)	226	
Pastoralist status				
Nomadic pastoralists	83(89)	10 (11)	93	0.562
Agro-pastoralists	114(86)	19 (14)	133	
Total	197(87)	29(13)	226	
Form of TB				
Pulmonary TB	155(89)	20(11)	175	0.352
Extra-pulmonary TB	42(82)	9(18)	51	
Total	197(87)	29(13)	226	
Distance to health facility				
≤ 10km	47(75)	16(25)	63	<0.002
> 10km	150(92)	13(8)	163	
Total	197(87)	29(13)	226	
Knowledge on TB				
Low knowledge	135(93)	10(7)	145	<0.002
High knowledge	62(76.5)	19(23.5)	81	
Total	197(87)	29(13)	226	

*As shown in table 4, distance to health facilities, and patients' biomedical knowledge on TB significantly influence on health seeking action of study participants.

3.1.4 Length of different delays and associated factors
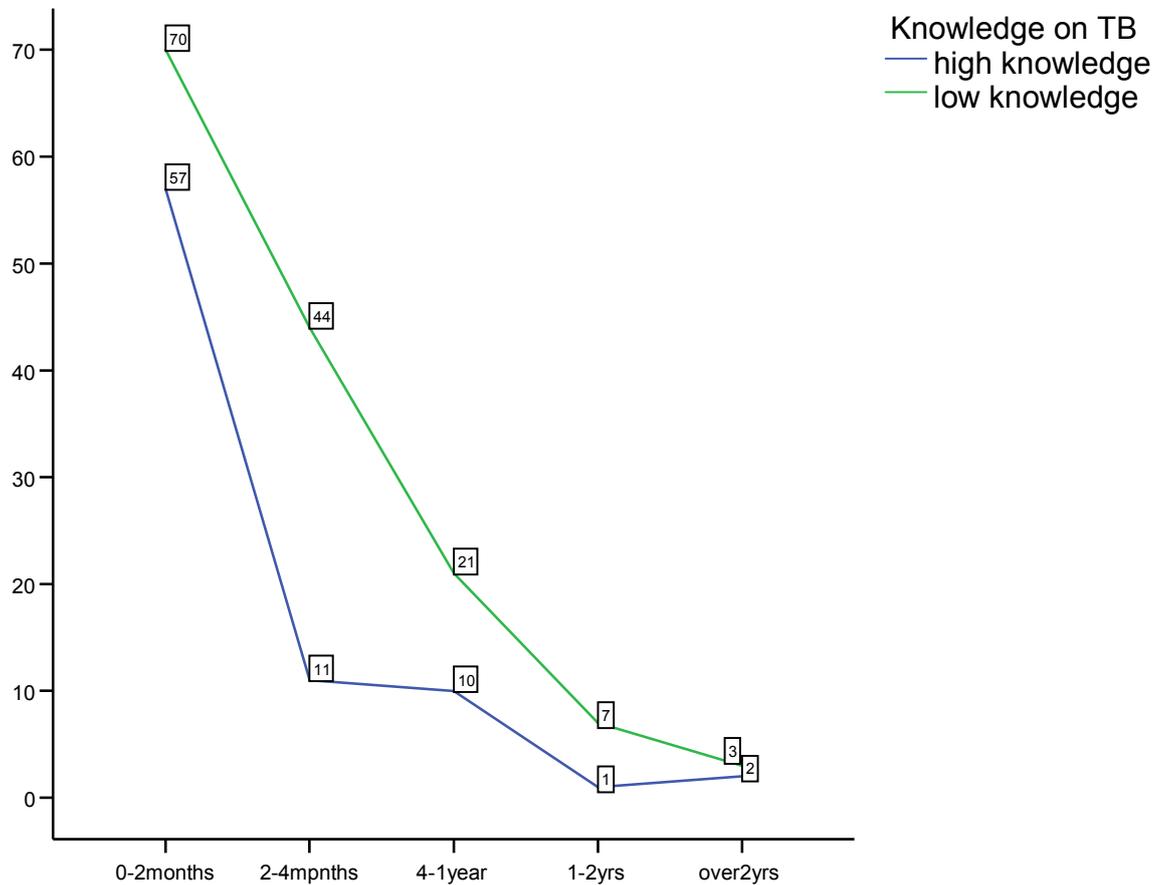
3.1.4.1 Patient delay

Patient delay was defined as time between onsets of TB symptoms to first consultation with a professional health provider.

This study found median patient delay of 60 days and mean delay of 130. The longest patient delay observed was 1800 days. We looked for group differences in patient delay using the median (60 days) as cut-off point for comparison. Table 5, summarizes data on patients delay among study participants.

There was no significant difference with regard to patient delay by sex, education, age, first health seeking action and form of TB. Nonetheless, a significant difference was observed between nomadic pastoralists and agro-pastoralists. Median delay of 83 days observed among nomadic pastoralists was significantly higher than the median delay of 57 days observed among agro-pastoralists (Mann-Whitney test, P<0.001).

Significant difference in median patient delay was also observed between those categorized as having high biomedical knowledge on TB and those with low biomedical knowledge on TB, with median patient delay difference of 13 days (Mann-Whitney test, P<0.002). Among the 13 patients with the longest patient delay (delay >1 year), ten of them had low biomedical knowledge on TB (fig.2).

Fig.2. Distribution of patient delays in relation to patient's knowledge on TB.

The distance of patients' residence to health facilities was found to have an effect on the median patient delay. Those who lived within 10km radius had median patient delay of 56 days whereas those who lived a radius over 10km had median delay of 64 days (Mann-Whitney test, $P<0.005$). Even so, there were five patients who delayed over two years. All of them were nomadic pastoralists (fig.3) and lived over 10km distance from health facilities. Contrastingly, all patients who lived within 10km distance to health facilities delayed less than a year. Agro-pastoralist patients who lived over 10km distance to health facilities had significantly delayed longer in seeking care compared to those who lived within 10km radius to health facilities (Mann-Whitney test, $P<0.046$).

Table 5. Group differences with regard to median patient delay

Variables	NO	Median patient Delay	P, value
Gender			
Male	124	60	0.533*
Female	102	65	
Marital status			
Single	79	54	<0.006**
Married	129	70	
Divorced	18	60	
Age			
0-25	87	55.9	<0.970**
26-45	104	61.5	
46+	35	90	
Education			
Illiterate	200	61	0.066*
Literates	26	45	
Occupation			
Pastoralist	202	62.5	0.017*
With other occupation	24	49	
Type of pastoralist			
Nomadic pastoralists	93	82.7	<0.001*
Agro-pastoralists	133	57	
Distance to health facility			
≤ 10km	63	56	<0.005*
> 10km	163	64	
Biomedical knowledge on TB			
Low knowledge	145	67	<0.002*
Good knowledge	81	51	

* Mann Whitney test
**Kruskal Wallis test
*** Table 5, shows patient's knowledge on TB, marital status, type of pastoralist, occupation and distance to health facilities influence long median patient delay in group analysis.

Multivariate logistic regression analysis shows that low knowledge on TB (ORadj. 2.02, CI 1.02-3.98), and nomadic pastoralism (ORadj. 2.69, CI 1.47-4.91) are the most important predictors for long patient delay (table 6).

Table 6. The association of socio-demographic and cultural factors with patient delay.

Variables	Delay >60 days	No delay ≤ 60 days	Adjusted OR (95% CI)
Gender			
Male	52	72	1.00
Female	47	55	1.01(0.55-1.86)
Marital status			
Married	68	61	1.00
Single	23	56	0.68 (0.23-2.02)
Widowed or divorced	8	10	1.57 (0.46-5.37)
Education			
Illiterate	92	108	1.00
Literate	7	19	1.55 (0.47-5.05)
Occupation			
Pastoralists	94	108	1.00
With supplementary job	5	19	0.53 (0.15-1.82)
Type of pastoralist			
Agro-pastoralists	45	88	1.00
Nomadic pastoralists	54	39	2.69 (1.47-4.91)*
Knowledge on TB			
Good knowledge	24	57	1.00
Low knowledge	75	70	2.02 (1.02-3.98)*
First health seeking action			
Traditional means	89	108	1.00
Modern health care	10	19	1.12 (0.45-2.17)

*Significant at <0.05
*** Table 6, shows low knowledge on TB and nomadic pastoralism are independently associated with prolonged patient delay in multivariate logistic regression analysis.
** Adjusted: Gender, Age, Marital status, education, occupation, first health seeking action and form of TB.

