Delay in the Diagnosis of Tuberculosis in Banke District, Nepal

Rajendra Basnet

Centre for International Health
Faculty of Medicine and Dentistry
University of Bergen, Norway
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Abstract

Background: Tuberculosis is one of the major causes of ill health in the world and almost 33% of the global new case was found in South East Asian Region. In 2006, tuberculosis incidence was reported 30,000 and 14,000 of them were sputum smear positive pulmonary tuberculosis in Nepal and still 5,000 to 7,000 people die due to tuberculosis. Delay in diagnosis and starting tuberculosis treatment increases severity, risk of mortality and transmission of the disease in the community.

Objectives: This study aims to assess the delay in the diagnosis of tuberculosis and to investigate its determinants.

Setting: The study was conducted in 48 out of 55 DOTS centres/sub-centres in Banke district of Nepal.

Method: A cross-sectional survey was conducted using a structured questionnaire to 307 newly registered tuberculosis patients, who were on anti-tuberculosis treatment under National Tuberculosis Programme during June to July, 2007.

Results: Median patient delay was 50 days, median health system delay was 18 days, median DOTS delay 3 days and median total delay was 60 days and 69% of the participants had 30 days delay or more in the diagnosis of tuberculosis. Total delay was mainly contributed by patient delay (73%). Patient's occupation was associated with delay in the diagnosis of tuberculosis. Occupation directly involved in income generation had shorter patient delay compared to farmers.

Conclusion: Total delay in the diagnosis of tuberculosis in Banke district was shorter (median delay was 60 days) compared to other places in Nepal. Raising public awareness of the disease in the community, collaboration with private health care providers and expansion of the facilities with assured quality especially diagnostic facilities could be helpful to reduce delay in the diagnosis of tuberculosis.

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Abbreviations

AFB	Acid Fast Bacilli
AIDS	Acquired Immune Deficiency Syndrome
ARI	Annual Risk of Infection
CI	Confidence Interval
DOTS	Direct Observed Treatment Short Course
DHO	District Health Office
DPHO	District Public Health Office
DTLA	District Tuberculosis/Leprosy Assistant
EP	Extra Pulmonary
HIV	Human Immune Deficiency Virus
HP	Health Post
INF	International Nepal Fellowship
IUATLD	International Union Against Tuberculosis and Lungs Diseases
n	Number of observations in the sample size
NATA	Nepal Anti-Tuberculosis Association
NGO	Non-governmental Organisation
NRs	Nepali Rupee (Nepali currency)
NHRC	Nepal Health Research Council
NTC	National Tuberculosis Centre
NTP	National Tuberculosis Programme
OR	Odds Ratio
RTLA	Regional Tuberculosis/Leprosy Assistant
SHP	Sub-Health Post
SPSS	Statistical Package for Social Science
TB	Tuberculosis
UNAIDS	The Joint United Nations Programme on HIV/AIDS
UNDP	United Nations Development Programmes
VDC	Village Development Committee
WHO	World Health Organisation

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Chapter 1: Introduction

1.1 Background

Tuberculosis is an infectious disease caused by Mycobacterium tuberculosis. The micro-organisms usually enter the body by inhalation into the lungs where they spread to other parts of the body by direct extension, the lymphatic system or the blood stream to the other organs.[1] The bacteria come into the air when a person with active tuberculosis of the lungs coughs. People nearby may breathe in these bacteria and become infected.[2]

Tuberculosis is a worldwide public health problem although the bacterium was discovered more than 100 years ago, highly effective drugs and vaccines are available and being a curable and preventable disease. HIV, the most recent pandemic to affect the human species, and tuberculosis has combined their pathogenic effects to become the primary cause of death in many parts of the world.[3] Nearly one-third of the global population is infected with mycobacterium tuberculosis and at risk of developing the disease at any time in their lives. More than eight million people develop active tuberculosis every year and about two million die.

Someone in the world is newly infected with tuberculosis bacilli every second. Almost 5-10% of people who are infected with tuberculosis bacilli become sick or infectious at some time during their life. People with HIV and tuberculosis infection are much more likely to develop tuberculosis.[4] Tuberculosis causes 2.9% of total deaths and 3% loss of healthy life years in the world.[5] More than 90% of the global tuberculosis cases and deaths occur in the developing world, of which 75% of cases are in the most economically productive age group (15-44 years). In 2006, 1.6 million people died from tuberculosis, which represents 4,400 deaths in a day.[6]

The largest number of new tuberculosis cases in the world occurs in South East Asian Region. One third of the global burden of tuberculosis is from this region where approximately 40% of total population has been infected with tuberculosis.[7] India, Myanmar, Nepal and Thailand have the highest rates of co-infection of tuberculosis and HIV in South

East Asia. The prevalence rate of tuberculosis and HIV co-infection is 3.1% among persons aged 15-49 in Nepal.[8]

Nepal is a landlocked country. The country is bordering between the two most populous countries in the world; India in the East, South, and West, and China in the North. Its total area is 147,181 square kilometer. Administratively, the country is divided into 5 development regions, 14 zones and 75 districts. Topographically, it is divided into three regions; Terai (the low land) covers 17%, the hilly region covers 58% and mountains covers 15% of the total land. The estimated population of Nepal for the year 2006 was 25.8 million.[9] The adult literacy rate was 48% in 2004 with male literacy rate 64.5% and female literacy rate 33.8%.[10]

Nepal is one of the least developed countries in the world with the Human Development Index Rank of 142 out of 177 countries. Almost 38% of the total population is under the poverty line, with 86% living in the rural area. Life expectancy at birth is 63 years, infant mortality rate 56 (per 1,000 live births) and under five mortality rate is 74 (per 1,000 live births).[11]

Tuberculosis is a major public health problem in Nepal. About 45% of the total population is infected with tuberculosis bacilli. In 2006, tuberculosis incidence was reported 30,000 and 14,000 of them were sputum smear positive pulmonary tuberculosis. National Tuberculosis Programme (NTP) introduced Direct Observed Treatment Short course (DOTS) strategy in 1996 and the number of deaths are reduced since then, but still 5,000 to 7,000 people die due to tuberculosis in Nepal every year.[12]

National Tuberculosis Programme is the government body which is overall responsible for tuberculosis control activities all over the county. The goal of NTP is to reduce the mortality, morbidity and transmission of tuberculosis until it is no longer a public health problem. One of the long term objectives of NTP is to increase the case detection rate to 80% nationally and to at least 70% in all districts by 2012.[13]

1.2 Operational definitions

The following operational definitions are taken from "Treatment of Tuberculosis: Guidelines for National Programmes".[14]

Case of tuberculosis: A patient in whom tuberculosis has been confirmed by bacteriology or diagnosed by a clinician.

Pulmonary case: A patient with tuberculosis disease involving the lung parenchyma.

Sputum smear positive pulmonary case: A patient with at least two initial sputum smear positive or one sputum smear positive and radiographic abnormalities consistent with active pulmonary tuberculosis as determined by a clinician or one sputum specimen positive and culture positive for M. tuberculosis.

Sputum smear negative pulmonary tuberculosis case: A patient with pulmonary tuberculosis not meeting the above criteria for smear-positive disease.

Extra pulmonary case: A patient with tuberculosis of organs other than the lungs.

New case: A patient who has never had treatment for tuberculosis or who has taken anti-tuberculosis drugs for less than one month.

Retreatment case: A patient previously treated for tuberculosis who has been cured or treatment completed and diagnosed tuberculosis for a new episode.

In our study, we used the word "delay" to denote the time interval and is not meant to blame anybody for missing the diagnosis. It does not necessarily indicate the wide range of duration. We did no analyse the interval between the diagnosis and treatment initiation in this study.

Patient delay: The time interval from the appearance of the first symptoms of tuberculosis until the first visit to any health care facilities.

Health system delay: The time interval from the first consultation at any health facilities until the date of diagnosis.

DOTS delay: The time interval from the first visit to any DOTS centre until the date of diagnosis. It is a part of health system delay.

Total delay: The sum of patient delay and health system delay.

