

# Human Presumptive Tuberculosis Cases: Syndromes and Animal Ownership in the Rural Communities of North-Western and North-Eastern Parts of Amhara Regional State, Ethiopia

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## Abstract

**Objective:** Human tuberculosis is a global public health problem where considerable numbers are infected by *Mycobacterium tuberculosis* and are at a risk of developing active tuberculosis. Tuberculosis is a problem for the livestock's as well. Tuberculosis in humans should be considered early in the evaluation of patients with chronic cough and risk factors like HIV/AIDS are diagnosed. The aim of this study was to know the status of the clinical signs that could be noticed by presumptive TB cases and look livestock ownership with the existence of chronic cough in their animals.

**Methodology:** The study was cross-sectional and conducted in purposefully selected ten districts encompassing 26 peasant associations. The study populations were individuals or households who suffered from a chronic cough for more than two weeks. Pretested questionnaire was used to collect the required information and the data were collected by health extension workers. The data were checked and entered into excel spreadsheet and exported to SPSS version 20.0 software. The data were cleaned and checked before analysis. Descriptive statistics used to analyze the data and graphs as well as tables used to present the findings. The ethical clearance was obtained from the University of Gondar Ethical Review Board and permission obtained from respective health departments.

**Results:** In this study 681 individuals were found to have chronic cough/presumptive tuberculosis cases. More than half (nearly 53%) of them lives in the high altitudes and 49% reported a cough duration of >2 weeks to 4 weeks, while 18.7% coughed for more than one year. Among the cases 63.7%, 73.6% and 19.2%, showed productive cough, tried getting treatments and used home remedies, respectively. Three fourth of the participants reported the presence of fever, night sweat and fatigue while a quarter of them claimed blood in the sputum. Eighty three point seven percent of them own livestock and 38.4% of their animals were suffering from chronic cough. Of the coughing animals 21.4% received modern treatment, of which only 7.4% responded to the treatment. Likewise, 63.5% of livestock owners shared house with their animals.

**Conclusion and Recommendations:** Presumptive tuberculosis cases could be characterized by having an indicator clinical signs for tuberculosis. In this study three fourth of the participants reported the presence of fever, fatigue and night sweating while a quarter of them claimed the presence of hemoptysis. Of the owned animals 38.4% showed chronic cough and among the treated animals for the cough only 7.4% responded to the treatment. The practice of house sharing with animals was 63.5%. The presence of chronic cough in animals and less treatment response with a significant proportion of house sharing practice might play a role in the tuberculosis disease epidemiological dynamics. Therefore, identification of causes of chronic cough, early diagnosis of presumptive tuberculosis cases, providing better attention to animal health and avoiding of common house utilization with animals is suggested.

**Keywords:** Presumptive tuberculosis cases; Animals; Chronic cough; Signs

## Introduction

Human tuberculosis is a global public health problem where 9.6 million people developed the disease by the year 2014 and of these 1.2 million was HIV positive [1], where the African Region accounted for 74% of these cases. Besides, considerable numbers are infected by *Mycobacterium tuberculosis* and are at a risk of developing active tuberculosis since 5%-10% of carriers will become sick in their lifetime [2]. Nearly 81% of the population of Ethiopia live in the rural community [3] and depend on agriculture and the majority of their activities supported by livestock, particularly by cattle and equines. A study carried out in the central highlands of Ethiopia, indicated that, livestock ownership per household was 7.44 and 4.71 Tropical Livestock Unit (TLU) to the high and the lower altitude zones, respectively [4].

Livestock's, particularly cattle could be infected by *M. tuberculosis* complex species. Particularly cattle are affected by *Mycobacterium*