Fig.3. Distribution of patient delay in relation to pastoralist status of patients
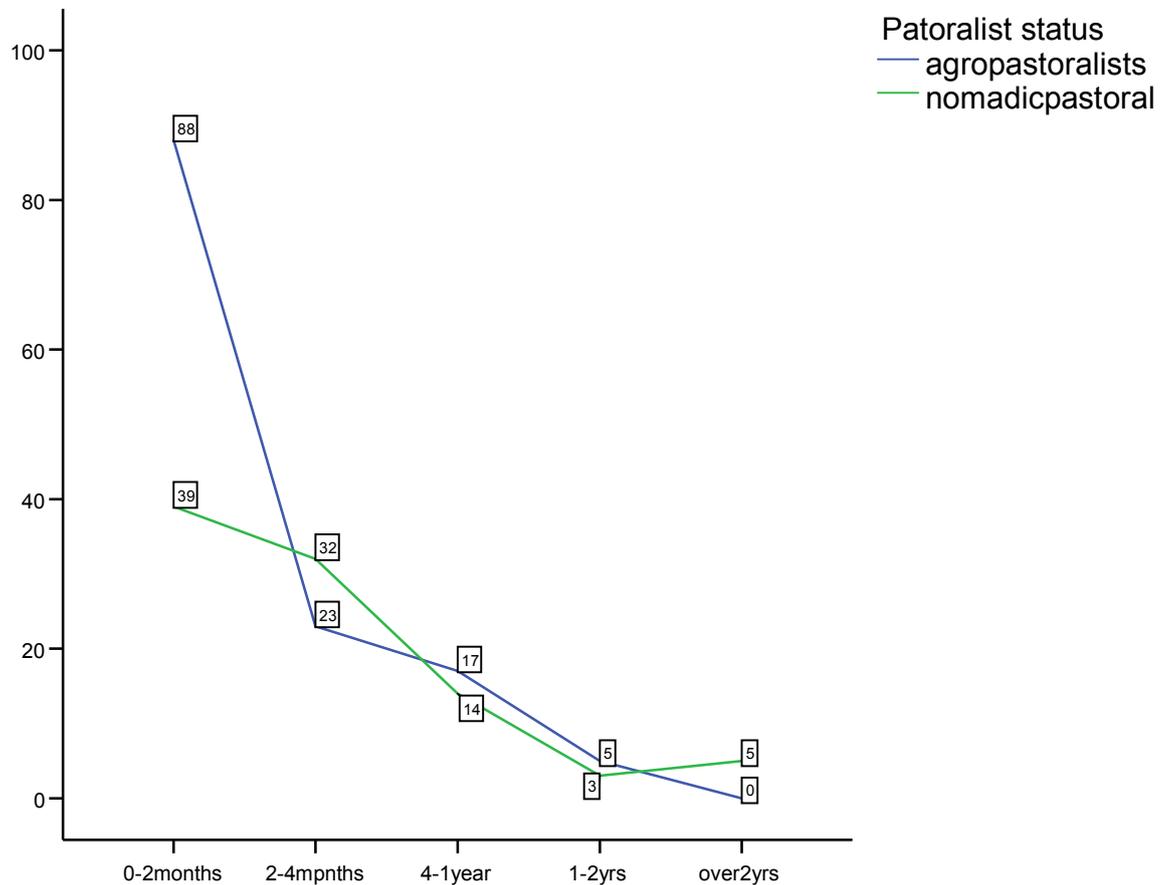
Since 20% of study participants had median patient delay exceeding 120 days (figure 4), we investigated characteristics that might have associated with such a long delay using 120 days as cut-off point for comparison. Sex, age, marital status, education, occupation, form of TB, first health seeking action, pastoralist status and knowledge on TB were found not to influence patient delay over 120 days in group analysis. Contrastingly, distance of the patients' residence to health facilities significantly influence on patient delay over 120 days (Mann Whitney test, P<0.003).

Similar result was found in multivariate logistic regression analysis where we adjusted all potential confounders (ORadj. 4.23, CI 1.32-13.54).

Fig.4. Patient delay in relation to distance of patients' dwellings to health facilities
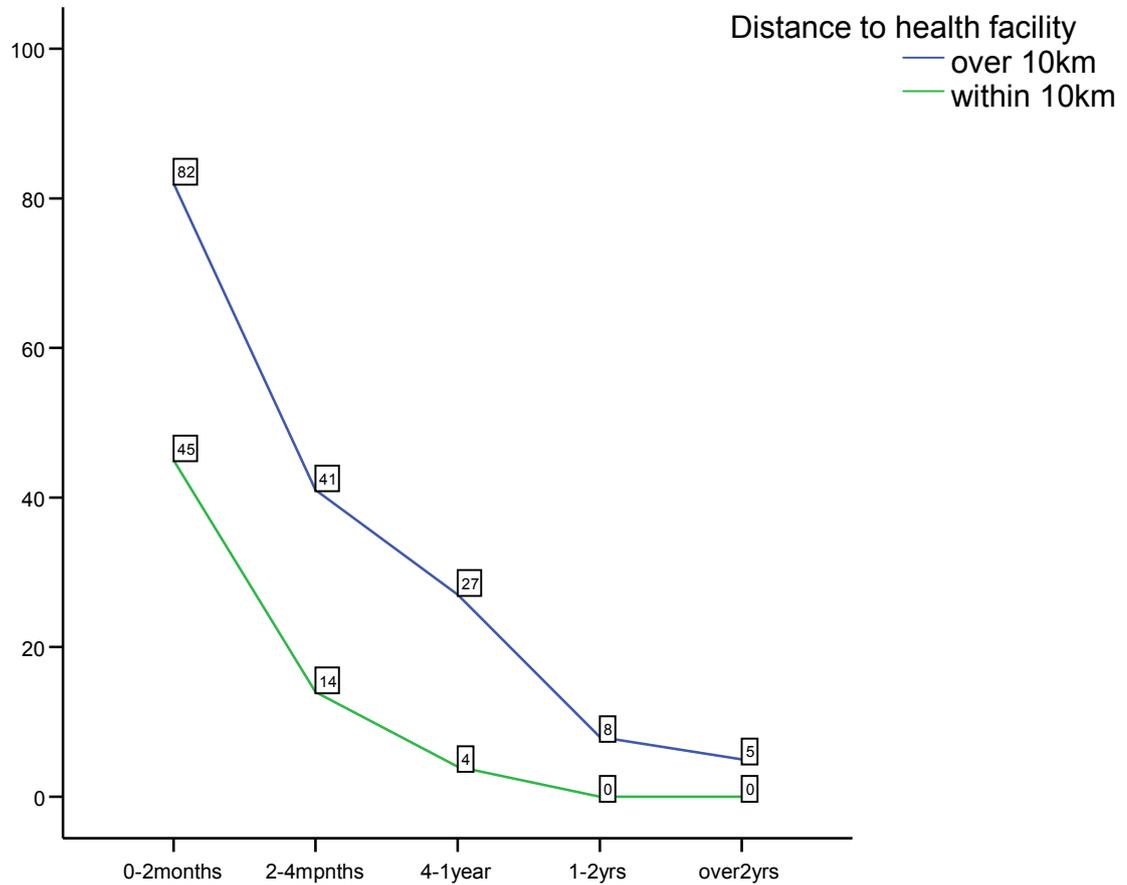
3.4.1.2 Health providers' delay

Health providers' delay was defined as time between first consultations with medical provider to the date of diagnosis. In this study, the median providers' delay was 6 days and the mean was 9 days, ranging 1-66 days.

Higher proportion of our study population (53.5%) had a medical provider's delay of less than 6 days. Majority of them (85%) were diagnosed within 15 days. We analyzed group differences in medical providers' delay using the median (6 days) as cut off point for comparison (table 7).

Significant difference with regard to medical providers' delay was observed between nomadic pastoralists and agro pastoralists (Mann-Whitnet test, $P < 0.007$), extra

pulmonary TB patients (median: 10.2 days) and pulmonary TB patients (median: 5.8 days) (Mann-Whitnet test, P< 0.002), those having low biomedical knowledge on TB and those with high knowledge on TB (Mann-Whitnet test, P= 0.041), and among age groups (Kruskal Wallis test, P= 0.038). However, most of these tendencies lost significance in multivariate logistic regression analysis, where having extra pulmonary TB remain the sole predictor for long medical providers' delay (ORadj. 3.39, CI 1.68-6.83).

Table 7. Association of socio-demographic and health related factors with medical providers' delay   .

Characteristics	Delay >6 days	No delay <6 days	ORadj. (95% CI)
Gender			
Male	59	65	1.00
Female	46	56	1.01 (0.56-1.82)
Age			
26-45	46	71	1.00
0-25	49	38	1.54 (0.67-3.55)
46+	10	12	0.76 (0.32-1.79)
Form of TB			
Pulmonary TB	71	104	1.00
Extra-pulmonary TB	34	17	3.39 (1.68-6.83)*
Distance			
>10k	69	94	1.00
<10km	36	27	0.74 (0.38-1.44)
Type of pastoralists			
Nomadic pastoralists	33	60	1.00
Agro-pastoralists	72	61	0.42 (0.23-0.77)*

*Significant at <0.05
**As shown in Table 7, having extra-pulmonary TB is the most important predictor for medical provider's delay.
** Adjusted: gender, marital status, age, education, form of TB, distance to health facility, first health seeking action and type of pastoralist.

Similar result was found when we used 15 days as cut off point for comparison. In this case, multivariate logistic regression analysis shows extra pulmonary TB (table 8) as the sole character that was independently associated with medical providers delay >15 days (ORadj. 3.51(1.48-8.28)

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Table 8. Association of socio-demographic and health related factors with medical providers' delay over 15 days   .

