COMPLIANCE WITH DOTS AMONG TB PATIENTS UNDER COMMUNITY BASED DOTS STRATEGY IN PALPA DISTRICT, NEPAL

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ABSTRACT

Directly Observed Treatment Short-course (DOTS) is a method that encourages tuberculosis (TB) patients to take their medicine under the direct supervision of a daily observer according to the schedule. The aim of this cross-sectional study was to describe and identify the relationship between patients' compliance and their socio-demographic characteristics, knowledge and perception toward TB and Community Based DOTS program, availability and accessibility of its services and social supports. The data was collected from 101 registered TB patients in Palpa district, Nepal, during 1st Jul. to 31st Dec. 2004 by using a self administered questionnaire.

It was revealed that 61.39% of the patients followed the treatment procedure strictly and more than one-third of noncompliant patients interrupted their treatment due to side effects of TB drugs. The majority of the respondents were 15-34 yrs. old, male, married, secondary and over level in education, farmers, and with low family income. Two-fifths of them had high knowledge level and more than half of them had moderate perception level toward the disease and its treatment. Most of them agreed that TB drugs, health education and daily observers were available to them. Nearly two thirds of them got drugs within 15 minutes. A half of them had appropriate time in the morning to take the drugs and two-fifths of them found it easiest to get information from a health worker. Nearly three-fourths of them received a high level of social support.

It was shown that age group, family income, knowledge level, availability and accessibility of the services were associated with patient compliance. Furthermore overall perception, perception on susceptibility, severity and benefit were significantly different for the compliant status as were overall social support, social supports from family and health workers/community health volunteers, mental and informational supports. All of these had associations at p-value <0.05.

The findings reveal the urgent need to revise the content of health communication, emphasize side effects of the drugs, causes and preventive measurement of the disease. The readiness of daily observers to provide services will contribute positively to the continuation of drug intake.

KEY WORDS: COMPLIANCE / COMMUNITY BASED DOTS / TUBERCULOSIS /DOTS

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LIST OF ABBREVIATIONS

TB	:	Tuberculosis
DOTS	:	Directly Observed Treatment Short course
WHO	:	World Health Organization
HIV	:	Human Immune-deficiency Virus
AIDS	:	Acquired Immuno Deficiency Syndrome
NTP	:	National Tuberculosis Control Program
CBDOTS	:	Community Based DOTS
CHV	:	Community Health Volunteer
MDR	:	Multi Drug Resistance
SCC	:	Short Course Chemotherapy
DOT	:	Directly Observed Treatment
FCHV	:	Female Community Health Volunteer
MCHW	:	Maternal Child Health Worker
VHW	:	Village Health Worker
DHO	:	District Health Office
PHC	:	Primary Health Center
HP	:	Health Post
SHP	:	Sub Health Post
HBM	:	Health Belief Model
NTC	:	National Tuberculosis Center
HW	:	Health Worker
AIHD	:	ASEAN Institute for Health Development

CHAPTER 1
INTRODUCTION

1.1 Rationale & Justification

Tuberculosis (TB) is a contagious disease caused by Mycobacterium tuberculosis. This bacillus is usually spread when people infected with TB in their lungs cough and spread germs into the air. When any person breathes the germ in the air, it can reach to the lungs. The germs can then spread from the lungs to other parts of the body. Extended, close, indoor contact is usually required for TB transmission from one person to another (1).

TB is curable disease and Directly Observed Treatment Short-course (DOTS) should be administered to the greatest possible number of patients in order to cure them and thereby interrupt the chain of transmission of TB within the population. The most serious problem hindering TB treatment and control is noncompliance of patient (2).

1.1.1 Global Tuberculosis Situation

Tuberculosis is one of the major public health problem which is considered the most important resurgent disease world wide, especially in the developing countries. It has the highest mortality and morbidity rate compared to any other single disease. WHO (World Health Organization) estimates indicate that one third of the world population is infected with TB. About 8 million people become sick with TB annually (3). More than 3 million deaths are attributed to TB every year; one million of which are women and about 170,000 children (4). Most important things that 95% of TB cases and 98% of TB deaths are in developing countries. About 75% of TB cases are developed in the economically productive age group (15-59 year). Beside this TB is showing an increasing trend not only increasing multi drug resistance but also due to TB/HIV co-infection (5).

1.1.2 Tuberculosis Situation in South East Asia

Nearly 3 million cases, 700,000 deaths occur every year and 40% of the world TB cases live in the South-East-Asia Region. More than 2000 people die everyday in this region. 95% of the deaths come from five countries; Bangladesh, India, Indonesia Myanmar and Thailand. The situation is likely to be further complicated with rapidly increased of HIV and emergence of multi-drug resistant strains in the region. Nearly 2 million patients have so far been treated with a success rate of around 80% under programmatic condition in areas where the strategy has been applied. Nearly 60% AIDS cases developed to be TB patients and indicate that the latter is the most common life threatening opportunistic infection associated with HIV (6).

1.1.3 TB Situation in Nepal

In Nepal about 45% of the total population is infected with TB, out of which 60% are in adult age group. Every year, 40,000 people develop to be active TB. Of whom 20,000 have infectious pulmonary tuberculosis. These 20,000 cases are able to spread the Mycobacterium Tuberculosis to others. Now 5,000 -7,000 people continue to die every year from this disease in Nepal (7).