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*bovis*. The disease in cattle is chronic in nature, which is characterized by weakness, loss of condition and appetite, swelling of various lymph nodes and persistent cough or short hacking cough and respiratory distress. Apart from difficulty to diagnose, treatment of the disease is hardly as well. From its public health importance point of view being it is a known zoonotic disease, data are lacking in countries like Ethiopia. Those cattle with the possibility of harbouring the disease causing agent could serve as a source of infection to humans, particularly in areas where house sharing is practiced [5]. Tuberculosis in general is a contagious disease that can lead to considerable morbidity as well as mortality for the individual patients and the society as a whole. Tuberculosis is still killing nearly 5000 people every day [6] and it is still responsible for considerable human morbidity and mortality as well as economic losses by affecting young at their productive ages, particularly in developing countries. If tuberculosis left unchecked within 20 years, it will kill 35 million people [7]. The problem could be worsened by the emergence of multi-drug resistant (MDR) and extensively or extremely drug resistant strains. Multi-drug resistant tuberculosis exists virtually in 109 countries in the world [7]. Tuberculosis should be considered early in the evaluation of patients with chronic cough. In areas where TB prevalence is high or in populations, which are at high risk of TB (e.g. HIV-seropositive persons), the tuberculosis diagnosis should be considered in all patients with chronic cough, sputum production, hemoptysis, fever, or weight loss. Some high-risk persons may have TB even with normal physical examination and chest radiograph findings, especially when they are immunocompromised [8]. Despite efforts made globally or nationally to curb the effects of tuberculosis different studies have shown that the trend of pulmonary tuberculosis remained as a public health problem in the world [9-13]. Therefore, the aim of this study was to know the status of the clinical signs that could be noticed by presumptive TB cases and look ownership of livestock that have chronic cough.

## Materials and Methods

### Study areas

The study was conducted in 10 selected districts of North Gondar and North Wollo zones in the Amhara Regional State. Based on the 2007 Census conducted by the Central Statistical Agency of Ethiopia [14], North Gondar zone has a total population of 2,929,628, of which 1,486,040 were men and 1,443,588 women with a population density of 63.76 and more than 74% lives in rural areas. A total of 654,803 households was counted in this Zone, which results in an average of 4.47 persons to a household. While North wollo Zone has a total population of 1,500,303, of which 752,895 are men and 747,408 women with a population density of 123.25. More than 87% of them live in the rural settings and a total of 355,974 households were counted in this Zone, which results in an average of 4.21 persons to a household [14]. Six and 4 districts were selected from North Gondar and North Wollo zones, respectively. In this study, based on tuberculosis report and randomly two to three Kebeles were included from each district.

### Study design and selection

The study was a cross-sectional one conducted from March 15, 2016 to March 30, 2016. The study zones and districts were selected purposefully and kebeles were selected based on relatively high tuberculosis cases or suspected case reports. If the number of kebeles with tuberculosis report are more than three per district simple random sampling technique (lottery system) was applied to select the Kebeles. Study individuals were selected following information with history of chronic cough that lasts more than two weeks. Those who identified

as presumptive tuberculosis cases were registered by health extension workers and the information collected. The health extension workers directed these individuals to health institutes for detailed examinations, diagnosis and actions.

### Source and study populations with exclusion criteria

Usual residents of the two study zones are considered as the source population, while households in selected districts are considered as the study population. For this study those under TB or other treatment against cough were not included.

### Data collection

Pretested questionnaire was administered for the collection the required information. All households were taken as a cluster and in each kebele, the required data were collected by using a house-to-house move and dissemination of the information through the developmental or health army teams. Those who had cough more than 2 weeks were interviewed on the spot and those heard the message were appearing in the health post and gave information. The questionnaires were filled by data collectors.

### Data management and analysis

The collected questionnaire was checked for completeness. The variables were coded as 0 (No) and 1 (Yes) and the data were entered into excel spreadsheet by the data clerk. The data were edited and cleared before analysis and exported to SPSS (20.0). Descriptive statistics was used to analyze the data and table and graphs used to present the findings.

### Ethical consideration

The research was approved by the University of Gondar Ethical Review Board and then Amhara National Health Research Center. Before data collection official permission was also obtained from each zonal health departments and district health offices. Oral consent was obtained from all participants where they were explained about the study and told to withdraw from the research, if they are not willing. Those who identified as presumptive tuberculosis cases were registered by health extension workers and subjected to acid fast bacilli stain for further diagnosis and actions and this mandate was given to health extension workers to follow all the forthcoming procedures.