Characteristics	Delay >15 days	No delay ≤15 days	ORadj. (95% CI)
Gender			
Male	20	104	1.00
Female	14	88	1.13 (0.49-2.60)
Age			
26-45	11	106	1.00
0-25	20	67	1.53 (0.38-6.20)
46+	3	19	0.57 (0.13-2.43)
Form of TB			
Pulmonary TB	20	155	1.00
Extra-pulmonary TB	14	37	3.51 (1.48-8.28)*
Distance			
>10k	18	145	1.00
<10km	16	47	2.17 (0.92-5.12)
Type of pastoralists			
Nomadic pastoralists	11	82	1.00
Agro-pastoralists	23	110	1.47 (0.62-3.51)

*Significant at <0.05

** As shown in Table 7, having extra-pulmonary TB is the most important predictor for long medical provider's delay over 15 days.

**Adjusted: Gender, type of pastoralist, Knowledge, Age, distance to health facility and first health seeking action

3.1.4.3 Total delay

The total delay was defined as sum of the patient delay and the medical provider's delay. In this study the median total delay was 70 days with mean of 140. The highest delay observed was 1803 days. However, 15% of study respondents had total delay that exceeds 6 months while almost 10% of them had total delay that exceeds one year (fig.5).

Fig.5. distribution of total delay among TB patients in Somali Region
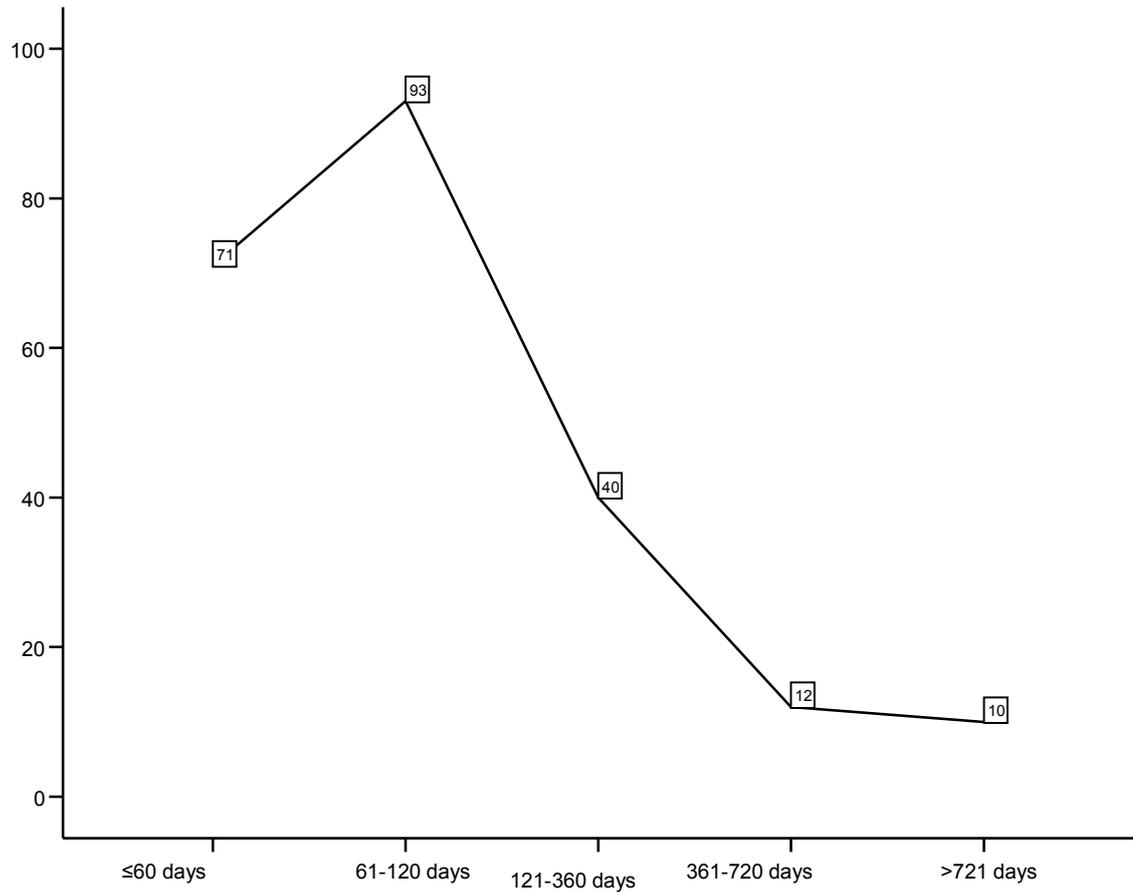
 In order to see variables that may affect the total delay of the study population, we divided patients into delay and no delay by using the median (70 days) as cut off point for comparison. The median total delay to diagnosis did not vary by sex, age and level of education.

However, pastoralist status of the patients was found to have strong influence on median total delay to diagnosis. In this case, nomadic pastoralists had median total delay of 91 days which was significantly longer than that of agro-pastoralists of 63 days. This difference was statistically significant (Mann Whitney test, $P<0.008$).

People who had high knowledge on TB sought medical help much earlier (median 63 days) than those with low biomedical knowledge on TB (median 76 days). This difference was significant (MannWhitney test, P<0.005).

Distances of patients' residence to health facilities was found to have an effect on the long median total delay. The result shows that those who lived a distance over 10km to health facilities had longer median delay (75 days) compared to those who lived within a 10km radius to health facilities (62 days). This difference was statistically significant (MannWhitney test, P=0.020).

With regard to first health seeking action of study subjects, the median total delay (70 days) observed among those who first sought traditional help was relatively higher than those who first sought medical help (66 days). However, this result was not statistically significant (Mann Whitney test P=0.278).

Table 9. Group differences with regard to median total delay

Characteristics	NO	Median total delay	P-value
Gender			
Male	124	67	0.322*
Female	102	71	
Marital status			
Married	129	80	
Single	79	63	<0.002**
Divorced/widowed	18	64	
Age			
26-45	104	69	
0-25	87	64	0.357**
46+	35	99	
Education			
Illiterate	200	70	0.073**
Literates	26	62	
Type of pastoralist			
Nomadic pastoralists	93	91.5	<0.008*
Agro-pastoralists	133	63	
Form of TB			
Pulmonary TB	175	68	0.364*
Extra-pulmonary TB	51	74	
Biomedical knowledge on TB			
Low knowledge	145	76	<0.005*
High knowledge	81	63	
Distance to health facility			
> 10km	163	75	
≤ 10km	63	63	0.020*
First health seeking action			
Traditional help first	197	70	0.278*
Medical help first	29	66	

*MannWhitney test
**KruskalWallis test
***Table 8, shows being married, being nomadic pastoralist, having low biomedical knowledge on TB and living over 10km to health facilities, significantly influence long median total delay in group analysis.

Although variables like marital status and living over 10km radius to health facilities had shown to significantly influence on the long median total delay of study participants, these tendencies lost significance in multivariate logistic regression analysis. In this case, being a nomadic pastoralist (ORadj 2.05, CI 1.13-3.71) and having low knowledge on TB (ORadj 1.98, 1.05-3.73) become the most important predictors for long median total delay.

Table 10. Association of socio-demographic and health related factors with median total delay .

Variables	Delay >70 days	No delay ≤ 70 days	Adjusted OR (95% CI)
Gender			
Male	55	69	1.00
Female	52	50	1.12 (0.62-2.03)
Marital status			
Married	74	55	1.00
Single	25	54	0.55(0.19-1.58)
Divorced	8	10	1.58(0.47-5.25)
Age			
26-45	56	61	1.00
0-25	35	52	1.91(0.83-4.41)
46+	16	6	1.52(0.57-4.05)
Education			
Illiterate	99	101	1.00
Literates	8	18	1.29(0.42-3.96)
Type of pastoralist			
Agro-pastoralists	53	80	1.00
Nomadic pastoralists	54	39	2.05(1.13-3.71)*
Knowledge on TB			
High knowledge	28	53	1.00
Low knowledge	79	66	1.98(1.05-3.73)*

…………………………………………………………………………………

*Significant at *P*<0.05
**Table 9 shows, low knowledge on TB and being a nomadic pastoralist are the most important predictors for prolonged total delay in multivariate logistic regression analysis.
ŧ. Adjusted: Gender, Age, Marital status, education, occupation, first health seeking action and form of TB.

3.2.1 Introduction

This section, explains the seasonal movement of Somali pastoralists using detailed and illustrative maps. This will give the readers an overview of the impact of pastoralists' seasonal migration on the delay of TB patients in diagnosis. Afterwards, we will explain about health seeking behaviour of pastoralists. In this part, we will discuss about how pastoralists understand TB and how they respond to it. We will also give details about traditional believes associated with TB treatment in pastoralist context. In the process, we will expose the perceived attitudes of regional health planners about provision of health care to pastoralist communities. This paper argues, from a practical perspective, that migration pattern of Somali pastoralists in Ethiopia is constant and therefore they can effectively benefit from sedentary health services which are established in strategic towns and villages.

3.2.2 Migration pattern of Somali pastoralists in Ethiopia
3.2.3 Seasonal movements of agro-pastoralist communities

Agro-pastoralists are semi-mobile community who rear livestock and also engage small scale farming. Agro-pastoralists in this study were exclusively from Abaskul tribe that occupies eastern part of Jigjiga zone, particularly around Qabribayah district. We conducted PRA to evaluate seasonal migration of this community.