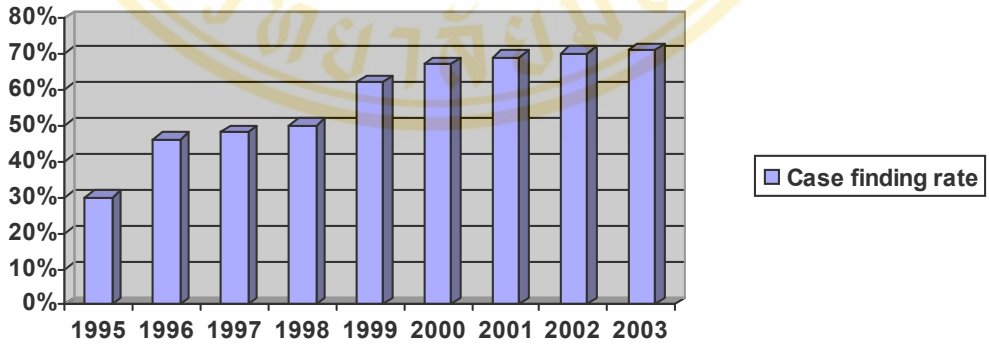

Figure 1 Increasing trend on Case finding in Nepal (7)

From figure 1, it is shown that the case finding rate is increasing in Nepal. In 1995, the case finding rate was 30%, but it is increased 71% in 2003. It means to the transmission of tuberculosis is being rapid spread (7).

1.1.4 Situation of National Tuberculosis Control Program in Nepal

The National Tuberculosis program is an integrated approach within the national general health system to control TB. It has policies, plans and activities to achieve good case finding and treatment of tuberculosis patients. So there have many efforts to control this disease from the government, but it still remains as a major threat, from the government sector. The National TB Control Program (NTP) is functioning its services extend on all 75 districts of the country through the general health services. The goal of NTP is to reduce the mortality, morbidity and transmission of TB to such a level that it is no longer a public health problem. In order to attain the goal, NTP has set up the objectives of achieving 85% cure rate as recommended by WHO (7).

TB control program has already been expanded throughout the country; it has reduced the deaths significantly. However, around 5 to 7 thousands people continue to die every year due to TB. Despite this is encouraging the progress, there has still needs of the out-reaching services in the most rural and difficult areas of the country (7).

Besides, there are new challenges in TB cure. From a public health perspective, poorly supervised or incomplete treatment of TB is become worsen and these will develop to multi drug resistance. Migration, the numbers of refugees, displaced people are also increasing that help the spread of TB among the patients. Moreover, HIV is accelerating the spread of TB as HIV and TB have very close association, each speeding the other's progress (5).

1.1.5 Situation of DOTS implementation in Nepal

WHO declared TB as a global emergency in 1993, and adopted and promoted a new effective DOTS strategy for the TB control. TB control program be implemented within the framework of a National Tuberculosis Program. The World Bank considers and recommended that DOTS is one of the most cost-effectiveness of all health care interventions and should be a part of the essential clinical services package available in primary health care (5).

However, the effective implementation of DOTS strategy is crucial for developing countries where resources are limited and health services are poorly managed. Despite many difficulties; DOTS has been successfully implemented in many countries. But this effective strategy is being affected by some factors like poor socio-economic status, migration, health provider's behavior etc. (8).

In Nepal DOTS has launched in 1996 with four pilot projects. The DOTS program has been extended to reach 94% of the population today as demonstrated in figure 2. The program has great benefits from government commitment, community supports, and assistances from great benefits both international agencies and NGOs.

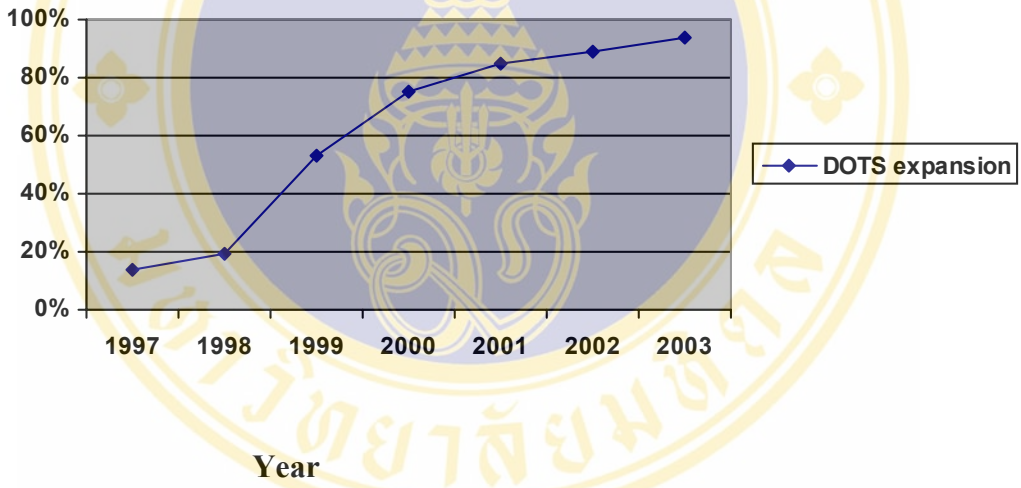

Figure 2 Trends of DOTS expansion in Nepal (7)

DOTS has been successfully expanded all over the country since April 2001. By July 2003, it has been expanded to 335 treatment centers with 1407 sub centers of the country. The program has almost completed the expansion phase and is now moving into the crucial consolidation phase. NTP achieved more than 85% of cure rate according to the target defined by WHO. But it is also noticed that there still have problems of defaulter and deaths. The data showed that defaulter rates are 7%(2001), 6%(2002), 5%(2003) and death rates are 5%(2001), 6%(2002), 6%(2003) in the country as demonstrated in figure 3 (7).