## Results

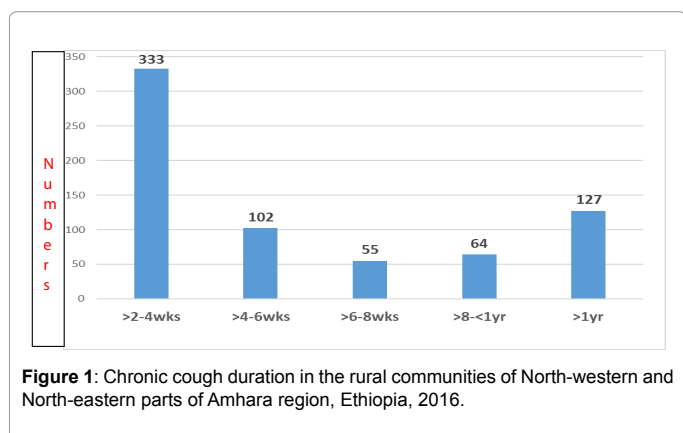
Among the participants, 53.2%, nearly 53% as well as 64% were males, lowland dwellers and suffered from moist cough. Seventy four percent of them received treatment for their cough. Either as a means of prevention or treatment, 19.2% of them knew home remedies for the cough. About 84% of the participants own at least one type of domestic animal species (Table 1). Of the 570 HHs who own cattle 219 (38.4%) were having animals which cough and 362 (63.5%) were used common house sharing with their animals. Only 122 (21.4%) of owners seek modern treatment for their cattle, which suffered from cough and among the treated only 42 (7.4%) responded to the treatment.

Majority of the individuals; 49% coughed for duration of more than 2 weeks to 4 weeks. Considerable proportion (18.7%) of the participants reported a cough duration of greater than one year (Figure 1).

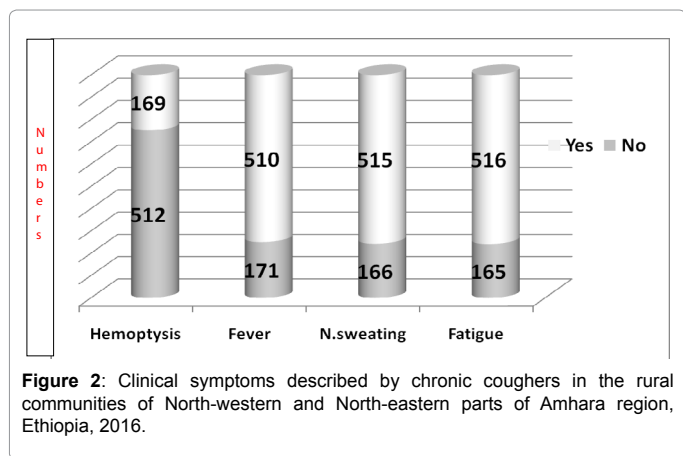
Among all, 75.6% of the chronic coughers reported the presence of night sweating, fever and fatigue while a 25% of them showed haemoptysis (Figure 2).

Descriptions	Frequency	Percent
<b>Sex of Households</b>		
Male	362	53.2
Female	319	46.8
<b>Ecozone</b>		
Highland	360	52.9
Midland	176	25.8
lowland	145	21.3
<b>Cough type</b>		
Dry/hack	247	36.3
Productive/wet	434	63.7
<b>Treatment trail</b>		
No	180	26.4
Yes	501	73.6
<b>Home remedy either to cure or prevent chronic cough</b>		
No	550	80.8
Yes	131	19.2
<b>Animal ownership</b>		
No	111	16.3
Yes	570	83.7

**Table 1:** Characteristics of chronic coughers and animal ownership in the rural communities of North-western and North-eastern parts of Amharic region, Ethiopia, 2016.



**Figure 1:** Chronic cough duration in the rural communities of North-western and North-eastern parts of Amhara region, Ethiopia, 2016.



**Figure 2:** Clinical symptoms described by chronic coughers in the rural communities of North-western and North-eastern parts of Amhara region, Ethiopia, 2016.

## Discussions

The cough is a common problem in most of the world's population, particularly in the developing countries. A study done in Dar Es Salaam indicated that 3.5% of the patients who attend the outpatient department