Unlike nomadic pastoralists, this community practice more diversifies livelihood, involving farming as well as rearing livestock. They breed different livestock types and also engage small scale farming by growing maize, sorghum and wheat. They have permanent villages that are scattered in large farming areas east of Qabribayax district, namely Danaba one, Xananley, Juuq, Barakaramo and Lagaraarso. These villages are within walking distance to Qabribayax District; a town with two health facilities that provide both TB diagnostic and treatment care.

Even though they have permanent villages, agro-pastoralists follow infrequent migratory pattern which is mainly determined by availability of water and pastor as well as prospect of cultivation in particular season. Agro-pastoralists reported five seasons in a year and explained characteristics of each year as follows:

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Jilaal: hot dry season that lasts from January to March. Pastor and water are scarce and long migration takes place.

Gu': The first long rainy season that normally lasts from April to June. Pasture and water are abundant and there is no migration at all. People engage farming.

Xagaa: short dry season that lasts July to August, availability of pastor and water are scarce but mobility is limited and mostly depend on the situation.

Karan: Short wet season that last August to September, there is no migration at all.

Deyr: short rainy season that last from October to November. Pastor and water are abundant and farming takes place.

Since their habitat receives three rainy seasons, which satisfies periodic crop production, farming activities are carried out during wet seasons. By this time, livestock receive sufficient pastor and water around farming areas and therefore no migration takes place.

In the long dry season, however, when subsequent expected rains fail, as cultivation becomes impossible, agro-pastoralists migrate in search of pastor and water for their livestock to eastward into dense forests, namely Karingal and Bilcilbuur. Sometimes migration is pushed further up to Tulli village in Dhagaxbur zone (thin arrows in the map indicates migration during dry season). In this period, people use wells in Moyaha and Haljiid water machines as a source of water for both livestock and human. The lengths of the period they remain in those forests vary within seasons, but often not longer than two months. However, long draughts and famines are exceptional and determine the length of the duration.

Characteristically, when rainy season begins, agro-pastoralists migrate back to their permanent villages in eastern Qabribayax (bolded arrows in the map indicates migrations during wet seasons). Their seasonal migration involves the whole family.

In wet seasons, as mentioned above, pastoralists are within 10km distance to Qabribayax town where there are two health facilities equipped with both TB diagnostic and treatment facilities. In this period, people do not have a major problem with tuberculosis services regarding physical access, mainly because TB patients enable to collect

treatment in the morning and go back to their families in the same day to take care of their livestock.

During dry seasons, however, pastoralists migrate 60km away from health facilities in Qabribayax, but they still rely on these facilities when illness strikes. In this case, if patients have to seek care they must abandon their family responsibilities for two months (intensive phase of treatment) which is a very difficult choice for pastoralists. As a result, TB suspects often postpone seeking medical care until the next wet season when they migrate back to their villages close to health facilities.

Figure.7. Seasonal migration of Agro-pastoralists in SRS.
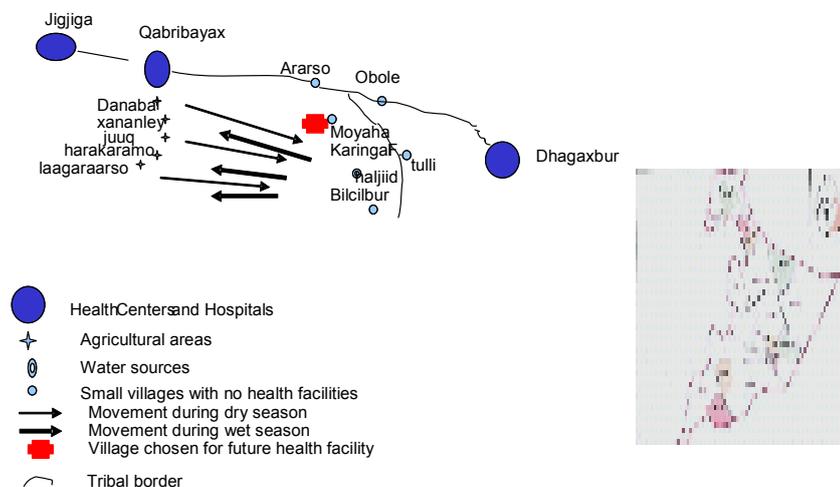
3.2.4 Seasonal movement of nomadic pastoralists

Unlike semi-settled agro-pastoralists, nomadic pastoralists from Ogaden community in Dhuxun District practice exclusively nomadic way of life. As a result they frequently migrate to valleys at the base of Qarinjuqood Mountains during wet seasons and to the peak of the mountains during dry seasons.

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In contrast to agro-pastoralists, nomadic pastoralists stated having four seasons in a year, namely:

Jilaal: hot dry season that lasts from January to March. Pastor and water are scarce and long migration takes place.

Gu': First long rainy season that lasts from April to June, pasture and water are abundant and it is most appreciated season of the year. There is no migration at all.

Xagaa: Milder dry season that lasts from July to September, availability of pastor and water are scarce and long migration takes place.

Deyr: It is the second rainy season that lasts from October to November. Pastor and water are abundant and migration is limited.

Fig. 8. Seasonal movement of nomadic pastoralists
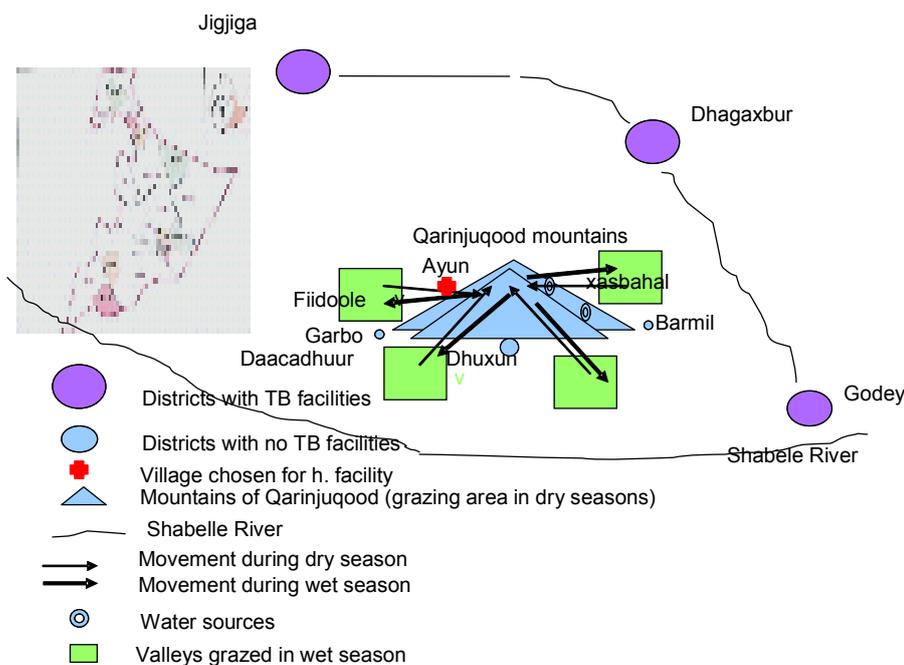
During wet season nomadic pastoralists spread over grassland valleys namely Fiidoole, Daacadhuur and Xasbahal. Their mobility is very limited in this period and they are closer to towns and health facilities. The rainy seasons are very much appreciated by pastoralists as social festivals such as wedding, thanks giving prayers; circumcisions, paying diyah (compensation) and social meetings are performed in that period. As pastoralists come closer to towns and moreover dry season dependent workload eases,

people often seek health care during wet season. Vaccination and feeding programs also get access to pastoralists during this season.

As pastor and water dries out progressively they spread over the valleys, and finally at the onset of the dry season, they start long migration where they ascend an extended chain of mountains known as Qarijuqood Mountains (thin arrows in the map indicate dry season migration). These mountains are not grazed in the wet season, hence rich for pastor in dry season. There are water captures and dams in and around the mountains which serve as a source of water for both human and livestock. They spend on top of these mountains for almost six months each year (jiilaal and xagaa seasons).

As rainy season begin, pastoralists migrate back to the valleys close to towns (wet season migration is shown by bolded arrows). This is when TB patients often seek TB services or health care in general. In this period, livestock becomes fatter and therefore expensive. Moreover, TB patients, often a people within their reproductive age, are the most important workforce in their families, particularly during dry season when they are on the mountains. However, in wet season, when families move into the valleys and dry season dependent workload fades; TB patients often find a suitable time to skip for health seeking. They spend the two months of intensive phase of treatment in the towns (where DOTS care is available) and they must go back to their families before dry season began. With this in mind, study participants accepted that if dry season began while they are on intensive phase treatment course, their families and livestock might not cope with the burden in their absence. As a result, TB patients may postpone seeking care in favour of livestock survival; this may also compel patients who have been already on treatment to default. However, if TB service would have been available within a reasonable distance the thoughts would have been different.

3.2.5 Pastoralists' access to health care

The only health centre in Fiq zone, which is the epicenter of nomadic pastoralists in SRS, does not provide TB services. During illness, sick individuals often travel to far away areas where there is TB health services. The nearest was reported to be either in Qabridahar or Godey, unfortunately there is no road connections between pastoralist

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areas of Fiq zone and those areas and even if there is one it is seasonal road that is closed in wet seasons; a period considered as optimal for health seeking.