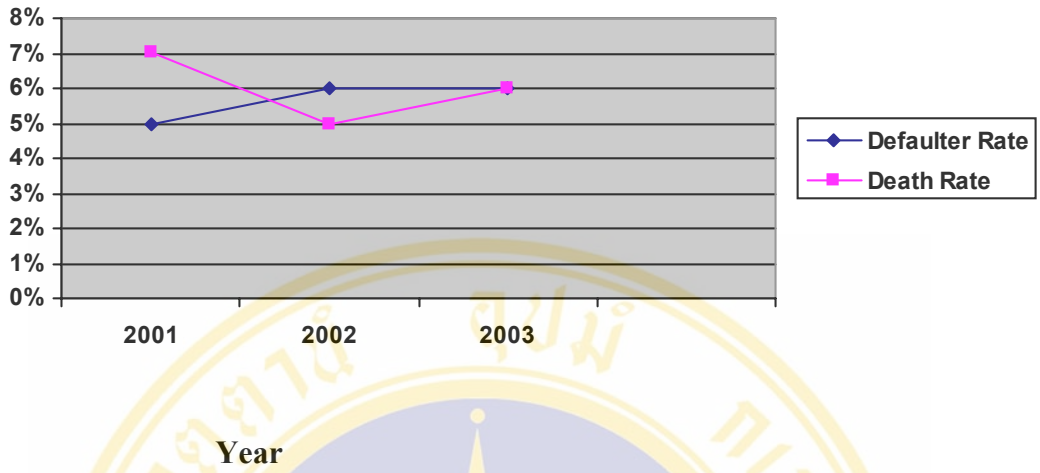

Figure 3 Trend of defaulter and death rate in Nepal (7)

1.1.6 Situation of Community Based DOTS Program in Nepal

As the Directly Observed Treatment Short course (DOTS) has already been expanded to cure TB throughout the country, it has reduced the deaths significantly. However, around 5 to 7 thousands people continue to die every year due to TB.

Despite this is encouraging progress, there are still needs of the DOTS out-reaching services in the most rural and difficult areas which are mountainous area and poor transportation situations, which yields the patients can not easily access to the health services, lack of knowledge and have low socio-economic conditions (7).

But success has not been easy and many hurdles remain before DOTS can be extended nationwide. Much of Nepal is remote mountain and hilly terrain and many areas are sparsely populated; making drug distribution and treatment supervision extremely difficult. In some areas, additional sub-health posts are used as DOTS-providing TB sub-centers in an effort to extend coverage. But it is difficult to everywhere because of not easy to access. So government has decided to implement an alternative DOTS strategy is called Community Based DOTS (CBDOTS), where

Community Health Volunteers (CHV) can provide the medicine under their direct supervision. Patients can be treated there and only have to go to a health centre for occasional sputum checks to monitor progress (5).

Initially, Community Based DOTS has been implemented in 1999 with 6 districts of the country as trial basis. Palpa is on of the district where government has recommended implementing the Community Based DOTS program.

1.1.7 Situation of Community Based DOTS Program in Palpa district, Nepal

Palpa is a one of the hill district of Nepal. Due to difficulty of geographical area, TB patient can not easily access to health services. So Community Based DOTS has been implemented as trial basis which covers the whole population.

In Community Based DOTS activities community health volunteers also involved as treatment supervisor of TB patient. The main aim of this strategy is to help the patient access the DOTS service in the relevant community or village conveniently. But tuberculosis is still a major health problem in the district, where yearly almost 300-450 TB cases registered for treatment, average half of them are new smear positive cases. This type of TB is the most easily transmitted type compared to others as extra-pulmonary and sputum smear negative types. Data showed that sometime there has been some poor compliance in the district. The treatment outcomes are also lower than the National TB Control Program and WHO recommendation (7).

In Palpa District, Community Based DOTS strategy was implemented in 1999. Unfortunately, there are still higher numbers of defaulter rates and death rates almost every year as shown in figure 4. It is describe that in Palpa district have problems of higher non-compliance rate of TB treatment. Every year more than 5% are defaulted from TB treatment and more than 6% are died due to the TB disease.

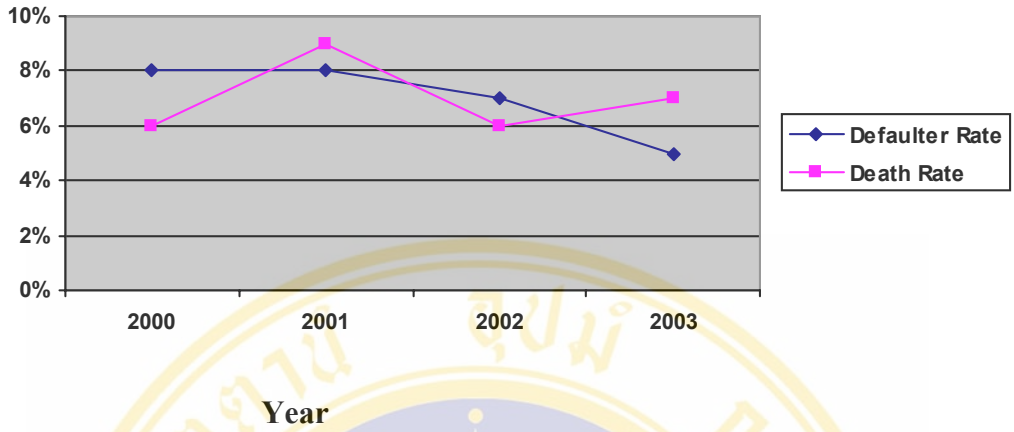

Figure 4 Trend of defaulter and death rate in Palpa district, Nepal (7)

More over these, the proportion of new sputum smear positive cases are increasing and treatment success rates are lower than 85% as illustrated in figure 5. This is not fulfill the target of National TB Control Program and WHO recommendation.