reported to have a cough. Among these the majority (89.1%) coughed for  $\geq 2$  weeks. In the current study, 49% reported a cough duration of  $>2$  weeks to 4 weeks. In fact, the percentage of individuals who coughed from  $>2$  weeks  $\geq 1$  year is 81.3%. The difference in these findings could be related to the difference in the study setting, where it is a hospital and community based in Dar Es Salaam and the current study, respectively. People with pulmonary TB cough a lot [15] and therefore, individuals who coughed for duration of  $\geq 2$  weeks are tuberculosis suspects and are advised to be examined for tuberculosis using Acid Fast Bacilli (AFB). The study in Dar Es Salaam also showed that 10.9% and 12.7% who coughed for  $<2$  weeks and for two weeks or more, respectively were AFB positives. In this regard, since the immune systems weakened those AIDS patients are much more likely to develop tuberculosis compared to others [16]. In this study, 63.7% of the presumptive tuberculosis cases suffered from productive cough. The figure could increase, if there was a follow-up since tuberculosis could start as a dry irritating cough, which in time produces a lot of phlegm (sputum), which may be blood-stained [17]. Although tuberculosis is a global problem, in the current study, nearly 53% of presumptive tuberculosis cases were recorded in the high altitude areas. This variability could be explained by environmental and social factors such as temperature, humidity, sunlight, as well as crowding and person-to-person contacts that might contribute as a source of TB seasonality, particularly, in winter time in some areas of the globe [18,19]. As it is reported in many areas, [15,20] presumptive tuberculosis cases in this study revealed that three-fourth of them had night sweat, fatigue and fever, while a quarter of them claimed the presence of Haemoptysis (coughing up blood).

Despite the chronic cough problem in different parts of the world, the health seeking behaviour of the individuals could be a challenge to solicit a solution. In this study, 73.6% of the participants visit health facilities and received the required treatment. A survey conducted in Japan indicates that only 40% were visited health posts for their cough [21], whereas in Ethiopia 80% was reported [22]. The current finding is higher than the study done in Japan, while it is lower compared to Ethiopia. Although the current finding lies within the range of the two reports, the observed difference in the percentage among these situations could be attributed to differences in the culture (Japan) as well as the time factor and the current health extension program that is undergoing in the country (Ethiopia). The current study revealed that 19.2% of the participants used home preparations either for the prevention or treatment of chronic cough and this is in agreement with the practices used in different African countries where approximately 60%-80% of its population rely on traditional remedies [23,24].

The majority (80.97%) of the Ethiopian population lives in the rural community, where their life is led by agriculture supported by livestock's [3]. In the current study, 83.7% of presumptive tuberculosis cases own different domestic animals. A nationwide study carried out in 2011/12 indicated that 53.21%, 22.82%, and 9.7% of the farming community owned 1-4 heads of cattle, shoats and draught animals, respectively. In the present finding 38.4% of the animals (either of the species) where suffered from chronic cough and only 21.4% of the owners seek modern treatments and 7.4% were responded to the treatment. Among the diseases bovine tuberculosis (TB), caused by *M. bovis*, which is closely related to *M. tuberculosis* and also infect humans), is a chronic disease of animals characterized by a state of general illness, coughing and eventual death. The disease is treated hardly in both populations and in some countries up to 10% of human tuberculosis is due to bovine TB [25]. Besides, *M. tuberculosis* is also isolated in cattle with a prevalence of 4.7% to 30.8% in African and Asian countries [26-28]. Based on these established facts animals might suffer from this disease

and their chronic cough with poor treatment response failure might be related to this phenomenon and therefore even contribute the disease epidemiological dynamics. In the current research, of the participants, 63.5% practiced house sharing with their animals. A study conducted in selected areas of the two zones in the Amhara region, showed a lower value, 31.43%, of common house sharing in households who were diagnosed positive for human tuberculosis [5]. The difference between the two studies could be described to difference in time of data collection, situations as well as the presence or absence of possible predators. The sampling techniques employed, absence of chronic cough causative agent isolation and lack of inclusion of risk factor assessment were some of the limitations of the current study.

## Conclusion and Recommendations

Presumptive tuberculosis cases could be characterized by having an indicator clinical signs for tuberculosis. Nearly 53% of the tuberculosis suspected cases were registered in the high altitude areas. In this study three fourth of the participants reported the presence of fever, fatigue and night sweating while a quarter of them claimed the presence of hemoptysis. The proportion of individuals with productive cough was nearly 64%. Of the owned animals 38.4% showed chronic cough and among the treated animals for the chronic cough only 7.4% responded to the conventional treatment. The practice of house sharing with animals was 63.5%. The presence of chronic cough in animals and less treatment response with a significant proportion of house sharing practice might play a role in the tuberculosis disease epidemiological dynamics. Therefore, causes of chronic cough identification, early diagnosis of presumptive tuberculosis cases, looking the problem based on altitude, giving attention to the animals as well as separate house utilization for the animals is suggested.

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