Moreover, pastoralists often sell livestock for their health costs and living expenses while on intensive phase treatment course. In that regard, they often choose areas where they can obtain both TB health facilities and better market for their livestock. Pastoralists consider Jigjiga as the best market for livestock in terms of price, hence often seek TB care to those places. The problem of the distance is further complicated by lack of transportation. Therefore TB patients often travel with their livestock on foot all the way to Jigjiga. Study participants reported that they had been on their way to treatment center between 25 to 28 days. This may exclude all vulnerable groups such us women, children and elderly people from seeking TB treatment care.

"*I am a man and I had hard time to reach here, it is difficult to bring children and women here. When they (children and women) get TB, we treat them with our traditional way. Some times they are cured or they may live with disease for long period or in some cases they die. That is all we can do (…)*".
   (Nomadic pastoralist patient, Jigjiga health center)

Although the distance to treatment delivery points is a burden, economic cost imposed to pastoralist families by seeking TB treatment is unendurable. Study participants agreed that they sold an average of 4 camels or 26 goats for their cost during intensive phase treatment course (first two months) and the cost may rise to double in continuation phase (the six months following intensive phase). As livestock is the sole means of survival for pastoralists, they must weigh expenditure on their health care against other family needs. In many cases, families that own smaller number of livestock herds may not be able to endure such a heavy loss of livestock and their TB patients may not therefore seek treatment at all. Those who happen to seek care, the journey to DOTs center alone may contribute a significant delay to treatment while sometimes death may intervene before they reach to treatment points.

During first two months treatment course, pastoralists must stay in the towns because they need to be in the DOTs center daily for two consecutive months (intensive phase). However, during continuation phase, they take treatments in monthly base for six months, they should therefore go back to their pastoral families and come back once in each month to Jigjiga. This may complicate the adherence of TB treatment.

"After I finish first two months treatment I will get the rest on monthly bases. However, it took 25 days on foot from my home to here. If they give me one month treatment, I may not be able to come back next month. I am financially unable to stay in Jigjiga for 8 months too; Moreover, my herd and kids are neglected, I don't know what I am going to do".

(Nomadic pastoralist patient, Jigjiga health center)

In view of these complications due to pastoralist's lack of access to DOTs services, TB patients may inevitably delay seeking treatment care or even some times to default. This may also encourage the preservation and reliance of traditional health, which is often available at the vicinity with low price.

3.2.6 Health seeking behaviour of Somali pastoralists in Ethiopia

Every culture, irrespective of its simplicity or complexity, has its own belief and practice concerning diseases and evolves its own system of treatment in order to tend diseases. Somali pastoralists in SRS of Ethiopia have least access to TB services which adds to the burden of climate difficulties, poverty and illiteracy; as a result pastoralists have developed their own way of solving their health problems through traditional and religious remedies.

Nomadic pastoralist and agro-pastoralists in this study demonstrated slight difference in terms of their health seeking behaviour with regard to TB. During illness family members, relatives and members of the community assemble and discuss about the situation of the patient. They nametag the diseases based on previous experience of similar situations. Most of health knowledge, however, lies within elders' domain.

Community elders therefore make suggestions of the type of remedy suitable for the condition being named.

Both pastoralist groups share the idea that TB is the product of internal injury due to hard work and malnutrition and as a result health care is probably sought from that perspective. They also share the idea that persistent cough is human phenomenon and therefore it can not create a suspicion for TB.

"People cough for years and they still look healthy. If coughing person becomes rapidly wasted or cough is accompanied with blood, we suspect that person of having TB".
    (Agro-pastoralist patient, Qabribayax health center)

When TB is suspected, patients take traditional herbs widely believed by pastoralists to treat TB namely **Mawe** and **Tiire**. The roots of these herbs are ground, mixed with tea and drank by patients every morning and evening until the symptoms disappear. Agro-pastoralists added one more herb (seeds) namely ***Shinfax*** of which nomadic pastoralists were not familiar with. Agro-pastoralists grew this herb in their farms and it is available in their homes. Moreover, it is widely available in markets where it is sold with relatively expensive price. The full tea spoon of this herb (seeds) is mixed with butter oil and taken by patients twice a day (morning and evening). These herbs are believed to be useful for diseases which characterize coughing; ranging from common cold to TB. It is also used to treat livestock TB. Pastoralists described symptoms of livestock TB as persistent cough with loss of weight, constant passiveness and failing to graze. Seeds are mixed with salt and fed to the sick animal. As soon as individual animal takes these remedies, it release pus along with manure and recovery follows.

Figure 9. Traditional herbs which pastoralists use for treatment of TB

Mawe   **Shinfax**   **Tiire**

The other form of treatment being mentioned was western medicine namely tetracycline capsule which pastoralist believe is effective for majority of their illnesses. They buy it from local drug vendors and use it for treating diverse of diseases ranging from minor wounds to TB.

"W*e have capsule with red and yellow color called tetracycline. We buy it from towns. It must be available in every pastoralist's house because we use it for both men and livestock diseases such as TB".*
(Nomadic pastoralist patient, Jigjiga health center)

If symptoms do not subside, religious remedies are applied. This is performed in the form of Quran verses that is read for the patient. Generally for the Muslims, Quran is a sure means of help when ever they are invoked.

When the above methods are exhausted, a complex process locally named *Usmir* is applied. In this method, cow is slaughtered and the belly is removed out. The belly is pierced with knife in several places with resultant formation of holes. The belly is then hanged from a tree with holes pointing down. Drops of water leak from the holes. That water is collected with small container and mixed it with blood. This mixed water and blood is given to the patient to drink. The idea behind this method (usmir) is that the

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water from the belly is an extract of varieties of herbs grazed by the cow and therefore there is an assumption that one of these herbs may treat TB. Different theories indicate that when a patient drinks the liquid he vomits mucus and pus which is stored in the chest cavity due to TB and if the pus is vomited, the patient will recover.

Tuberculosis patients try all available traditional means until they finally fail to perform their daily activities.

"I tried Mawe and Tiire (two local herbs). I avoided sex. I tried religious remedies in many occasions. I didn't seek treatment until my situation reached to a point that I couldn't milk camels for my children".
  (Nomadic pastoralist, Jigjiga health center)

Study participants believed that many people in their community permanently recovered of TB because of traditional remedies. The idea that the disease occurs due to hard work and malnutrition, and their limited access to modern health care,   apparently led them to seeking traditional healing, leaving modern medical care as the last resort with resultant diagnostic and treatment delay.

Even though pastoralists acknowledged the effectiveness of traditional healings for TB, when traditional means exhaust, they accepted that their final resort is modern medicine. However, there are still traditional misconceptions attached to modern medical care, particularly TB treatment in pastoralist context. The most wide spread, is patient's believes on abstaining sex while on TB treatment course.

"*My family (wife) was moved to Jigjiga area by relatives* (to interrupt sexual contacts) *and my wife will never come here until I finish 8 months TB treatment course".*
  (Agro-pastoralist patient, Qabribayax health center)

Both male and female TB patients acknowledged the importance of this practice. In connection, many agro-pastoralist patients in Qabribayax continue staying in the town throughout the 8 months treatment course and they may never, or may rarely visit their

families, just to abstain sex. To enforce this practice, nomadic pastoralists apply stricter rules on TB patients. One of the study respondents explains how his nomadic community strictly forbids sexual contact by TB patients,

"*When I go back to my community, elders will assign members of close relatives mainly men with same age to scrutinize me such that I never meet my wife privately until I fully recover from the TB*".

(Nomadic pastoralist, Jigjiga health center)

Nevertheless, participants discussed the main philosophy behind this believe. Because TB is characterized with wasting, they believe it can be cured when treatment is supplemented with intake of highly nutritious food, term locally called *baan*. According to them, treatment without nourishment will inevitably result reactivation of the disease. However, they associate sex with high loss of body nutrients. Therefore, since they believe a person can be cured only by treatment complemented with intake of nutritious food, they thought sex may exacerbate the disease by affecting body nutrients. Hence, it must be avoided.

Moreover, agro-pastoralist respondents agreed the necessity of avoiding camel's milk and meat when a person is confirmed as TB case. They believe that meat and milk from camels create internal lesion or widen already existing lesion due to TB. However, for nomadic pastoralists, both items are believed to be helpful for nutrition purpose. Isolation of TB patients from the families that would have cared for them, and preventing them from eating the most available nutritious food drive pastoralists into extreme living conditions. As a result, patients may deny the disease and therefore delay their seeking diagnostic and treatment services.

With presence of all these traditional misconceptions towards TB, lack of communication between patients and health providers due to language barrier was observed in some facilities. In these cases, health providers and TB patients speak totally different languages, thus, leave alone health education but minimum verbal communication between patients and their providers was observed. In other cases, despite the fact that health providers and patients could communicate well, and health providers had

performed health education sessions several times in our presence, they kept concentrating on issues like treatment adherence and precautious measures, such as awareness of the risks associated with splitting sputum around health facility. Health providers never explored perceptions of patients on tuberculosis and never waited to listen and respond to patients in our presence.