1.3 Literature review

Patient delay

The length of patient delay varies according to the studies and countries. A number of studies from China, Malaysia, Ethiopia, East London, Gambia, New York, Tanzania and Argentina measured the median of patient delay 30 days or above.[15-24] However other studies from Ethiopia, Argentina, Cameroon, Southern Taiwan and South India observed median patient delay less than 30 days.[25-29]

The potential risk factors for patient delay were not same in each study. Some of the studies observed type of tuberculosis is associated with patient delay. Pulmonary sputum smear positive tuberculosis patients had shorter duration of patients delay in Ethiopia, Argentina, Southern Taiwan and Khartoum state of Sudan.[17, 26, 28, 30] Pulmonary patient had shorter delay compared to extra pulmonary patients in East London.[18]

Studies from Tanzania, Argentina and Rural Nepal observed that sex has no impact on patient delay .[22, 24, 31] A study from Malaysia found male patients had shorter range of patient delay compared to female[16] but a study from South India reported that male is a risk factor for longer patient delay.[27] In some studies, patient delay was influenced by age[20-22, 24] but two separate studies conducted in Nepal and Brazil concluded there was no association of age with patient delay.[31, 32]

A number of studies found distance to health centre from patient residence was one of the main risk factors for patient delay.[15, 17, 22, 24, 27] Patient delay was greatly influenced by initial visit to traditional healers in China, Southern Thailand, Ethiopia, Rural Cameroon, Tanzania and Urban Zambia.[15, 20, 22, 23, 25, 33, 34]

Time and cost of travel to health care providers were other influencing factors for patient delay in Rural Cameroon and Ethiopia.[25, 33] Studies from Gambia, Tanzania, South India and Yemen found awareness and education play significant roles to determine the duration of patient delay.[19, 22, 27, 35] But other studies from Argentina and Brazil observed no effect of education level and awareness on patient delay.[24, 32] A study from South India had found alcohol consumption is a risk factor for patient delay.[27] Another study from Brazil stated that

there was no significant association between alcohol consumption and patient delay. Patients' income was also found an influencing factor for patient delay in China and Canada.[15, 36] Tuberculosis patients presenting to health care facilities with haemoptysis had shorter patient delay in China and Tiawan.[15, 26]

Health system delay

Many studies conducted in different countries found median health system delay between 10 to 30 days.[15, 16, 20, 22-24, 27, 28] A study conducted in Ethiopia reported less then 1 week health system delay.[17] However, two separate studies from East London and Kathmandu, Nepal found longer health system delay than 30 days.[18, 29]

Two different studies conducted in Ethiopia and New York reported that smear positive patients had shorter health system delay than smear negative and extra pulmonary.[17, 21] Health system delay was longer in males than females in New York, Kathmandu valley, rural Nepal and Vietnam.[21, 29, 31, 37]

Distance to health care provider from patient residence was associated with health system delay, and longer distance is likely to have an impact to longer health system delay.[17, 22, 27, 31] Many studies observed initially visit to traditional healers or folk treatment or private practitioners or low level of health facilities are risk factors for longer health system delay.[20,22, 23, 31, 38] A study from Tanzania found longer health system delay in the rural facilities than urban.[22] A study from Malaysia had found patients' income (poverty) could be a risk factor for health system delay.[16] Another study from South India found alcohol consumption could be a risk factor for longer health system dealy.[27] A study from Rural China found patients education and awareness had an impact on health system delay.[15]

1.4 Rationale of the study

Tuberculosis is still a major public health problem in Nepal. Early detection of infectious tuberculosis cases, followed by effective treatment is very important for effective control of tuberculosis. Delay in the start of treatment of tuberculosis cases spreads the infection in the community, increases severity of the disease and is associated with higher risk of mortality.

Thus, with the aim to assess the duration of delay in the diagnosis of tuberculosis and to investigate its determinants, this study was conducted in Banke district of Nepal. The findings of our study would be useful for further planning and policies in tuberculosis control in Nepal.

1.5. Aims

To assist National Tuberculosis Programme to control tuberculosis in Nepal.

1.6 Objectives

The general objective of this study was to assess the duration of delay in the diagnosis of tuberculosis patients reported to NTP and to investigate its determinants in Banke district of Nepal.

Our specific objectives were as follow:

1. To determine the duration of patient delay, health system delay, DOTS delay and total delay.
2. To assess the duration of delay according to type of tuberculosis, age, sex, marital status, education level, occupation, smoking habit, alcohol consumption, income and distance to treatment centre.
3. To assess risk of delay according to type of tuberculosis, age, sex, marital status, education level, occupation, smoking habit, alcoholism, income and distance to treatment centre.

Chapter 2: Methodology

2.1 Research design

This is a cross-sectional survey to assess retrospectively the duration of delay in the diagnosis of tuberculosis and to investigate its determinants.

2.2 Study site

The study was conducted in Banke district of Nepal. This is a Terai (low land) district in the Mid Western Region. Total area of this district is 2,337 square kilometer. The population of Banke district in 2007 was estimated 447,000.[39] The district is divided into 46 Village Development Committees (VDCs) and 1 municipality.[40] Banke district has open border with India. Banke is one of the relatively well developed districts of the country. Nepalgunj is district headquarter of Banke. Nepalgunj is the main centre for trade and industry of the Mid Western Region. The reported incidence rate of new pulmonary positive tuberculosis patients in Banke in 2007 was 92 per 100,000 population.[39]

The district has got 1 zonal hospital, 1 public health office, 3 primary health centres, 9 health posts, 35 sub-health posts in public sector. In the private sector, there are 2 medical colleges and 2 NGOs (INF and NATA) are actively working on tuberculosis control. There are 10 DOTS centres and 45 DOTS sub-centres in Banke reporting to NTP.[39] In our study we included 48 out of 55 DOTS centres/sub-centres in Banke district and 7 were excluded because of no tuberculosis patients on treatment in 3 DOTS sub-centres during the data collection period and responsible staffs were on leave at 4 sub-centres during the training for data collectors.

2.3 Study population

We included all tuberculosis patients registered as “new” category who were on anti-tuberculosis treatment (DOTS) under National Tuberculosis Programme (NTP) during the period of data collection (June-July, 2007) in Banke district of Nepal.

Inclusion criteria

All tuberculosis patients on treatment during the period of data collection (sputum smear positive pulmonary tuberculosis, sputum smear negative pulmonary tuberculosis and extra pulmonary tuberculosis) registered as "new" is the inclusion criteria of this study.

Exclusion criteria

- Other categories of tuberculosis than newly registered.
- Not on treatment during the data collection period.
- Not willing to participate or unable to participate.

2.4 Sampling

In Banke district 1,159 new tuberculosis patients were registered for anti-tuberculosis treatment under NTP in 2005/06. Approximately 770 cases were expected to be on treatment at the time of data collection who were registered as new patients, as the duration of anti-tuberculosis treatment is 8 months and 2/3 of the total annual patients are expected to be on treatment at any given time.[41] It was shown in Kathmandu valley that 47% of patients were delayed by 30 days or more to seek health care.[29] This prevalence rate was used as reference to calculate sample size with 5% absolute precision and 95% confident interval. The minimum required number of sample size (n) was 257 (using Open-Epi version 2.2, CDC, USA).

All consecutive newly registered tuberculosis patients who were on DOTS treatment under National Tuberculosis Programme during the data collection period coming to treatment centres or their parents (in case of child patient) were selected for interview.

2.5 Data collection

A closed-ended questionnaire was administered to tuberculosis patients who were registered as new and on tuberculosis treatment (DOTS) under National Tuberculosis Programme during the data collection period or their parents (in case of child patient) to collect socio-demographic information (age, sex, marital status, education, occupation), type of

tuberculosis, smoking habits, alcohol consumption, distance to treatment centre, symptoms presented, health seeking behaviours and delay in the diagnosis of tuberculosis.

A staff member in each DOTS treatment centres/sub-centres was appointed as a data collector with the collaboration of District Public Health Office of Banke district. A training programme was organized for data collectors on how to interview patient, maintain confidentiality and on ethical issues. A completed questionnaire was administered for 335 tuberculosis patients consecutively in June-July, 2007. All completed questionnaires were reviewed. After the discussion with DTLA and data collectors, 28 interviewed were found poor quality and decided not to include these general tuberculosis patients in the study. Finally, 307 patients were included from 48 DOTS centres/sub-centres of Banke district.

2.6 Data processing and analyzing

All information obtained from interviews was checked for completeness, consistency and credibility. The completed questionnaires were reviewed by the researcher. Using Epi-Data 3.1, double data entry of the collected information was done. Two data sets obtained from data entry were validated by the researcher. Records with disagreement were reviewed and corrected. EpiData 3.1 was used for data entry, tables and frequency. SPSS 15.0 was used for the other statistical tests.

2.7 Ethics

Ethical permission was obtained from Ethical Board of Nepal Health Research Council (NHRC) and Research Ethic Committee of International Nepal Fellowship (INF). Permission was obtained to conduct research from National Tuberculosis Programme (NTP) and Regional Directorate of Health, Mid Western Region, Nepal.

The nature and objectives of the study, possible harm and benefits, rights of participants and duties of the researches were informed to each participant. It was ensured to participants to maintain their confidentiality. An invitation sheet including information of the study was provided to each participant. A written and signed informed consent was taken from participants who accepted. Each participant was respected and equally treated by the researcher and data collectors.