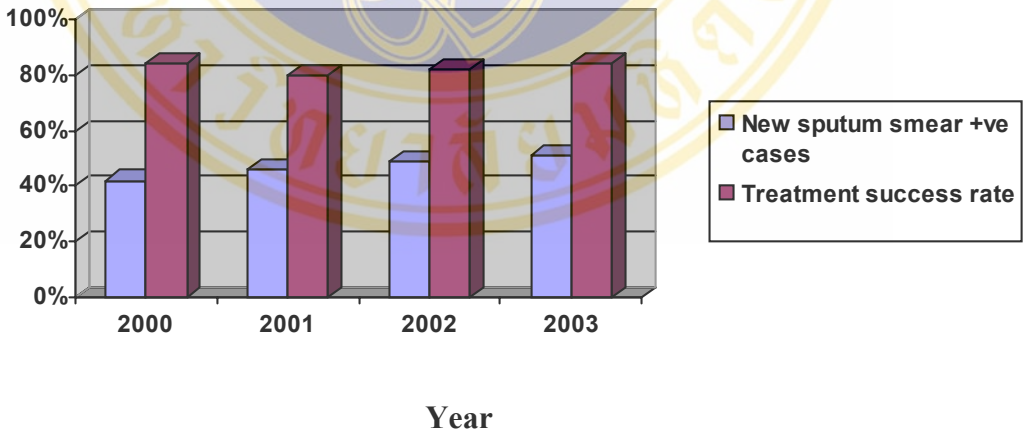

Figure 5 Trend of treatment success rate and sputum smear positive cases in Palpa district, Nepal (7)

There is no such standard and uniform operational policy to get high compliance of TB patient even through DOTS. There have been done few studies on patients' compliance with treatment in rural health service under Community Based DOTS. The available data also showed that the death and defaulter rates are still higher and the

poor compliance is still being in some districts. So it is necessary to study compliance with treatment among tuberculosis patients under Community Based DOTS and its related factors in rural health service. The results can be used for enhancing DOTS implementation in Nepal country for the future time.

1.2 Research Questions

- How do TB patients comply on Community Based DOTS in Palpa district, Nepal?
- What are the factors related to the compliance on treatment among TB patients?

1.3 Research objectives

1.3.1 General objective

- To identify TB patients' compliance on Community Based DOTS strategy in Palpa district, Nepal.

1.3.2 Specific Objectives

1. To identify the patient compliance with Community Based DOTS strategy,

2. To describe the socio-demographic characteristics of TB patients as age, sex, marital status, occupation, education, and family income.

3. To identify the knowledge and perception of TB patients on TB disease and practices of Community Based DOTS strategy.

4. To identify the accessibility and availability of Community Based DOTS services,

5. To identify the social support from their family, health workers and community health volunteers.

6. To identify relationship between patients' compliance and their socio-demographic characteristics, knowledge and perception of TB disease and Community Based DOTS, availability and accessibility of services, and social support.