3.2.7 Perceived attitudes of providing health service to pastoralists.

Despite the fact that pastoralists constitutes 85% of the population in SRS, and significantly contribute regional economy, there is no regional policy that specifically addresses health care for pastoralists. The widely held believe that pastoralists can seldom benefit from sedentary health services because they are frequently on move, is also prevalent in SRS. As a result, pastoralist dominated areas of SRS are devoid of health services with particular problem on DOTs services.

Establishment of health facility in particular area is determined by population density of given area. For instance, health post which is the lowest in the hierarchy, as a rule, serves 3000-5000 people. As pastoralists are sparsely dispersed into large geographical area, they can hardly meet the condition.

(Senior health official, Jigjiga town)

Despite evidence to the contrary, absence of TB services in pastoralist dominated areas of the region was attributed to their migratory lifestyle.

"If DOTs facility is established in pastoralist areas, next day you may not get a single individual, they migrate".

(Senior health official, Jigjiga town)

Nevertheless, migration pattern of pastoralists in SRS is constant, and therefore is conducive for sedentary health services. In this case, study participants reported that the only service they access in their area is a community based religious schools. Two types of schools were reported. Mobile school that teaches basic Arabic and Koran, and sedentary school that teaches advanced religious studies such as interpretation of Koran.

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The later is located in strategic village which pastoralists can access every season (indicated by the cross sign in the map). They believe if health facility is established in such strategic villages, they would have used it very effectively. This eliminates the widely held view that pastoralists are constantly on move and their health care is therefore costly and difficult.

As a positive sign, there were new recruits from villages close to pastoralist areas who were under training in Jigjiga Health Science College and they would be sent back to their respective communities to run previously non functional health posts and clinics. In addition, there was a plan of training laboratory technicians from remote communities such that DOTs service is to be extended to new areas of the region. Health officials in the region believe that pastoralists will benefit from this new initiative; however whether pastoralists will effectively benefit from these initiatives is still unclear.

 Noteworthy is the fact that social stigma attached to this disease is less common in the SRS. According to regional health official, majority of out-patients in health facilities demand TB treatment. When they are found negative through AFB examination, many of them don't accept the result. Instead they go to the laboratory and try to bribe laboratory technicians, such that they label their specimen as positive. This is an indication that pastoralists consider TB as dangerous disease, and this attitude towards the disease definitely makes TB control easier in that part of the globe.

Chapter four Discussion, conclusion and recommendations

4.1 Distribution of the study population

This study investigated socio-cultural attributes in the management and control of TB among 226 TB patients with pastoralist identity from SRS of Ethiopia.

The majority of study participants (85%) were within the age range of 16 to 45 yrs. This is the most productive age group with usually a number of dependent family members.

In developing countries, it is common that TB strikes young adults who are economically the most productive age group in the society (56).

Proportion of males was slightly higher than that of females. Generally, more men than women are diagnosed and die of TB globally (57).This finding is consistent with findings of other studies in Ethiopia (7;24;25) as well as other part of Africa (58).

Proportion of agro-pastoralists (58.8%) in this study was much higher than that of nomadic pastoralists (41.2%). This is because the population of the study area were predominantly agro-pastoralists. The illiteracy rate of study participants (88.5%) was much higher than the national level (57%). Illiteracy rate of similar scale was reported from other pastoral communities in Ethiopia (59). This is an indication of the exclusion of pastoralists from development programs such as access to education and health care. Similar situation was reported from pastoralists in the Sahel region (60).

The median distance from patient's residence to the health facility, where patient sought care first for their current illness, was 24km. Earlier study in the same area has reported similar figure (11). However, this median distance is over two fold higher for nomadic pastoralists (36km) than agro-pastoralists (16km). As demonstrated in qualitative result, nomadic pastoralists are more geographically isolated than agro-pastoralists and that may therefore explain their long median distance to health facilities. Similar distance to health facilities were reported from pastoralists in Northern Kenya (61). Widespread poverty compounded with resource allocation bias in many African countries resulted in concentration of limited investment in urban areas, despite the fact that large proportions of their population are rural. Nonetheless, access to health care for all was a vital part of

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health related millennium development goals adopted by international community in 2000 (62). Pastoralists in sub-Saharan Africa were long known to be vulnerable to exclusion from modern medical care (34;35). We argue that this goal may not be achieved as long as large segments of the population are deprived access to health care just because they live under extreme conditions.

4.2 Knowledge on TB and first health seeking action of study population

Results indicate that majority of study participants (64%) had low biomedical knowledge on TB. However, good lay knowledge on TB and positive perception on the disease and its management is prerequisite for early seeking of medical care. Limited knowledge on TB was reported to encourage people to consider various traditional alternatives (19;63).

The patient's treatment options is often influenced by their perceptions on causes of the disease (64). Our result supports this finding by the fact that health seeking action of study population is significantly associated with their biomedical knowledge on TB.

Traditional herbs namely **Mawe, Tiire** and **Shinfax** are widely believed to be effective for both human and livestock TB in pastoralist context. However, traditional healings has been a common practice among the Somali people since time immemorial and has been the only service available for vast majority of rural Somalis (65). Application of traditional herbs for conditions involved with chest and abdominal symptoms was earlier reported from Somalia (65). This is true in this study by the fact that study participants strongly believed these herbs as efficient in majority of diseases characterized with coughing that ranges from normal flu to TB. Other communities in east Africa were reported to believe herbs as effective in curing TB (18).

Strong reliance of traditional medicine observed among Somali pastoralists may serve as a source of delay of TB patients in diagnosis. However, traditional herbs which are used by communities in Mexico were recently confirmed to be effective in both drug resistant and drug susceptible mycobacterium species (66).

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Although the herbs reported by this study are widely used in pastoralist contexts of Somalia, Ethiopia and Kenya, their impact on management and the control of TB is not known and we recommend further study to be done in that area.

Because of their close contact with livestock, pastoralists could be at risk of acquiring bovine TB. In this study, vast majority (91%) of participants reported to consume raw milk and 72% reported to share accommodations with livestock. This is in consistence with earlier study in southern region of Ethiopia (67). However the vast majority of our study population had never heard that TB can be transmitted by livestock or through it's products. This is an indication of lack of health information and it probably makes this community highly exposed to bovine TB.

4.3 Patient delay

Patient delay was defined as period between onsets of major symptoms of TB to first medical consultations. It is very important time as most of disease transmissions occur in the community during this period. The long patient delay may lead to deterioration of the disease, death and transmission to family and community members. As the delay of patients with active PTB+ disease protracts, their infectiousness increases (14). In the present study, 74.5% of PTB+ patients were highly infectious, determined by sputum grading. Each of these patients dispenses up to 3,500 bacilli in each cough, and may infect 10-15 people each year, eventually creating a public health time bomb.

In this study, we found a median patient delay of 60 days with mean of 130 days, ranging from 10 days to 1800 days. This is one of the longest patients delay being reported so far from developing countries. It is much higher than the median patient delay found in Amhara region of Ethiopia (25), Awasa, Ethiopia (23), Ghana (68), Argentina (69), Thailand (70), Vietnam (71), Malaysia (72) and the seven countries of the WHO-Eastern Mediterranean Region including Iran, Iraq, Pakistan, Syria, Yemen, Egypt and Somalia (45).

These studies were urban based (sedentary population) and therefore the longer patient delay in this study could be explained due to distinctive socio-culture and lifestyle of

pastoralists, often characterized with mobility, poverty and illiteracy compounded with lack of access to modern medical care. Earlier studies found rural residence as a risk factor for diagnostic delay just because of poor access to health care and low awareness of TB disease among these populations (73;74). However, pastoralists are even more marginalized than rural sedentary populations regarding access to health care and awareness of TB.

 To our understanding, there is no published report that addressed delay in TB diagnosis among pastoral communities; therefore any comparison of this result to another study being conducted in urban area might be less convenient. However, it illustrates the disparity between pastoralists and sedentary people with regard to equity of TB control programs. This will eventually lead for health planners to understand the segment of the population that have not been reached and therefore to be targeted for future tuberculosis control intervention.

4.4 Factors associated with patient delay
 Low biomedical knowledge on causes, treatment and mechanisms for transmission of TB was found to be an independent predictor for patient delay. This result is in consistence with the previous studies conducted in Ethiopia (7;25), Tanzania (75), Burkina Faso (74), Nigeria (76), and Mexico (63). Poor knowledge and practices related to TB disease was also reported from pastoralist communities in Tanzania (77).

The most frequent symptom presented by pulmonary TB patients and which prompted them to seek health care for their current illness was weight loss, despite the fact that, PTB is initially suspected by cough symptom. Similar situation was reported from Iran (45).

Lack of knowledge of the fact that the disease is caused by infectious agent which is an airborne and contagious, may result in increased propagation of the disease in the community (49). Somali pastoralists consider persistent cough as a normal phenomenon and not as a symptom of TB, which reflects their unawareness of the contagious nature of

the disease. This is a serious public health concern that warrants an aggressive intervention through accelerated health education.

Sexual abstinence during treatment with reasons related to risk of recurrence or worsening of the disease was observed. Similar situation was reported from Malawi (78). However, TB largely strikes the most sexually active age group in the community. In order to avoid sexual restrictions, many TB patients may keep on denying the disease until it reaches to critical stage. These negative traditional views towards TB could probably be lack of communication between pastoralists and modern health care that supposed to serve for them.