Chapter 3: Results

3.1 Characteristics of participants

Table 1 shows characteristics of participants of this study. A total of 307 tuberculosis patients were interviewed to determine the duration of delay in the diagnosis of tuberculosis and to find out the factors associated with it. Among them, 139 (45.3%) participants were sputum smear positive, 136 (44.3%) sputum smear negative and 32 (10.4%) were extra pulmonary tuberculosis. The mean age of participants in our study was 34.5 years (median: 30 years) and 31 (10.4%) participants were 0-14 years old, 217 (70.7%) were 15-54 years old and 58 (18.9%) 55 years and above. Almost 59% of participants were male and 126 (41%) were female. The majority of the participants were married (73.9%). Most of the participants (62.2%) were illiterate. The main occupations of the participants were reported farmer (48.2%) and house wife (19.9%). In our study, 46.9% participants had smoking habit and 28.7% reported alcohol consumption before tuberculosis diagnosis.

Figure 1 shows the number of participants interviewed by different age groups and sex. Most of the participants were from 15 to 44 years age in both male and female.

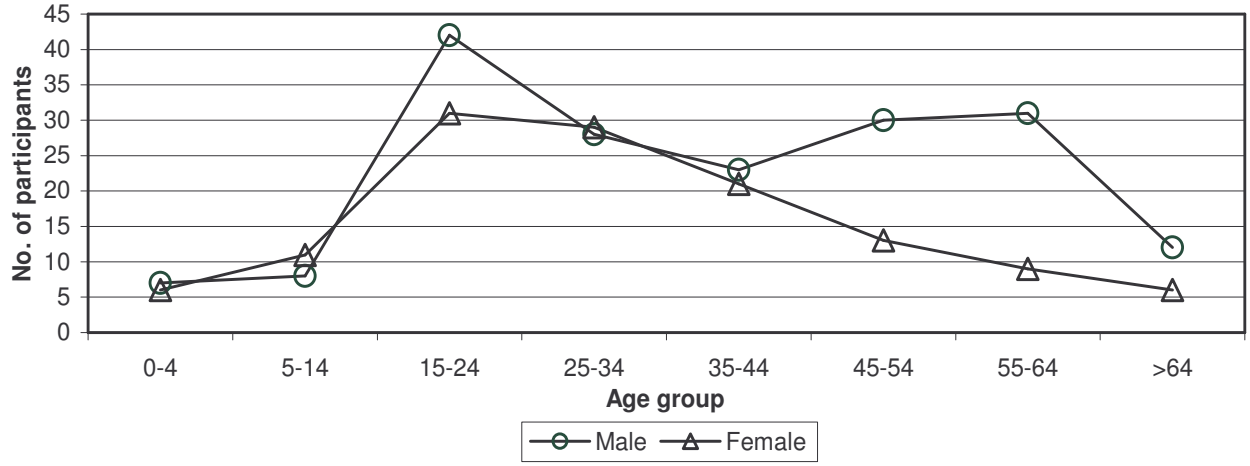

Figure 1: Participants by age group and sex.

Table 2 shows the education level of participants. The proportion of educated participants is higher in male compared to female. In our study 75.4% female and 53% male participants were illiterate.

3.2 Reported symptoms

Majority of the participants (83%) had cough as a symptom of tuberculosis, 74% had fever and 64% had weakness. Most of them reported multiple symptoms of tuberculosis in our study. Table 3 represents reported symptoms of tuberculosis by type of tuberculosis.

3.3 First contact after the appearance of tuberculosis symptoms

The location where patients first sought advice is shown in figure 2. Obviously, most patients first sought family members/relatives/friends for their advice on their symptoms (58.3%). Government health facilities were contacted by 22.8% participants to seek their first advice. Private practitioners/pharmacists/drug sellers were contacted by 10.4% participants and 4.2% contacted traditional healers.

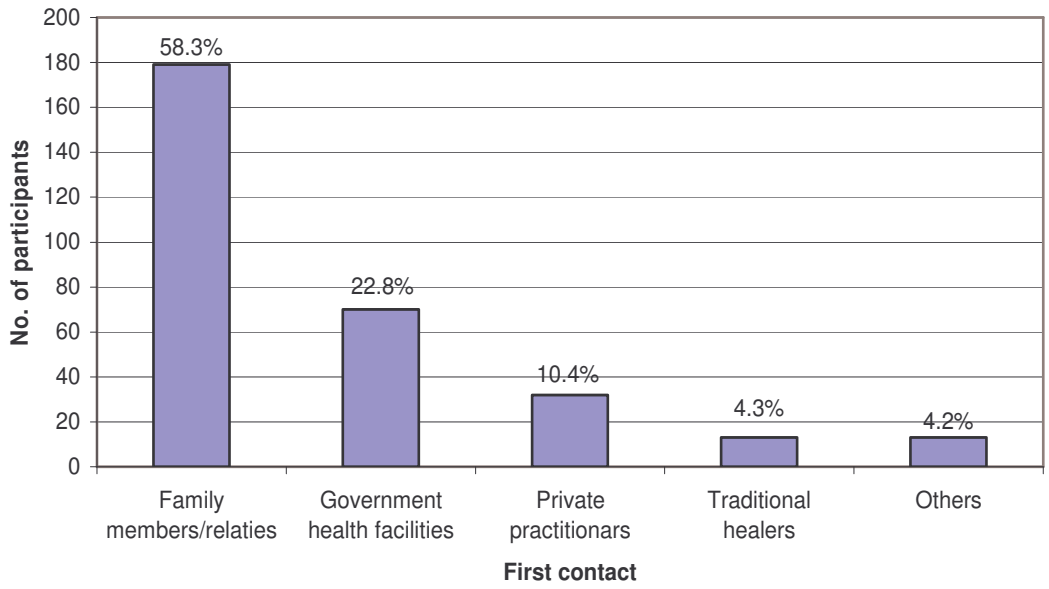

Figure 2: First contact after the appearance of tuberculosis symptoms.

3.4 Travel to DOTS treatment centre

Most of the participants (60.9%) reported that they travelled by foot to DOTS centres/sub-centres for tuberculosis diagnosis and treatment, 34.2% used bicycle and the rest of the participants (5%) travelled by bus or rickshaw. The majority of the participants (91.8%)

travelled less than 1 hour to go to DOTS treatment centre. The median time from patients' residences to DOTS centre was 30 minutes in our study. Among total participants, 32.2% were referred to DOTS centres by government health facilities. Almost 30% went to DOTS centres/sub-centres by their own decision and 10.7% were suggested to go to DOTS centre by private practitioners and drug sellers.

3.5 Visiting to health care providers before tuberculosis diagnosis

Table 4 shows health care providers visited by the participants before tuberculosis diagnosis. A significant number of participants (61.8%) visited private practitioners/pharmacists/drug sellers at least once for their tuberculosis symptoms before tuberculosis diagnosis. Traditional healers and ayurveda were visited by 16.3% participants.

3.6 Delay

Table 5 shows mean and median delay in the diagnosis of tuberculosis. The median total delay was 60 days. Similarly, the median patient delay, the median health system delay and the median DOTS delay were calculated 50 days, 18 days and 3 days respectively.

In our study, almost 90% participants had patients delay more than 15 days and 60.2% participants were reported patient delay more than 30 days. Similarly, 49.2% of participants had 15 days or more health system delay and 24.1% were reported more than 30 days health system delay. Almost 35% patient had more than 3 days median DOTS delay and 13.7% patients had more than 1 week DOTS delay, 69% patients had more than 1 month total delay and 29.4% had more than 3 months total delay.

In simple analysis, patients with "others" occupation had shorter (≤ days) patient delay than farmers (p= <0.01). Monthly family income less than NRs. 2,500 had longer (>15 days) patient delay (p= 0.02). Rest of the observed factors in this study did not have any impact on patient delay. Patients with smoking habit before tuberculosis diagnosis were likely to have longer health system delay than non-smoker patients (p= 0.03) (Table: 7).

3.7 Regression analysis

Tables 9-11 show regression analysis of delay. In unadjusted regression analysis the risk of patient delay was significantly lower in “others” category of occupation compared to farmers (OR 0.2, 95% CI 0.08-0.52). “Others” occupation includes service, business and labourers which are directly involved in income generation. The risk of patient delay was lower in patients who had family income higher than NRs 2,500 per month (OR 0.4, 95% CI 0.18-0.85). Health system delay was not associated with any epidemiological factor considered in this study. “Others” category of occupations hand shorter DOTS delay compared to farmers (OR 0.4, 95% CI 0.19-0.83) in this study (Table: 11).

Age, sex, education, family income and distance were adjusted in multivariate analysis in our study. In adjusted regression analysis “others” category of occupations had significantly shorter patient delay compared to farmers (OR 0.2, 95% CI 0.09-0.62). Family income was not more significant for patient delay after the adjustment. “Others” occupation had significantly shorter DOTS delay compared to farmers (OR 0.4, 95% CI 0.18-0.80).