1.4 Conceptual Framework

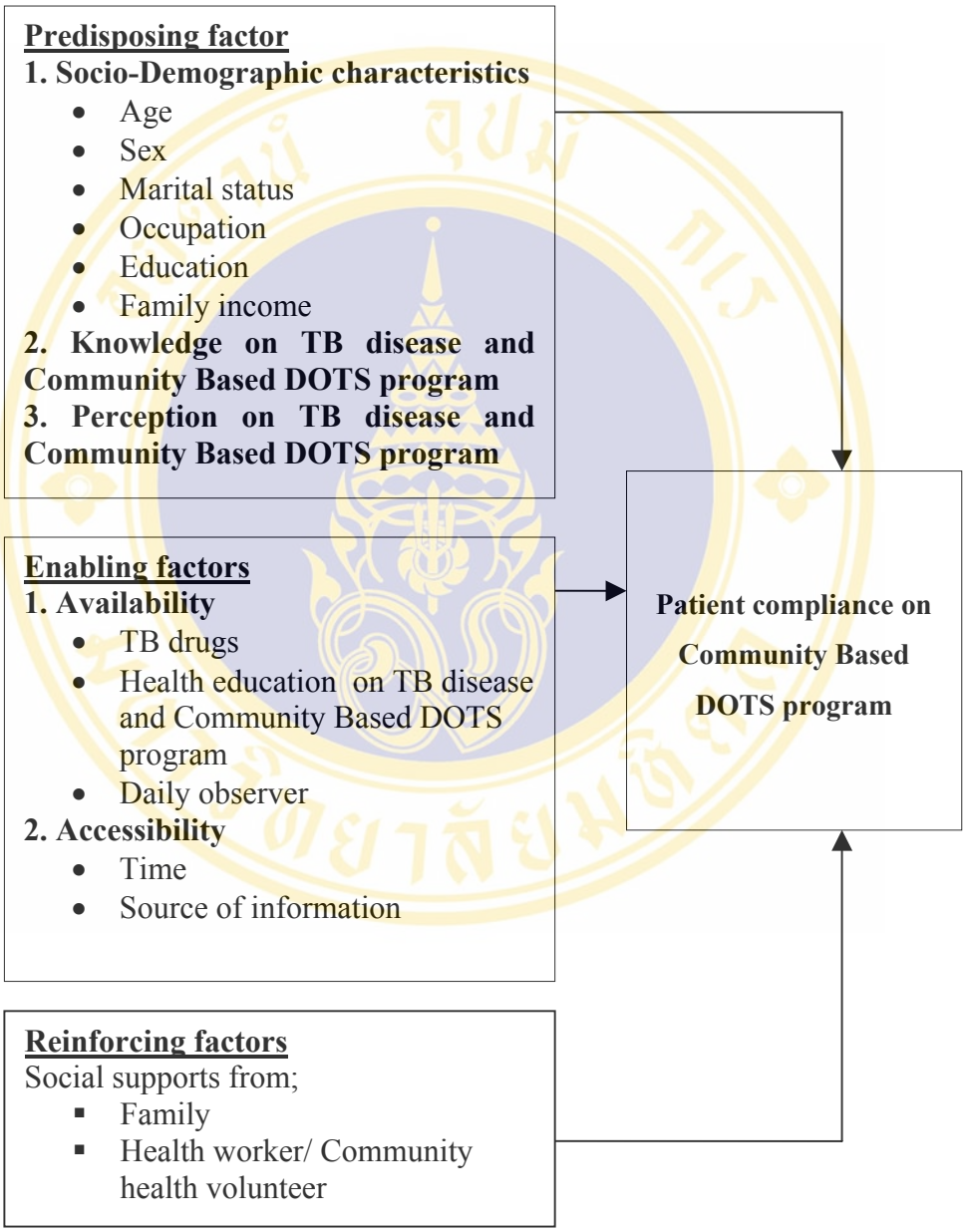

Figure 6 Conceptual framework

1.5 Operational definition

Patient compliance on Community Based DOTS: It refers to the patients must take the drugs routinely at DOTS treatment centre or under the direct observation of treatment supervisor without interruption of any dose of medicines under the intensive phase. Under the continuation phase it also refer to the patient who self administer the drugs routinely according to the treatment schedule through checking up from each his/her TB treatment card and stock of residual TB drugs. It is included to the patients who have missed the drug administration less than one week both in two phases.

Non-compliance is refers to a patient who has had interrupted treatment more than one week or any patient who does not follow the schedule mentioned in the operational definition of compliance.

Community Based DOTS: As per approved strategy of the ministry of health of Nepal, it means to the strategy that is used for the patients who are living within one hour walking distance. These are to be supervised by the health worker for administering the doses of TB drugs daily in the relevant health facility. For the patients who are living more than one hour walking distance, they are to be supervised by the community health volunteer for their drug administration in the relevant village or ward.

Intensive phase: It refers to the first two months treatment that the patients must take the daily drugs under the direct observation by health workers or community health volunteers.

Continuation phase: It refers to the rest six months treatment, the patients must go to visit and collect the drugs monthly from the DOTS treatment centre and self-administer it daily.

Health Workers: It means to the person of government health officers who are directly involved in the treatment of TB patients under the Community Based DOTS strategy.

Treatment supervisor: It refers to a person who observes the daily dose of drug intaken by the TB patient during the course of treatment. In this study, it means to health workers or community health volunteers.

TB patients: It refers to the patients who register in Community Based DOTS treatment and are diagnosed to TB case.

DOTS Treatment Centre: It refers to the health institutions where TB patients screened and diagnosed. Some patients are also treated with DOTS program under the center.

Duration of treatment: It refers to the eight months treatment under Community Based DOTS.

Community health volunteer: It refers to Female Community Health Volunteer, Village Health Worker and Maternal and Child Health Worker who are living in the same village or ward with the TB patients. These groups have willingness to observe the doses of TB drugs daily intaken by the TB patients.

1.5.1 Predisposing factors

Predisposing factors are factors that provide the rational or motivation for the TB patient's behaviors to comply on the TB treatment. In this study, the predisposing factors are included to socio-demographic characteristics of TB patients, their knowledge about TB disease and Community Based DOTS program and perception towards TB disease and Community Based DOTS program.

Socio-demographic characteristics

Socio-demographic characteristics are consisted of age, sex, marital status, occupation, educational status and family income of the respondents.

Age: It refers to a real age of the TB patients at the interviewing taken on the study places. Categorized as 15 – 34, 35 – 54 and 54 over.

Marital status: It includes to married, single, widowed, separated and divorced.

Occupation: It means to the patients occupations as farmer, laborer, housewife/ househusband, government and private employee, and others.

Education: It refers to the highest level of formal education among the respondents. The education is classified as illiterate, primary school level, secondary school level, certificate degree level, and bachelor degree level and over (college and university) and others.

Family income: It means to total monthly income earned by all family members of the respondents and measure in term of Nepali rupees. Categorized as less and equal to 3,000 and more than 3,000 Nepali Rupees.