Information Education Communication (IEC) which is supposed to inform, motivate and subsequently guide people into action, that leads to positive health seeking behaviour, is observed to be weak or absent mainly due to shortage of trained personnel in DOTs facilities. The implication of this poor pattern of communication means that TB patients can not access to necessary information to enhance their health seeking behavior. If TB patients did not get the necessary information about the disease, the result could be for the community to maintain their traditional way of attending the disease with consequent delay of seeking care.

Nomadic pastoralism was also found as independent predictor of patient delay. In this regard, nomadic pastoralists had significantly higher median patient delay (83 days) than agro-pastoralists (57 days). It is probably because nomadic pastoralists dwell in very remote areas, often far from health facilities particularly DOTs services. Distance to health facility was earlier associated with patient delay in Ethiopia (7) and elsewhere (79). Access to health care is defined in Ethiopia as living within 10km radius to health facility (80). Based on that defination, almost 84% of nomadic pastoralists in this study had no access to health care and therefore might have succumbed to traditional health with consequent patient delay.

Agro-pastoralists who lived over 10km to health facilities, because they were probably migrated to dry season grazing area, delayed seeking care significantly longer compared

to the group who lived within 10km radius to the health facilities. It is clear, in this regard, that seasonal migration is an important factor with regard to the patient delay in diagnosis. However, migration pattern observed among Somali pastoralists in SRS of Ethiopia was predictable and their route of migration was constant. With this in mind, fixed health services which are established in strategic villages could be an ideal option for this particular community than mobile clinics, an idea failed in other pastoral communities (81).

Nomadic pastoralists reported that their TB patients undergo series traditional practices before they sought medical care. Among them were traditional herbs, religious remedies and antibiotics. In sub-Saharan Africa, people often seek traditional help before medical care with consequent treatment delay (15;16;23;44;82). Somali pastoralists in Kenya were reported to prefer traditional health over modern medical care. The reason was because traditional healers were easily accessible for them whereas modern health facilities were either hardly accessible due to long distance or else, lacked the necessary services (53). This could be true in SRS where the median distance to nearest health facility were reported to be 21km (11), while traditional providers are available at the vicinity.

Low knowledge on TB, which probably led to prevalent use of traditional medicine and negative traditional believes associated with TB treatment regimen observed among Somali pastoralists, compounded with their lack of access to health care that is further complicated by their seasonal migration, may together contributed the long patient delay observed among Somali pastoral community in Ethiopia.

4.5 Health provider's delay

Health provider's delay was defined as time between first medical consultations to diagnoses. This study found median health provider's delay of 6 days and mean of 9 days, ranging 1-66 days. Median providers delay documented in this study is lower than the findings from Ghana and malaysia (68;83) however, similar to the studies in Ethiopia (7) and Somalia (45).

The low provider's delay in this study could be due to high degree of alertness on the side of health workers to suspect TB which is an event quite common in TB endemic areas (7).

Moreover, pastoralists were reported to seek professional health services only with advanced stage of illnesses (20). Therefore, the low median provider's delay in this study could be due to presentation of patients to health facilities with advanced symptoms of the disease, which probably made its diagnosis easier.

On the other hand, stigma has been associated with diagnostic delay (45). Interestingly, TB was reported not to be a subject to stigma in SRS. Therefore, patients might have volunteered all possible explanations of their condition, which probably made easy for providers to suspect TB at initial presentation, hence the short providers delay. In this study 85% of patients were diagnosed in less than 15 days after their initial presentation to professional health providers.

4.6 Factors associated with health provider's delay

Having EPTB was found to be the sole predictor for long health provider's delay. Earlier studies documented similar findings (84;85). This study was conducted in an area where diagnosis of EPTB exclusively relies on clinical criteria. Nonetheless, EPTB can involve almost all organs in human body, hence present wide range of non-specific clinical manifestations. This might make it difficult for health providers to rule out other diseases with comparable symptoms, hence failure to accurately diagnose the disease at the initial presentation.

Because EPTB cases are rarely infectious, they are less important with regard to disease transmission. However, human suffering associated with the disease and the cost of health care imposed to patients and their families could be remarkable.

Extrapulmonary tuberculosis constituted 22% of all cases in this study. Noteworthy, EPTB is more common in children (86) and patients with HIV infection (87). However, children were excluded from this study and there was lack of data on HIV prevalence in SRS particularly among pastoral communities. Therefore, as bovine TB more often leads

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to EPTB and is predominantly found in areas where people are in close contact with livestock (88), it is possible that bovine TB is highly prevalent among Somali pastoralists. This is supported by the fact that risk factors for bovine TB transmission such as consumption of raw milk and sharing same accommodation (same fence) with livestock were found highly prevalent among this community.

The result of this study shows that the medical providers in the region did an outstanding job with regard to diagnosing of TB. However, we still recommend more to be done in the area of EPTB.

4.7 Total delay

Total delay was defined as the sum of patient delay and the health providers' delay. This study documented a median total delay of 70 days with mean of 140 days.

Late patient presentation is the most important contributor of the total delay, constituting 86% of the observed delay. This is in accordance to prior finding from studies in Ethiopia (7), Somalia (45), South Africa (89), Yemen (45), Syria (45), and Iraq (45). However, other studies found health system delay as the most important contributor to the total delay (25;68;84).

Median total delay of this study is lower or similar to the median total delay found in other parts of sub-Saharan Africa such as Amhara region of Ethiopia (25), Ghana (68), Botswana (82), Uganda (58), Malawi (90) and Gambia (91). In contrast to our study, health system delay was the most important contributor to the total delay of the above studies.

Delay in diagnosis observed among pastoralist TB patients in SRS of Ethiopia is high, exceeding two years in some patients. Factors related to socio-cultural perceptions on TB and pastoralist's limited access to health care, with nomadic pastoralists being of most concern, are the factors significantly associated with the reported long delay.

4.8 Strength of the study

1. Large sample size was achieved within the study period.

2. We collected both quantitative and qualitative information. The findings from one technique enhance the reliability of the other.

3. Most of the studies, so far, investigated diagnostic delay of PTB patients. However, this study adapted broader context by investigating diagnostic delay of both EPTB and PTB patients.

4.9 Limitation of the study

There are limitations in this study. We studied pastoralist patients attending health facilities for treatment. There is possibility that those patients could represent a unique social or economic class within the community. The idea is that, because it is costly and also tiresome for pastoralists to get to towns for TB treatment, there could be, then, people who are not able to cover the cost or others who might not able to walk for days and nights to reach DOTs facilities, and therefore not sought TB treatment. We only studied those who might have possibility to seek care. This might therefore have an impact on generalisation of our result.

Nevertheless, we studied all pastoralist patients attending 10 TBMU in the region during June to September. In the process, we reached patients from 7 zones out of nine zones of the SRS. Although qualitative data were limited to 12 patients from two tribes, still Somali pastoralists are known to be homogeneous with regard to culture, religion and language. We therefore believe that the information provided could be generalised to TB patients attending health facilities in the region.

Cross sectional design adopted by this study may hardly determine the association between exposure and outcome variables. However as we collected qualitative and quantitative information together, we believe the combination of methods is a strength that minimise the dilemma associated with the single study design.

The other problem is vulnerability of this study to recall bias. The delays was assessed through self reporting, implying the possibility of a recall bias. However, this is

minimised by using seasonal and religious festivals to facilitate patients' recall, and moreover, qualitative probing questions were used for validation of the answers.

Finally, we studied the onset of illness of EPTB patients. Generally, the disease presents broad range of non specific symptoms. Therefore as symptoms asked to patients were non specific, patients may relate these symptoms with other diseases and that may cause dilemma in relation to onset of the disease.

4.10 Conclusion

Generally, this study shows that there is significant delay in diagnosis among pastoralist TB patients. This long delay was overwhelmingly contributed by factors associated with individual patients (patient delay).

The median patient delay of 60 days and mean of 130 days was found. This substantial patient delay to diagnosis is a major contributing factor for increasing transmission of TB in Ethiopia, and therefore demands a new dimension of thinking by national and regional TB control programs. Factors related to socio-cultural perceptions on TB and pastoralist's limited access to health care, with nomadic pastoralists being of most concern, are the factors significantly associated with the reported long patient delay. These are areas that should be targeted by Regional Health Bureau for intervention such that the observed long delay of TB patients in the region is minimized. In order to accomplish a reduction of diagnostic delay, the following recommendations should be considered.

4.11 Recommendations

1. Population in SRS is mainly pastoralists that are largely illiterate, mobile and poor. Health provision to such a community demands strong political determination and commitment. Health policy that address health needs for pastoralists at both regional and national level should be put in place.

2. Due to insecurity prevailing in pastoralist dominated areas of SRS, high staff turnover in pastoralist areas was documented. In order to find a permanent

solution for this situation, influential members from pastoralist communities such as religious leaders and traditional healers should be considered for short time training in relation to early detection of TB suspects, referral systems and drug distribution and observations. Besides their readily availability to patients, they can be acceptable and trustable to pastoralists. This has been demonstrated by previous study (92). We believe this strategy can be a sustainable way of making TB services readily available for pastoralists and will eventually encourage early care seeking and adherence to treatment with subsequent improvement of case detection rate and adherence to treatment in SRS.