Chapter 4: Discussion

Our cross-sectional survey of 48 DOTS centres/sub-centres out of 55 in Banke district found that median patient delay was 50 days, median health system delay was 18 days, median DOTS delay was 3 days and median total delay was 60 days and almost 69% of the participants had 30 days or longer delay in the diagnosis of tuberculosis. Patient delay represented 73% of the total delay.

4.1 Validity of the results

The subjects of this study were tuberculosis patients who were taking anti-tuberculosis treatment on DOTS under National Tuberculosis Programme during the period of data collection (June – July, 2007). Many patients may have been taking tuberculosis treatment from private sector and tuberculosis patients who were taking treatment from private sector were not a part of this study. Late comers and defaulters may have different habits which would be useful to study, but they were excluded from this study. From NTP data we see defaulters account for 3% in 2006,[12] and these were not represented in this study.

Patients were interviewed by trained DOTS centre/sub-centre staff in our study. Some participants may had "eager to please" interviewers but as no remuneration was given to any interviewees, it is probably small impact.

Season, festival and working time also may affect the attendance of patients at treatment centres and therefore the participations in this study. However during the study period no major festival was celebrated.

Tuberculosis patients attending to the DOTS treatment centres were interviewed for their socio-demographic information and time elapsed before diagnosis. The most recent patients may remember better, but there is no obvious bias because of this.

There are many private nursing homes and clinics in Banke district where many tuberculosis patients may have been on tuberculosis treatment at private sector. We think these patients have similar experience to our patients but we hesitate to generalize.

The study was conducted in a Terai (flat land) district of Nepal where there is easy access to the health facilities. Transportation facilities are easily available and affordable for most of the patients. The median time to reach DOTS centres from patient residence was 30 minutes. These facts may limit to generalize the results in hilly and mountainous parts of the country. Also, because of the relatively good access we see a relatively narrow range of delay which is also less dependent on the potential risk factors.

4.2 Discussion of main results

Reported symptoms

Cough was the most frequently reported symptom of tuberculosis in our study and only 17% of total participants had no cough. Other frequently experienced symptoms were fever and weakness. Many studies found cough in similar proportions as the most reported symptom for tuberculosis.[17, 27]

First advice after the appearance of tuberculosis symptoms

The first contact person may play an important role to advice patients about their still unrecognized disease and recommend visiting health care providers. They may play key role to determine the delay in the diagnosis. If the first contacted person is aware of tuberculosis symptoms and treatment he/she may suggest patients to go to DOTS centre, which may result shorter delay. The majority of the patients (57.4%) contacted their family members/relatives or friends to seek advice about what to do and where to go for diagnosis and treatment. Private practitioners or pharmacists were visited by 10.4% of the participants.

Mode of travel to DOTS centre

Banke is a well developed district of Nepal, so the infrastructure of health care system is fairly good and DOTS centres are easy accessible for most patients in this district. The median time from patient home to DOTS centre/sub-centre by foot was 30 minutes in our study. This time may be much longer at more rural and hilly area of the country. Most of the participants used to walk (61%) to go to DOTS centres/sub-centres in this study. As Banke is a Terai district and easy to ride bicycle, 34.2% were found using bicycles to go to DOTS centre.

Visiting to health care providers

In our study, almost 62% of the participants visited to private sector at least once between the appearance of tuberculosis symptoms and diagnosis. Traditional healers were visited by 14% and 2.3% visited ayurvada persons before tuberculosis diagnosis. A large number of patients visited traditional healers or private sector for tuberculosis diagnosis and treatment in Tanzania.[22] It was natural for them to seek advice from tradition healers because of lack of awareness about the disease and free tuberculosis treatment, time constraints, easy access and trust on traditional healers.

Delay

The median patient delay was 50 days in our study. A study conducted in Ethiopia showed longer patient delay than our study.[17] Shorter patient delay was observed in Kathmandu valley.[29] A longer patient delay in Banke district could be because of lack of patient awareness about tuberculosis and patients from this district may spend much time to visit hospital, nursing homes and clinics in India initially because of stigma or easy access.

Median health system delay was 18 days in this study. A study from Kathmandu valley reported longer health system delay (39 days) than our study.[29] It could be because few tuberculosis patients go to private practitioners/pharmacists in Banke compare to Kathmandu valley. Private doctors/pharmacists may refer tuberculosis patients to DOTS centres earlier in Banke district than in Kathmandu. However, another study from Ethiopia observed shorter health system delay.[17] The median total delay in our study was 60 days. Almost same length of total delay was reported in rural Nepal (2.3 months) and South India (60 days).[27, 31]

Influencing factors of delay in diagnosis

In our study the type of tuberculosis did not have any impact on delay in the diagnosis of tuberculosis. This could be due to each type of tuberculosis have equal access to health care facilities, they are aware about the disease and treatment at certain level and it could be because of the awareness of DOTS centre staff too. DOTS centre staff may provide effective TB services. Other reasons could be most of the physicians may diagnosis smear negative pulmonary tuberculosis and extra pulmonary tuberculosis without proper investigations. Pulmonary tuberculosis sputum smear positive patients had shorter patient delay than pulmonary smear negative tuberculosis patients in Malaysia.[16] A study from Ethiopia reported that pulmonary tuberculosis smear positive patients had shorter health system delay compared

to smear negative.[17] Age did not have any impact on delay in our study. Similarly age was not associated with delay in the diagnosis of tuberculosis in rural Nepal and Kathmandu valley.[31] It may be because of easy access to health care facilities. However age less than 25 years had less health system delay in Gambia.[19] It could be because child patients are given much priority at health centres or elder people are busy on their work.

Sex was not found to be associated factor with delay in current study. Sex did not have any impact on delay in Tanzania too.[22] It may be because both sexes have equal access in health care providers and there may be gender sensitization at a certain level. Male patients found less patient delay in a study from Malaysia.[16] It may be because male patients have more money and freedom to visit to health care providers in Malaysia. However a study from Southern India concluded that males had longer patient delay.[27] It may be because females are more aware of their health in southern India. Women had longer health system delay in rural Nepal.[31] It could be because women did not have equal access to health care providers in this setting as man. Marital status did not have any impact on delay in the diagnosis of tuberculosis in our study. A study from Brazil showed the same result.[32]

Surprisingly, patient education did not have any significant impact on delay in our study. The same result was observed by a study from rural Nepal.[31] It may be because educated and non-educated patients have equal access to health care providers. It could be due to selection bias because majority of our participants were illiterate (62%). Also, almost all patients in this study were poor. In a study from south India, the higher education had shorter delay.[27] It may be because educated patient are more aware of their health, have more income and easy access to health care providers in that settings.

"Others" category of occupation had significant lower risk of patient delay (OR 0.2, 95% CI 0.09-0.62) and DOTS delay (OR 0.4, 95%, CI 0.18-0.80) in our study. "Others" occupation includes service, business and labourers who are directly involved in income generation in this study. It could be because farmers are much busy in their work and have less time to seek for health care and they may be poorer and less aware of their health. Some of unemployed participants may have been reported as farmer in our study. On the other hand, it is very difficult to distinguish between farmer and house wife profession because most women are involved on both.

Patient's smoking habits before tuberculosis diagnosis did not have any impact on our study. But a study from New Zealand reported smokers had risk of longer patient delay.[42] It may be because smokers are less aware of their health and they may postpone their visit to health care providers. As smokers always have cough, they do not recognize coughing as a symptom of tuberculosis and will be delayed to seek health care until they have any other symptoms of tuberculosis or they are seriously ill.

Alcohol consumption before tuberculosis diagnosis did not have any significant impact on delay in our study. A study from Brazil supports our findings.[32] Alcohol use was a risk factor for delay in the diagnosis of tuberculosis in south India.[27] It may be because some alcohol abusers may not be aware of their health or they want to hide their health problems. They may have less money to spend on their health.

Patient's family income did not have any impact on delay in the diagnosis of tuberculosis in our study. No association was found between delay and income in Sudan too.[28] It could be because tuberculosis facilities are completely free of charge and both rich and poor have equal access to heath care providers. Another important fact, many rich tuberculosis patients may have gone to private sector and take treatment from there. So, there was a chance to be missed these patients. According to a study from Malaysia, patient income was associated with health system delay.[16] It could be because poor people have less access on health care providers in Malaysia.

In our study, distance from patient's home to DOTS centre was not associated with patient delay in the diagnosis of tuberculosis. The same result was found in a study conducted in rural Nepal.[31] This could be because the distance in Banke district is below a "threshold" for travel and not requiring much expense. However, a study from South India showed that distance to health care facilities from patient residence had significant impact of patient delay.[27] This makes sense because patients would spend more time and money to visit health care provider if the distance is longer.

Chapter 5: Conclusions

In this cross-sectional study, 307 new tuberculosis patients were interviewed to assess the magnitude of delay in the diagnosis of tuberculosis and its detriments in Banke district of Nepal. Cough (83%), fever (74%) and weakness (64%) were the most frequently reported symptom to tuberculosis. Most of the participants experienced multiple symptoms of tuberculosis. Majority of the participants (58%) first consult family members/relatives/friends to seek advice about their health problems.