Knowledge: It refers to understanding of TB patients about causes of tuberculosis, symptoms of TB, mode of its transmission, method of its diagnosis, major side effects of TB drugs, duration of full course of the treatment, and their practices under the Community Based DOTS program.

Cause of tuberculosis: It refers to Mycobacterium tuberculosis.

Symptoms of tuberculosis: It refers to the most important symptoms of TB as coughing from two weeks or more with fever at night

Mode of transmission: It indicates to the inhalation of TB aerosol spreading in the air when is occurred from TB patient coughing or sneezing.

Method of diagnosis: It refers to the sputum examination.

Duration of treatment: It means to the full treatment course consumed for eight months.

Stop treatment: It refers to the stop treatment after declaring that the patients are cured or completed by the health workers.

Practice of Community based DOTS: It refers to aims, duties and practice of patients and health workers/community health volunteers on Community Based DOTS. The main aim of this strategy will increase the patient compliance with easy access to the services. In the intensive phase, the patient must take TB medicines

regularly under direct observation from health workers or community health volunteers. After diagnosis as TB, a patient needs to have treatment supervisor either health worker or community health volunteer. If the health worker is an observer, any patient must come to ingest the drugs in front of him/her daily. If any community health volunteer is selected for TB patients, he/she must be able to observe these activities regularly.

In the continuation phase of treatment, the patients should collect monthly TB drugs from treatment center/sub-center. They by themselves are responsible for complete their course of treatment. Regularity of the patient on treatment can be checked by reviewing the TB treatment cards and their stock of the medicine.

Both of two phases, the health workers and community health volunteers will give social supports for the patients.

Perception towards TB disease: It refers to the patient perception on susceptibility of TB disease, severity of TB disease, benefits and barriers of Community Based DOTS program.

Susceptibility of TB disease: In this study, it refers to patient perception on TB susceptibility as it's easy to infect whether or not if someone get in close contacts and eating food together with TB patient.

Severity of TB illness: In this study, it refers to patient perception on TB severities which includes to his/her discomfort, loss of work time, financial burdens and death from TB disease.

Benefits of community Based DOTS program: In this study, it refers to the patient perception on benefits of the TB treatment as its efficacy, their capabilities on job performance under treatment of Community Based DOTS program.

Barriers of Community Based DOTS program: In this study, it refers to the patient perception on barriers related to the side effects /taste of drugs, social interaction with community members, difficult of practicing under Community Based DOTS program.

1.5.2 Enabling factors

Enabling factors are the factors that facilitate the motivation of predisposing factors to make more affecting towards compliance of TB treatment under Community Based DOTS strategy.

Availability of services: It is defined as available of TB drugs, health education, and available of daily observer during the treatment of the TB patients.

Accessibility of services: It refers to the time to get the TB medicine and source to get the information. The time is evaluated as average waiting time and appropriate time to get the TB medicine for the TB patients.

1.5.3 Reinforcing factors

Reinforcing factors are the factors that provide incentive force for the patient compliance of TB treatment on Community Based DOTS and contribute to its persistence. In this study, it is emphasized only social supports from family member, health workers and community health volunteers.

Social supports are included as:

Mental support: It refers to the patient perception on mental support in term of motivation, inducing and persuasion received from family, community health volunteers and health workers. It helps the patients to overcome their feelings of hopelessness, isolation, despair and confusion. This type of support can be provided through discussion, sharing feelings and talking about benefits of regular treatment under Community Based DOTS program.

Informational support: It means to the patient perception toward the information about the benefit of regular treatment under DOTS, management of side effects, and such kinds of nutritional food in additional to information about TB and its treatment. These types of support are provided by family member, community health volunteers and health workers.

Material support: It refers to the patient perception on material supports as enough foods and shelter, drugs without any charge provided by family member, health workers and community health volunteers.

1.6 Scope and limitation of study

This study had been done in Palpa district of Nepal. The target populations of the study were all tuberculosis patients age $\geq$15 years old registered during 1st July to 31st December 2004.

Due to the differences in socials, cultures and geographical areas of each community, therefore the result of this study might not be generalized to describe for the other communities or areas.

CHAPTER 2
LITERATURE REVIEW

2.1 Epidemiology of TB disease

Tuberculosis is an infectious disease caused by Mycobacterium Tuberculosis, which spread through the air when the infected persons cough or sneeze (1). The disease primarily affects lungs and causes pulmonary tuberculosis. It can also affects other parts of the body like bone & joints, tissues surrounding the brain, lymph nodes etc.(9), but the pulmonary tuberculosis is major public health problem because one untreated sputum smear positive patient can transmit disease 10-15 person per year.

Cough more then 2 weeks is the most common symptom to suspect symptomatic tuberculosis for diagnosis. Others symptoms are chest pain, night sweat, fever, loss of appetite, difficult to breathing and haemoptysis etc. (9).

WHO estimated that one third of the world population is infected with TB. About 8 million people become sick with TB annually, mostly of whom 95% are in developing countries (3). More than three million deaths are attributed to TB every year; one million of which are women and about 170,000 children (4). Most important things that 95% of TB cases and 98% of TB deaths are in developing countries. About 75% of TB cases developed in the economically productive age group (15-59 year). Beside this TB is showing an increasing trend not only increasing multi drug resistance but also due to TB/HIV co-infection. WHO declared TB as a global emergency in 1993, and adopted and promoted a new effective DOTS strategy for the TB control. TB control program be implemented within the framework of a National Tuberculosis Program. The World Bank considers and recommended that DOTS is one of the most cost effective of all health care interventions and should be a part of the essential clinical services package available in primary health care (5).