3. This study indicates that pastoralists have no access to health care, and health providers are in doubt about what kind of health services would fit best to pastoralist communities in the region. With regard to PRA based study, we found that the migration pattern of Somali pastoralists is constant. They made clear that they can effectively benefit from sedentary health services which are built in strategic villages. Therefore policy makers should include decision making to pastoralists with regard to which kind of health care fit into their context. According to our findings there are strategic villages that they can be accessed every season and such villages should be considered for health facility.

4. We found that health education is either not existent or very poor in DOTs facilities of the region. However, IEC is a very crucial for improvement of both early care seeking and treatment adherence of TB patients. Health education for rural communities with minimum access to health care led to increased case detection in many areas of the developing world. Therefore, IEC that emphasizes traditional barriers mentioned above should be considered. This should be designed in a culturally acceptable way that fits to a migratory and overwhelmingly illiterate society.

5. It is important that health workers should empower patients by giving them a chance to express their view points, they should listen to them, explore their perceptions on the disease and learn much about cultural practices and believes

associated with the disease at community level. In so doing, health workers will understand areas to be focused in health education sessions. This may remove information barriers between health workers and pastoralists and enhances not only patient's understanding on biomedical aspect of the disease but also influence early care seeking of general community and their adherence to treatment.

4.12 Research implications

1. Further studies are recommended in the area of gender difference in health care utilization and outcome of TB treatment among Somali pastoral community in Ethiopia.

2. Data on HIV in the region is lacking. It is important to know the magnitude of HIV contribution on TB in the region and therefore further research on that subject is recommended. This will contribute information necessary for future planning and implementation of coordinated intervention strategy for both diseases.

3. Care seeking with regard to TB may differ among pastoralists. Keeping that in mind, research that addresses socioeconomic determinant of care seeking of TB among pastoralists is recommended.

4. Urban population in SRS share a lot with their fellow pastoralists. We suspect that urban population may also share perceptions of traditional medicine for TB and other misconceptions that led to the delay in diagnosis. To find their difference and similarities, we recommend a comparative study on diagnostic delay among Somali urban and Somali pastoralists in the SRS.

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Appendix 1

Questionnaire for patients*:*

This questionnaire will be used as a tool for the research entitled socio-cultural attributes in the management and control of tuberculosis among Somali pastoralist community in Ethiopia. The study is a partial fulfillment of the master of philosophy degree in international community health at the University of Oslo: Norway.

Your honest answers will help us improve the TB control among pastoral communities in Ethiopia and in the Horn of Africa in general. We request your truthful answers, as it is not bad if your answer is either "I do not know or I don't remember".

Abdi Ali; Student at the University of OSLO

Participant number............................... Date of interview...............................
Name of the health facility........................
Name of the interviewer.....................................

1. Personal and socio demographic information:
1.1 **Age**.............years

1.2 **Sex**:
    Male   □
    Female   □

1.3 **Literacy**:
    Unable to read and write   □
    Primary (1-8)   □
    Secondary (9-12)   □
    College   □
    Other   □

1.4 **Occupation**
    Pastoralist   □
    With supplementary job   □
    Others, explain……………………………………………………………

1.5. **Marital status**
    Single   □
    Married   □
    Divorced   □
    Widowed.   □

1.6. **Pastoralist status**
  Nomadic pastoralist   ☐
  Agro-pastoralist   ☐

1.7. **Herd type:**
Cattle   ☐
Goats   ☐
Camels   ☐
Sheep   ☐
Others, explain……………………………..

1.8. **Form of TB**
  Pulmonary TB   ☐
  Extra-pulmonary TB ☐

2. **Knowledge of TB**

2.1. **What did you think are causes of TB**?

Possible causes	No	yes	I do not know
Chewing kat			
Heredity			
Bacilli/germ			
hard work			
malnutrition			
other causes			

2.2. **How do you think TB can be treated?**
Burning on the aching part of the body   ☐
Avoiding sex   ☐
Modern medicine   ☐
Taking rest   ☐
Other, explain   ☐

2.3. Did you know that the TB treatment was available free of charge?
Yes   ☐
No   ☐
Don't know   ☐

2.4. If TB patient is treated, can it be cured?
Yes   ☐
No   ☐
Do not know   ☐

2.5. How long is TB treated?

1 year	□
8. Months	□
2. Months	□
I do not know □	

2.6. If symptoms fully disappear before you finish treatment course what would you do?

I stop treatment and go back to my daily work	□
I stop treatment and begin taking nutritious food	□
I continue treatment until I finish treatment course	□

2. 7.What do you do if you find some of your cattle/goats sick and coughing?

I slaughter and eat meat	□
I slaughter and sell meat	□
I slaughter and throw meat out	□
I sell the sick animal	□

Other, explain ……………………………………

2. 8. Do you or any other person in your family sometimes or always share same accommodation with livestock?

Yes □
No □

2.9. Do you know that TB can be acquired from livestock?

Yes	□
No	□

2.10. Do you boil milk before you drink?

Yes □
No □

2.11. Do you think TB can be transmitted through drinking un-boiled milk?

Yes	□
No	□
Don't know	□

3. **Health seeking**.

3. 1. **What makes you seek care for your current illness**?

Symptoms	Yes	No	Date of onset. Weeks/days
Persistent cough			
Haemoptysis			
Fever			
Chest pain			
Weight loss			
Swollen lymph anodes			
Back pain			
Others			

3.2. **Could you take decisions on seeking treatment on your own?**
Yes □
No □

3.3. **Did you suspect that you may have TB?**
Yes □
No □

3.4. **Did you first try to treat the illness (symptoms) by your own**?
Yes □
No □

3. 5. **Which of the following providers did you consult first about your illness?**

	yes	No	
traditional healers			
religious (sheikh, ma,alim)			
drug vendor			
Provisional health provider			
Others			

3.6. **How did you come to this TBMU?**
Referred by public facility   □
Referred by private facility   □
Self referred   □

4. Delays

4.1. **Which of the following health care facilities did you visit first for this illness**?

HF	Yes	No	Location of the facility	Patients' residence at the onset of symptoms	KM\walking hours/days
Private health center					
Public health center					

 A. **If visited to private health facility first.**

4.2. When was your first visit to this private doctor? Days\weeks…………………

4.3. Was it this private facility which made you clear that you had TB?
Yes   □   No   □

4.4. If yes ,(in 4.2), date you're confirmed that you are TB case…………..

4.5. If no, (in 4.2) what did the doctor/ the health worker in the private clinic do?
 He/she referred me to public facility …………………………………….□
 I was referred to public health facility by self………………………….□
 I was given a prescription and sent to a pharmacy to buy anti drugs……□
 Other, please describe.. ……………

4. 6. How long did it take from the time   you were referred by the private facility till you first reported to the public health facility.......... days/weeks?

4. 7. How long did it take from the time you first reported to the private facility till you first diagnosed as TB case.............days/weeks?

B. If first visited to public health facility.

4. 8. Date of first visit to the doctor at public health facility (PHF)
…………………………… ....

4.9. How long did it take since you came to the PHF till you were first seen by the doctor/HW? ……......................days/Weeks

4.10. Date the patient was first seen by the doctor /HW checked……………........

4.11. How long did it take from the time   you were first seen by the doctor/ health worker till you first received the sputum request for AFB?………days/ Weeks

4.12. How long did it take from the time you first reported to the public facility till you first diagnosed as TB case.............days/weeks?

 4.13. Date first Sputum for AFB /x-ray was requested   Checked……………….

4.14. Date the patient gave the sputum for AFB ………..

4.15. Date Sputum Result was registered in the laboratory registration book checked………

4.16. **Grading of sputum** (out patient card)
      Scanty   +1 □
      Moderate   +2 □
      Severe   +3 □

4.17. How long did it take from the time you gave sputum for examination till you received the results?................................

4.18. Date the patient first received results checked……....................

Appendix 2

Witnessed consent

Information about the research project

As you are TB patient at this health facility I here by asking for your participation in this research project which is related to your disease. This research determines the socio-cultural attributes in the management and control of TB among Somali pastoral community of Ethiopia. The project is a part of a broad project that focuses on understanding of epidemiology of TB among pastoral communities of Ethiopia with the aim of finding out proper control measures of TB appropriate for pastoralist communities of Ethiopia. The project is carried out by Abdi Ali Gele, master of philosophy student at the faculty of medicine, University of Oslo.

Participation of this research project is exclusively voluntary. Every subject is free to withdraw from the project without justifying his withdrawal. I guarantee you that your withdrawal will have no consequence or anything to do with your treatment neither now nor in the future. All the information that you may provide will be dealt strictly confidential and your name will never be documented and therefore not be connected to the information you provide.

The project is funded by Norwegian Co-operation program for Development, Research and Higher education (NUFU).

Regards

Abdi Ali

Appendix 3

Declaration of witnessed consent for the study

I have received information on the study entitled "Socio-cultural attributes in the management and control of tuberculosis among Somali pastoralist communities in Ethiopia". I fully understood about the purpose of this study and I know the information I provide will be used in the study I participate in.

I am aware that all information concerning myself will be treated strictly confidential. I know I can withdraw from the study at any time without harm or consequence.

Name……………………………………………………………………………….

Date……………………………………………………………………………..

Place…………………………………...Signature……………………………………

This form was translated to a language that participants were fluent.