Most of the patients (61%) go to DOTS centres by foot for tuberculosis diagnosis and treatment and majority of them walk less then one hour to reach DOTS treatment centre. Still a big proportion of participants initially visit private practitioners/pharmacists or traditional healers with tuberculosis symptoms before tuberculosis diagnosis.

Almost 69% patients have 30 days delay or more in the diagnosis of tuberculosis in our study. Patient delay contributes almost 73% of total delay in our study. Total delay is shorter in Banke district than reported from other places in Nepal.

Patients` occupation is associated with delay in the diagnosis of tuberculosis. Occupation directly involved in income generation has shorter patient delay compare to farmers.

Raising public awareness of the disease in the community, collaboration with private health care providers and expansion of the services with assured quality especially diagnostic facilities could be helpful to reduce delay in the diagnosis of tuberculosis.

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Tables

Table 1: Characteristics of Participants

Characteristics		Frequency (n= 307)	Percentage (%)
Type of tuberculosis	Sputum smear positive	139	45.3
	Sputum smear negative	136	44.3
	Extra pulmonary	32	10.4
Age	≤14 years	32	10.4
	15 – 54 years	217	70.7
	≥55 years	58	18.9
Sex	Male	181	59.0
	Female	126	41.0
Marital status	Single	73	23.8
	Married	227	73.9
	Divorced/widow	7	2.3
Education level	Illiterate	191	62.2
	Literate	116	37.8
Occupation	Agriculture	148	48.2
	House wife	61	19.9
	Others	98	31.9
Monthly family income	<NRs2,500	233	75.9
	≥NRs2500	74	24.1
Smoking habit	No	163	53.1
	Yes	144	46.9
Alcohol consumption	No	219	71.3
	Yes	88	28.7

Table 2: Education level of participants

Sex	Education level				
	Illiterate	Primary	Secondary	University	Total (n= 307)
Male	96 (53.0%)	57 (31.5%)	22 (12.2%)	6 (3.3%)	181 (100%)
Female	95 (75.4%)	21 (16.7%)	9 (7.1%)	1 (0.8%)	126 (100%)

Table 3: Reported symptoms

Symptom	Type of tuberculosis			
	Smear Positive (n= 139)	Smear negative (n=136)	Extra pulmonary (n=32)	Total (n= 307)
Cough	130 (93.5%)	110 (80.9%)	14 (43.8%)	254 (82.7%)
Haemoptysis	54 (38.8%)	31 (22.8%)	3 (9.4%)	88 (28.7%)
Chest pain	84 (60.4%)	69 (50.7%)	12 (37.5%)	165 (53.7%)
Fever	115 (82.7%)	95 (69.9%)	18 (56.3%)	228 (74.3%)
Weight loss	79 (56.8%)	71 (52.2%)	12 (37.5%)	162 (52.8%)
Weakness	96 (69.1%)	84 (81.8%)	17 (53.1%)	197 (64.2%)
Others	19 (13.7%)	20 (14.7%)	16 (50.0%)	55 (17.9%)

Table 4: Participants visiting to health care providers before diagnosis

Characteristics		Traditional healers/ Ayurveda	Private practitioners/ Pharmacists	Others
Total		**50 (16.3%)**	**190 (61.8%)**	**63 (20.5%)**
Type of tuberculosis	Smear positive	22	89	29
	Smear negative	19	86	22
	Extra pulmonary	9	15	12
Age	≤14 years	7	19	6
	15 – 54 years	34	135	42
	≥55 years	9	36	15
Sex	Male	20	121	43
	Female	30	69	20
Marital status	Single	8	50	16
	Married	40	135	46
Education level	Illiterate	41	118	32
	Literate	9	72	31
Occupation	Agriculture	23	95	20
	House wife	16	30	7
	Others	11	65	36

Table 5: Mean and median delay

n= 307	Mean delay (days)	Median delay (days)
Patient delay	95.0	49.5
Health system delay	42.6	18.0
DOTS delay	6.2	3.0
Total delay	98.1	60.0

Table 6: Patient delay according to selected determinants

Factors		Patient delay		P- value
		≤15 days	>15 days	
Type of tuberculosis	Sputum smear positive	11 (35.5%)	128 (46.5%)	
	Sputum smear negative	17 (54.8%)	119 (43.3%)	0.46
	Extra pulmonary	3 (9.7%)	28 (10.2%)	
Age group	≤14 years	2 (6.5%)	30 (10.9%)	0.75
	≥15 years	29 (93.5%)	245 (89.1%)	
Sex	Male	22 (70.9%)	159 (57.8%)	0.18
	Female	9 (29.0%)	116 (42.2%)	
Marital status	Single	8 (25.8%)	64 (23.9%)	0.82
	Married	23 (74.2%)	204 (76.1%)	
Educational	Illiterate	15 (48.4%)	175 (63.6%)	0.12
	Literate	16 (51.6%)	100 (36.4%)	
Occupation	Farmers	9 (34.6%)	138 (57.3%)	
	House wife	3 (11.5%)	58 (24.1%)	<0.01
	Others	14 (53.8%)	45 (18.7%)	
Smoking	No	20 (64.5%)	142 (51.6%)	0.19
	Yes	11 (35.5%)	133 (48.4%)	
Alcohol	No	25 (80.6%)	193 (70.2)	0.29
	Yes	6 (19.4%)	82 (29.3)	
Monthly family income	<NRs2,500	18 (58.1%)	214 (77.8%)	0.02
	≥NRs2500	13 (41.9%)	61 (22.2%)	
Distance to DOTS centre	≤1 hour	29 (93.5%)	252 (91.6%)	1.00
	>1 hour	2 (6.5)	23 (8.4%)	

Table 7: Health system delay according to selected determinants

Factors		Health system delay		P- value
		≤15 days	>15	
Type of tuberculosis	Sputum smear positive	55 (44.0%)	84 (46.2%)	0.39
	Sputum smear negative	60 (48.0%)	76 (41.8%)	
	Extra pulmonary	10 (8.0%)	22 (12.0%)	
Age group	≤14 years	13 (10.4%)	19 (10.4%)	1.00
	≥15 years	112 (89.6%)	163 (89.6%)	
Sex	Male	79 (63.2%)	102 (56.0%)	0.24
	Female	46 (36.8%)	80 (44.0%)	
Marital status	Single	35 (28.0%)	38 (21.7%)	0.22
	Married	90 (72.0%)	137 (78.3%)	
Educational	Illiterate	72 (57.6%)	119 ((65.4%)	0.19
	Literate	53 (42.4%)	63 (34.6%)	
Occupation	Farmers	60 (54.5%)	88 (55.7%)	0.66
	House wife	23 (20.9%)	38 (24.1%)	
	Others	27 (24.6%)	32 (20.2%)	
Smoking	No	76 (60.8)	87 (47.8%)	0.03
	Yes	49 (39.2%)	95 (52.2%)	
Alcohol	No	93 (74.4%)	126 (69.3%)	0.37
	Yes	32 (25.6%)	56 (30.7%)	
Monthly family income	<NRs2,500	97 (77.6%)	136 (74.7%)	0.59
	≥NRs2,500	28 (22.4%)	46 (25.3%)	
Distance to DOTS centre	≤1 hour	113 (90.4%)	169 (92.9%)	0.53
	>1 hour	12 (9.6%)	13 (7.1%)	

Table 8: DOTS delay according to selected determinants

Factors		DOTS delay		P- value
		≤7 days	>7 days	
Type of tuberculosis	Sputum smear positive	125 (47.2%)	14 (33.3%)	
	Sputum smear negative	115 (43.4%)	21 (50.0%)	0.14
	Extra pulmonary	25 (9.4%)	7 (16.7%)	
Age group	≤14 years	25 (9.4%)	7 (16.7%)	0.17
	≥15 years	240 (90.6)	35 (83.3%)	
Sex	Male	159 (60.0%)	22 (52.4%)	0.40
	Female	106 (40.0%)	20 (47.6%)	
Marital status	Single	63 (24.2%)	10 (25.0%)	1.0
	Married	197 (75.8%)	30 (75.0%)	
Educational	Illiterate	168 (63.4%)	23 (54.8%)	0.31
	Literate	97 (36.6%)	19 (45.2%)	
Occupation	Farmers	126 (54.1%)	22 (62.9%)	
	House wife	53 (22.7%)	8 (22.9%)	0.46
	Others	54 (23.2%)	5 (14.3%)	
Smoking habit	No	140 (52.8%)	23 (54.8%)	0.86
	Yes	125 (47.2%)	19 (45.2%)	
Alcohol intake	No	187 (70.6%)	32 (76.2%)	0.58
	Yes	78 (29.4%)	10 (23.8%)	
Monthly family income	<NRs2,500	202 (76.2%)	31 (73.8%)	0.70
	≥NRs2,500	63 (23.8%)	11 (26.2%)	
Distance to DOTS centre	≤1 hour	242 (91.3%)	40 (95.2%)	0.55
	>1 hour	23 (8.7%)	2 (4.8%)	