2.1.1 Factors contributing to the Rise in TB

Co-infection of TB and HIV

HIV infection is single most powerful factor that increases the risk of progression from TB infection to active disease. With increasing immuno-suppression, HIV infected individuals are increasingly at risk of developing TB. Thus the higher the HIV prevalence in a population, the greater will be the impact of HIV on TB incidence. TB is many times more likely to become sick with TB than someone infected with TB who is HIV negative. TB is a leading cause of death among people who are HIV positive. It accounts for about 15% of AIDS deaths worldwide. In Africa, HIV is the single most important factor determining the increased incidence of TB in the last ten years (10).

Poor managed TB programs are threatening to make TB incurable

Some surveys have been documented that partially treatment or irregular treatment or using single drug may be developed drug resistance. A particularly dangerous form of drug resistance TB is multi drug resistance (MDR), which is define as the disease due to TB bacilli resistance to at least Isoniazid and Rifampicin-the most powerful anti-TB drugs. MDR-TB is rising at alarming rates in some countries especially in the former Soviet Union, and threatens global TB control effort (10).

From a public health perspective, poorly supervised or incomplete treatment of TB is worse than no treatment at all. When people fail to complete standard treatment regimens, or are given the wrong treatment regimen, they may remain infectious. The bacilli in their lungs may develop resistance to anti- TB drugs. People who infect will have the same drug-resistance strain. While drug resistance TB is treatable, it requires extensive chemotherapy (up to 2 years of treatment) that is often prohibitively expensive (10).

Movement of people is helping the spread of TB

In many industrialized countries, at least one-half of TB cases are among foreign-borne people. In United State, nearly 40% of TB cases are among foreign-borne

people. The number of refugees and displaced people in the world is also increasing. Untreated TB spreads quickly in crowed refugee camps and shelters. As many as 50% of the world's refugees may be infected with TB.

In 1995, approximately 30% of San Francisco's homeless population and 25% of London's homeless were reported to be infected with TB. These figures compare to overall prevalence of 7% in United State and 13% in the United Kingdom (10).

2.1.2 Epidemiology of TB in Nepal

Mainly two risk factors play a significant role in tuberculosis infection in Nepal. The population density is 145.6 people per square kilometers in Nepal. Family size is 5-7 persons mostly living in crowed conditions. Also the migration from rural to urban areas is increasing (11).

The age of the source of infection, namely infectious TB cases are concentrated in young age group. Therefore, the source of infection remains in the society for long time. The date showed that the largest number of infection TB cases is in the age group of 15-24 years (12).

About 60% of adults and 45% in general population have been infected with TB (7). The highest risk factor for tuberculosis disease is the HIV infection. The number of AIDS cases has slowly increased in Nepal. The result of surveillance of HIV in people with TB showed that HIV prevalence in TB patients was 0.6% in 1996 and 1.8% in 1998 (7). The results indicate that the prevalence of HIV is increasing. Other factors are that poverty is also strongly associated with TB. The number of people living in poverty is large 80% of urban people and 70% of rural people fall under the poverty line according to recent estimates (12). All these facts are influencing the speed of TB in the country.

2.2 Global TB Control Strategy

Recognizing that TB is one of the most neglected health crisis and that the TB epidemic is out of control in many parts of the world (13). Facing the present challenge of the TB resurgence, WHO recommended a global TB control policy package which represents an organizational framework for the effective utilization of the two existing tools; they are: sputum smear microscopy (for diagnosis) and short course chemotherapy (For treatment), the WHO recommended framework for effective TB control consist of the following essential points:

Overall objectives of TB control are to reduce mortality, morbidity and interrupt the chain of transmission and to prevent the development of drug resistance.

Strategy for TB Control is to provide standardized short course chemotherapy (SCC) under direct observation at least during the initial intensive phase of treatment to, at least all identified smear-positive TB cases.

Target for TB Control;

- To cure 85% of detected new smear positive cases, and
- To detect 70% of existing new smear-positive cases (13). It is important to expand case finding only when a National TB Program has achieved a high cure rate throughout the country.

According to the WHO, DOTS is a proven effective strategy of best TB treatment achieving good cure rate, many scientists, TB specialists, national program managers and international organization have made efforts to find out an effective strategy of TB treatment like DOTS. WHO has played a major role to implement DOTS in its member countries including Nepal. The DOTS strategy had wider option depending upon socio-cultural factors, geography, economic status and health infrastructure of a country or a community (14).

2.3 Brief description of Community Based DOTS strategy

There is no such standard and uniform operational policy to get high compliance of TB patient even through DOTS. Community Based DOTS is a method of treatment to the TB patient under the direct observation of community health volunteers. Due to the geographical barrier, not easily access to the health services, lack of knowledge and low socio-economic condition of the people in the rural areas, DOTS will be difficult to implement, and recognize that research is needed to develop appropriate methods of treatment supervision. For such areas, 'community volunteers' have been suggested as appropriate DOTS providers. So the policy of using community volunteers as TB treatment supervisor known as Community Based DOTS, which is recommended by the government in some districts of the country as a trial basis. The following plan should be arranged under Community Based DOTS strategy;