Table 9: Logistic regression analysis of patient delay

Factors		n	%	Unadjusted OR		Adjusted OR	
				OR	95% CI	OR	95% CI
Type of tuberculosis	Sputum smear positive	139	45.4%	1.0		1.0	
	Sputum smear negative	136	44.4%	0.6	0.27-1.34	0.5	0.21-1.15
	Extra pulmonary	31	10.1%	0.8	0.21-3.06	0.7	0.17-2.80
Age group	≤14 years	32	10.5%	1.0		1.0	
	15 - 54 years	216	70.6%	0.5	0.10-2.06	0.5	0.10-2.11
	≥ 55 years	58	19.0%	1.9	0.25-13.90	1.7	0.22-13.15
Sex	Male	181	59.2%	1.0		1.0	
	Female	125	40.8%	1.8	0.79-4.01	1.8	0.76-4.26
Marital status	Single	72	24.1%	1.0		1.0	
	Married	227	75.9%	1.1	0.47-2.06	1.1	0.40-3.04
Education	Illiterate	190	62.1%	1.0		1.0	
	Literate	116	37.9%	0.5	0.25-1.13	0.8	0.36-1.83
Occupation	Farmer	147	55.1%	1.0		1.0	
	House wife	61	22.8%	1.3	0.33-4.83	2.0	0.44-9.47
	Others	59	22.1%	0.2	0.08-0.52	0.2	0.09-0.62
Smoke	No	162	52.9%	1.0		1.0	
	Yes	144	47.1%	1.7	0.78-3.69	2.2	0.93-5.22
Alcohol	No	218	71.2%	1.0		1.0	
	Yes	88	28.8%	1.8	0.70-4.48	2.4	0.90-6.44
Income	<NRs. 2,500	232	75.8%	1.0		1.0	
	≥NRs.2,500	74	24.2%	0.4	0.18-0.85	0.5	0.21-1.01
Distance	≤1 hour	281	91.8%	1.0		1.0	
	>1 hour	25	8.2%	1.3	0.20-5.90	1.3	0.28-6.14

Table 10: Logistic regression analysis of health system delay

Factors		n	%	Unadjusted		Adjusted	
				OR	95% CI	OR	95% CI
Type of tuberculosis	Sputum smear positive	139	45.3%	1.0		1.0	
	Sputum smear negative	136	44.3%	0.8	0.47-1.21	0.7	0.42-1.15
	Extra pulmonary	32	10.4%	1.7	0.77-3.85	1.7	0.75-3.90
Age group	≤ 14 years	32	10.4%	1.0		1.0	
	15 - 54 years	217	70.7%	0.9	0.42-1.87	0.9	0.45-2.01
	≥ 55 years	58	18.9%	0.9	0.39-2.24	1.1	0.44-2.63
Sex	Male	181	59.0%	1.0		1.0	
	Female	126	41.0%	1.3	0.83-2.06	1.3	0.77-2.04
Marital status	Single	73	24.3%	1.0		1.0	
	Married	227	75.7%	1.3	0.75-2.15	1.6	0.82-3.27
Education	Illiterate	191	62.2%	1.0		1.0	
	Literate	116	37.8%	0.9	0.53-1.35	0.9	0.55-1.49
Occupation	Farmer	148	55.2%	1.0		1.0	
	House wife	61	22.8%	1.1	0.57-1.87	0.7	0.34-1.58
	Others	59	22.0%	1.1	0.56-1.89	1.1	0.57-2.04
Smoke	No	163	53.1%	1.0		1.0	
	Yes	144	46.9%	1.4	0.87-2.13	1.7	0.99-2.81
Alcohol	No	219	71.3%	1.0		1.0	
	Yes	88	28.7%	1.0	0.62-1.67	1.2	0.68-2.00
Income	<NRs. 2,500	233	75.9%	1.0		1.0	
	≥NRs.2,500	74	24.1%	1.2	0.70-2.00	1.2	0.70-2.06
Distance	≤1 hour	282	91.9%	1.0		1.0	
	>1 hour	25	8.1%	0.5	0.22-1.20	0.6	0.23-1.31

Table 11: Logistic regression analysis of DOTS delay

Factors		n	%	Unadjusted		Adjusted	
				OR	95% CI	OR	95% CI
Type of tuberculosis	Sputum smear positive	139	45.3%	1.0		1.0	
	Sputum smear negative	136	44.3%	1.1	0.65-1.76	1.0	0.60-1.74
	Extra pulmonary	32	10.4%	2.1	0.96-4.55	1.8	0.79-3.93
Age group	≤14 years	32	10.4%	1.0		1.0	
	15 - 54 years	217	70.7%	0.6	0.28-1.24	0.6	0.27-1.24
	≥ 55 years	58	18.9%	0.5	0.21-1.24	0.6	0.24-1.55
Sex	Male	181	59.0%	1.0		1.0	
	Female	126	41.0%	1.3	0.79-2.05	1.4	0.85-2.35
Marital status	Single	73	24.3%	1.0		1.0	
	Married	227	75.7%	0.6	0.34-1.00	0.7	0.37-1.49
Education	Illiterate	191	62.2%	1.0		1.0	
	Literate	116	37.8%	1.5	0.92-2.4	1.6	0.97-2.74
Occupation	Farmer	148	55.2%	1.0		1.0	
	House wife	61	22.8%	0.8	0.45-1.56	0.7	0.32-1.57
	Others	59	22.0%	0.4	0.19-0.83	0.4	0.18-0.80
Smoke	No	163	53.1%	1.0		1.0	
	Yes	144	46.9%	0.8	0.52-1.33	1.1	0.63-1.85
Alcohol	No	219	71.3%	1.0		1.0	
	Yes	88	28.7%	1.0	0.61-1.72	1.3	0.71-2.21
Income	<NRs. 2,500	233	75.9%	1.0		1.0	
	≥NRs.2,500	74	24.1%	1.2	0.64-1.89	1.0	0.59-1.81
Distance	≤1 hour	282	91.9%	1.0		1.0	
	>1 hour	25	8.0 %	1.1	0.45-2.47	1.2	0.48-2.76

Annexes

Questionnaire

Delay in the diagnosis of tuberculosis in Banke District, Nepal

DOTS centre: Respondent No.:

Registered No: Age: _____ (Years) Sex:

1. Marital status (Please tick (√) in the right box):

Single	
Married	
Widow	
Divorced	

2. Education level (Please tick (√) in the right box):

No formal education	
Primary	
Secondary	
University	

3. What is your occupation?

Please tick (√) in the right box		
a	Farmer	
b	House wife	
c	Service	
d	Business	
E	Unemployed	
F	Labour	
G	Other occupation (……)	

4. Did you use to smoke before tuberculosis diagnosis? Please tick (√) in the right box:

Yes	
No	

5. Did you use to drink alcohol before tuberculosis diagnosis?Please tick (√) in the right box:

Yes	
No	

6. What is your family monthly income?

Please tick (√) in the right box		
a	<NRs1,000	
b	NRs1,000 – 2,499	
C	NRs2,500- 4,999	
d	NRs5,000 – 7,499	
e	NRs7,500 or above	

7. Distance from your home to health post/DOTS centre by foot: _____ minutes

8. Symptoms present before diagnosis

Please tick (√) in the right box			If yes, number of days before diagnosis
a	Cough		
B	Haemoptysis		
C	Chest pain		
d	Fever		
e	Weight loss		
f	Weakness		
g	Other symptom (specify) ……		

9. For how long did you have persistent (non-remitting) symptom? _____ (in week)

10. To whom did you contact or consulate at first after the first symptom of tuberculosis?

Please tick (√) in the right box		
a	Family member/relative	
b	Friend	
c	Traditional healer	
d	Ayurveda	
e	Private practitioner	
f	Government health facilities	
g	Pharmacist	
h	Other (specify) …….	

11. Health care provider visited prior to diagnosis

	Please tick (√) in the right box	Yes	If yes, number of days before diagnosis
A	Traditional healer		
B	Ayurveda		
C	Private practitioner		
D	Government health facilities		
E	Pharmacist		
F	Other (specify) …….		

12. How did you come to DOTS centre today?

Please tick (√) in the right box		
a	Bus	
b	Rickshaw	
C	Taxi	
d	Motorbike	
e	Horse card	
f	On foot	
g	Other means (specify) …….	

13. How long did it take you to travel to DOTS centre from your home today? _____ (minutes)

14. What was the time difference between the first appearance of symptom of tuberculosis and the first visit to health care providers: _____ (days)

15. What was the time difference between the first appearance of cough and the first visit to DOTS centre/health post: _____ (days)

16. How did you come to DOTS centre at the first time?

Please tick (√) in the right box		
a	Referred by government health facilities	
b	Referred by private health facilities	
c	Suggested by relatives/friends	
d	Referred by traditional healer	
e	Referred by Ayurveda person	
f	Referred by pharmacist	
g	Referred/suggested by other (_____)	

17. What was the time difference between the first appearance of symptom of tuberculosis and the date of tuberculosis diagnosis: _____ (days)

18. What was the time difference between the first consultation in any health care facilities and tuberculosis diagnosis? _____ (days)

19 What was the time difference between the first visit to the DOTS centre and the date of tuberculosis Diagnosis? _____ (days)

Interviewed by: Signature: Date:

Consent form

I am Rajendra Basnet, permanent resident of Birendranagar Municipality, ward no: 7, Surkhet, Nepal. Currently, I am studying Master of Philosophy in International Health at University of Bergen, Norway. As a part of my degree, I am conducting a research study on "Factors associated with delay in the diagnosis of tuberculosis in Banke district, Nepal".

I am going to ask you some questions, some of them are personal like age, marital status, income, etc. Some questions are about disease. The whole process will take about 20 minutes. Your participation in this study is voluntary. You are free to withdraw your participation at any time without giving any reason. I would like to ensure complete confidentiality of your answer. Your name will not be written in this paper and anywhere else. Any information you are asked will not used except for study purpose. This information will be useful to assess the risk factors associated with why people are late to present their problems in tuberculosis diagnosis. You do not have to answer of any questions if you really do not like to and you can end your interview at anytime if you want. But your honest answer will be helpful to find out the contributing factors for initial delay in tuberculosis diagnosis and the magnitude of it and develop necessary strategy to control tuberculosis in Nepal.

I humbly request for your help for responding the interview.

Sincerely,

Rajendra Basnet
Student, Master of Philosophy in International Health
Central for International Health, University of Bergen
Bergen, Norway
Email: Rajendra.Basnet@student.uib.no

Consent

Title of the research study: “Factors associated with delay in the diagnosis of tuberculosis in Banke district of Nepal.”

Name of researcher: Rajendra Basnet

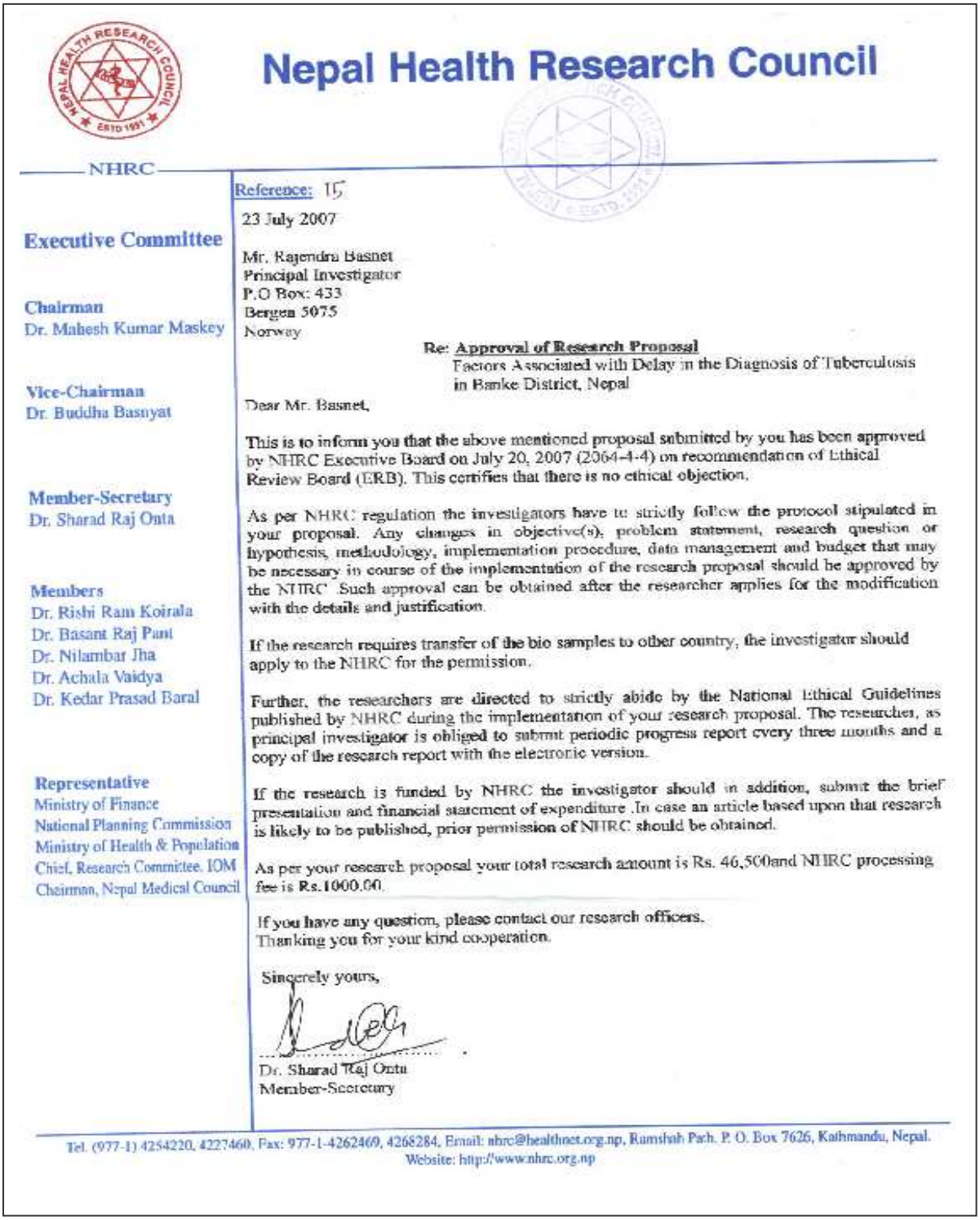
I confirm that I have read /herd and understood the information for the above study and have had the opportunity to ask questions. I understand that my participation is voluntary and that I am free to withdraw at any time without giving any reason. I give my consent for my participation for the study.

Name or respondent:	Signature:	Date:
Name of witness:	Signature:	Date:

List of participated DOTS centres/sub-centres

S.N.	DOTS centre/sub-centres	No. of participants	%
1	Baijapur	3	1
2	Bankatti	5	1.6
3	Bankutwa	5	1.6
4	Basudevpur	5	1.6
5	Belhari	5	1.6
6	Bheri Zonal Hospital	1	.3
7	Binauna	4	1.3
8	Birendra Police Regional Hospital	2	.7
9	Chisapani	3	1.0
10	Fattepur	6	2.0
11	Ganapur	6	2.0
12	Gangapur	5	1.6
13	Hirminiya	9	2.9
14	Holiya	5	1.6
15	Indrapur	10	3.3
16	International Nepal Fellowship	8	2.6
17	Jaispur	10	3.3
18	Kachanapur	4	1.3
19	Katkuiya	3	1.0
20	Khajura	6	2.0
21	Khajurakhurda	2	.7
22	Kohalpur	5	1.6
23	Kusum	9	2.9
24	Laxmanpur	4	1.3
25	Mahadevpuri	5	1.6
26	Manikapur	10	3.3
27	Mataiya	7	2.3
28	Narainapur	8	2.6
29	Narayanpur	4	1.3
30	Nepal Anti-tuberculosis Association	13	4.2
31	Naubasta	16	5.2
32	Nepalgunj	4	1.3
33	Nepalgunj Medical College Kohalpur	10	3.3
34	Nepalgunj Medical College nepalgunj	10	3.3
35	Paraspur	3	1.0
36	Paruspur	3	1.0
37	Puraina	7	2.3
38	Puraini	4	1.3
39	Radhapur	5	1.6
40	Rajhena	10	3.3
41	Raniyapur	16	5.2
42	Saigau	1	.3
43	Samsergunj	8	2.6
44	Sitapur	16	5.2
45	Sonpur	6	2.0
46	Titiriya	4	1.3
47	Udarapur	7	2.3
48	Udayapur	5	1.6
Total		307	100

Ethical clearance letter



Nepal Health Research Council

NHRC

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Representative
Ministry of Finance
National Planning Commission
Ministry of Health & Population
Chief, Research Committee, IOM
Chairman, Nepal Medical Council

Reference: 15

23 July 2007

Mr. Rajendra Basnet
Principal Investigator
P.O Box: 433
Bergen 5075
Norway

Re: **Approval of Research Proposal**
Factors Associated with Delay in the Diagnosis of Tuberculosis in Banke District, Nepal

Dear Mr. Basnet,

This is to inform you that the above mentioned proposal submitted by you has been approved by NHRC Executive Board on July 20, 2007 (2064-4-4) on recommendation of Ethical Review Board (ERB). This certifies that there is no ethical objection.

As per NHRC regulation the investigators have to strictly follow the protocol stipulated in your proposal. Any changes in objective(s), problem statement, research question or hypothesis, methodology, implementation procedure, data management and budget that may be necessary in course of the implementation of the research proposal should be approved by the NHRC. Such approval can be obtained after the researcher applies for the modification with the details and justification.

If the research requires transfer of the bio samples to other country, the investigator should apply to the NHRC for the permission.

Further, the researchers are directed to strictly abide by the National Ethical Guidelines published by NHRC during the implementation of your research proposal. The researches, as principal investigator is obliged to submit periodic progress report every three months and a copy of the research report with the electronic version.

If the research is funded by NHRC the investigator should in addition, submit the brief presentation and financial statement of expenditure .In case an article based upon that research is likely to be published, prior permission of NHRC should be obtained.

As per your research proposal your total research amount is Rs. 46,500and NHRC processing fee is Rs.1000.00.

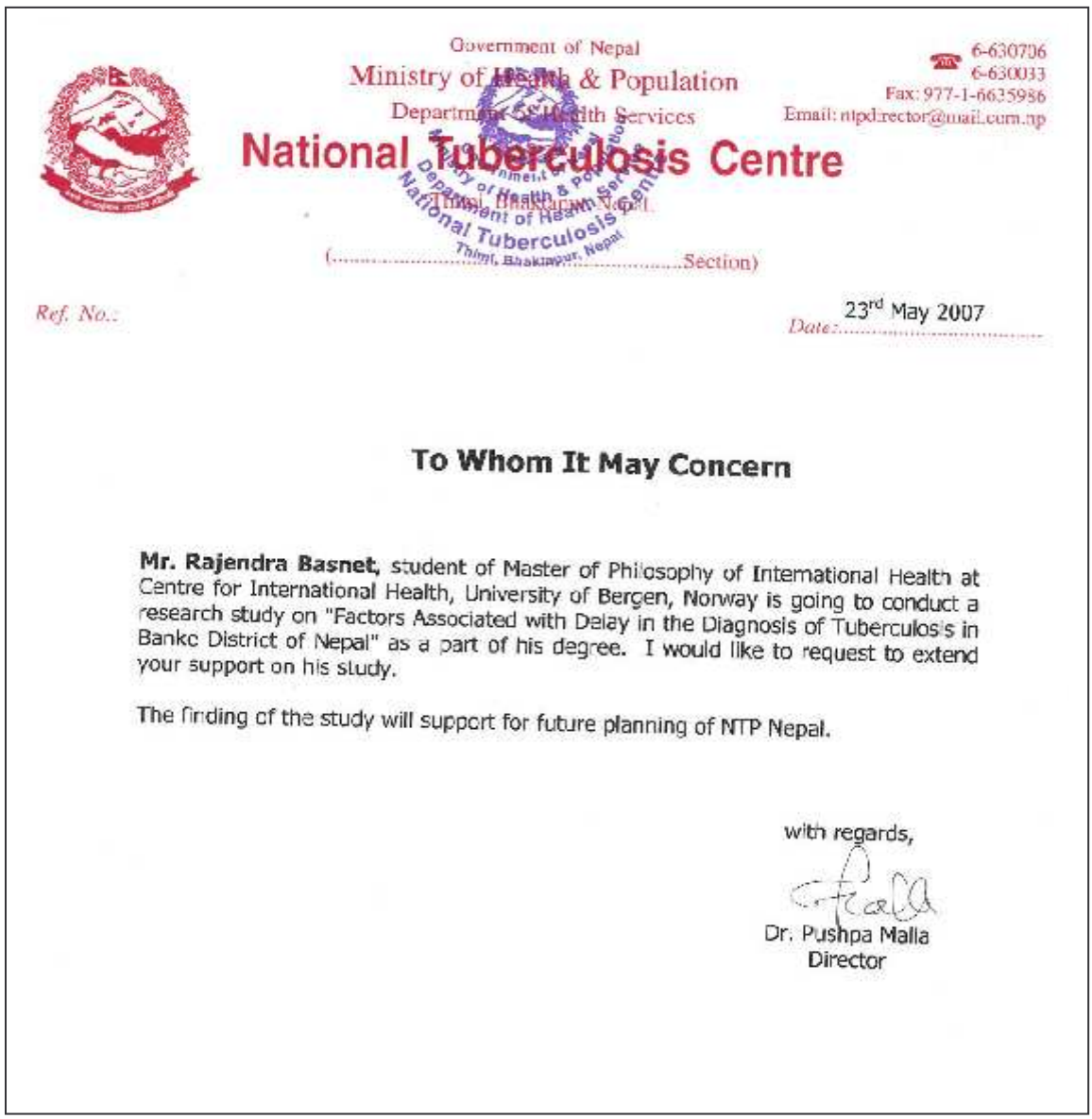
If you have any question, please contact our research officers.
Thanking you for your kind cooperation.

Sincerely yours,

Dr. Sharad Raj Onta
Member-Secretary

Tel. (977-1) 4254220, 4227460, Fax: 977-1-4262469, 4268284, Email: nhrc@healthnet.org.np, Ramshah Path, P. O. Box 7626, Kathmandu, Nepal.
Website: http://www.nhrc.org.np

Letter of National Tuberculosis Centre



Government of Nepal
Ministry of Health & Population
Department of Health Services

6-630706
6-630033
Fax: 977-1-6635986
Email: ntpdirector@mail.com.np

National Tuberculosis Centre

Thimi, Bhaktapur, Nepal

(.....Section)

Ref. No.:

Date: 23rd May 2007

To Whom It May Concern

Mr. Rajendra Basnet, student of Master of Philosophy of International Health at Centre for International Health, University of Bergen, Norway is going to conduct a research study on "Factors Associated with Delay in the Diagnosis of Tuberculosis in Banke District of Nepal" as a part of his degree. I would like to request to extend your support on his study.

The finding of the study will support for future planning of NTP Nepal.

with regards,

Dr. Pushpa Malla
Director

Letter of Regional Directorate of Health

नेपाल सरकार
स्वास्थ्य तथा जनसंख्या मन्त्रालय
मध्य पश्चिमाचल क्षेत्रीय स्वास्थ्य निर्देशनालय

पत्र संख्या :- ०६३/६४
सुलेन
चलानी नं :- १५९६

वीरेन्द्रनगर,

मिति :- २०६४।२।१४

Sub. :- Research

Mr. K. S. Godar
Public Heath Administrator and chief,
District Public Health Office, Banke

Mr. Rajendra Basnet, student of Master of Philosophy in International Health at Centre for International Health, University of Bergen, Norway is going to conduct a research study on "Factors associated with delay in the diagnosis of TB in Banke district of Nepal" as a part of his degree. So, I would like to request you to support him.

Thanks

.....
Dr. Peeyoosh Kumar Rajendra
Director


Map of Nepal
N
CHINA
(Tibet)
INDIA
(Sikkim)
INDIA
Humla
Dharchula
Bajhang
Mugu
Baitadi
Bajura
Jumla
Dadeldhura
Doti
Achham
Kalikot
Dolpa
Mustang
Kanchanpur
Dailekh
Jajarkot
Kailali
Rukum
Manang
Surkhet
Myagdi
Bardia
Salyan
Rolpa
Baglung
Kaski
Gorkha
Parbat
Lamjung
Rasuwa
Banke
Pyuthan
Gulmi
Dang
Syangja
Tanahu
Sindhupal
chok
Nuwakot
Argakhachi
Palpa
Dhading
KTM
Dolkha
Sankhuwasabha
Kapilbastu
Patan
B
Nawalparasi
Palanchok
Solukhumbu
Rupandehi
Chitwan
Makwanpur
Ramechhap
Taplejung
Okhaldhunga
Parsa
Sindhuli
Bhojpur
Khotang
Terathum
Bara
Sarlahi
Panchthar
Rautahat
Dhanusa
ILam
Siraha
Udayapur
Mahottari
Morang
Saptari
Sunsari
Jhapa

BANKE


Chisapani
Naubasta
Rajhena
Kohalpur
Banakatawa
Titihiriya
Mahadevpuri
Paniyapur
Samserganj
Sonapur
Bageswari
Kanchanapur
Udarapur
Ganapur
KhajuraKhurda
Belahari
Manikapur
Sitapur
KhajuraKhurda
Kamdi
Indrapur
Khaskarkado
Basudevapur
Radhapur
Belbhar
Nepalgunj N.P.
Purahi
Paraspur
Binauna
Saigaun
Puraina
Banakatti
Jaispur
Phatepur
Bhawaniyapur
Pipariawa
Hirminiya
Betahani
Khaskusma
Bejapur
Holiya
Gangapur
Matahiya
Narainapur
Laxmanpur
Kalaphanta
Kathkuiya