- If patient's home is in less than 1 hour walking distance from treatment center/sub-center, should be treated under daily observation of health worker at treatment center/sub center.
- If distance is more than 1 hour, alternative treatment supervisors should be selected. They might be Female Community Health Volunteers or Maternal & Child Health Workers or Village Health Workers.
- Community Health Volunteers should be provided services without any incentive from the government or TB patients.
- Community Health Volunteers will collect medicine monthly from treatment center/sub-center for TB patient.
- Until intensive phase of treatment, patient should be treated under direct observation of the Community Health Volunteers in the relevant village or ward. In the continuation phase of treatment, treatment centers/sub centers are directly provided monthly medicine to the TB patients. TB patients, themselves are responsible for collect the medicine and complete the remaining course.
- Community Health Volunteers can be supervised them during the continuous phase of treatment for reinforce to the treatment and routinely follow up of

sputum smear microscopy. Sputum smear microscopy should be done at 2 month, 5 month and end of treatment from the treatment start date.

- Community Health Volunteers should be provided health education to the patient as well as community people. They can advice the suspected TB cases to check up their health.

In most of the DOTS centers TB patients should come to the health facility for DOT (Directly Observed Treatment), walking distance and geographical situation are barrier to complete the course. Community Based DOTS is easier access for the TB patent for their treatment by using community health volunteers as alternative person to act as supervision, who most be cheeked out by directly visit by health care workers for flexibility and adaptation to local situation as how to implement the DOTS strategy.

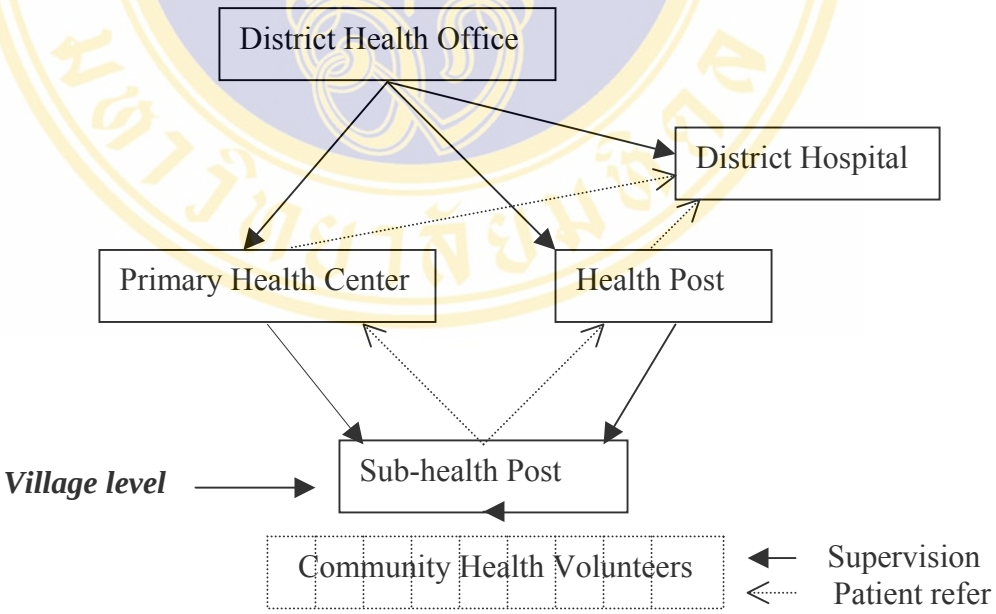

Figure 7 Diagram of government organization structure in district level of Nepal

This diagram shows that health system management in the district level including Community Based DOTS strategy. District health office (DHO) is main government organization in the district; its main responsibilities are planning, implementing, supervising, evaluating and monitoring the program in district level. Patient can refer from Sub-health Post (SHP) to District Hospital through Health Post (HP) or Primary Health Center (PHC). The front line providers in health service delivery are Female Community Health Volunteers (FCHVs), Maternal Child Health Workers (MCHWs) and Village Health Workers (VHWs). Their work at village level is reinforced by the community health facilities (7).

2.4 Community Based DOTS strategy in Palpa district, Nepal

In Palpa District, Community Based DOTS strategy was implemented in 1999 with covered the whole population. In this program most of the community health volunteers, health workers and other groups of the district are involved for success the alternative strategy. Unfortunately, there are still a number of defaults rates and death rates almost every year, and the number of patient and the proportion of new sputum smear positive cases are also increased as shown in table 1.

Table 1 Situation of Tuberculosis in Palpa district, Nepal from 2000-2003

Year	Number of TB cases	Proportion of new sputum smear positive cases	Treatment success rate (%)	Default rate (%)	Death rate (%)
2000	345	42%	84%	8%	6%
2001	315	46%	80%	8%	9%
2002	421	49%	82%	7%	6%
2003	377	51%	84%	5%	7%

Sources: Annual report of National Tuberculosis program, 2002/2003 (7).

DOTS is a new strategy to cure the patient and get high compliance. A patient has swallow the drugs in front of the health workers in order to ensure that the drug has been taken properly. But there are no fixed criteria to take the medicine and get high compliance in different situation. Of course DOTS is not easy, it needs a commitment from health worker, patients and community, which provide necessary support to the patient complete a full course of treatment (15).

2.5 Theory of Precede Proceed Model (16)

Health promotion has become a major challenge for all health providers. Having the necessary tools to create a health promotion project in the community. The PRECEDE-PROCEED model is a development model for the implementation of health promotion that was developed by L. W. Green in the 1970 as a specific measure in line with the concept of health promotion.

PRECEDE

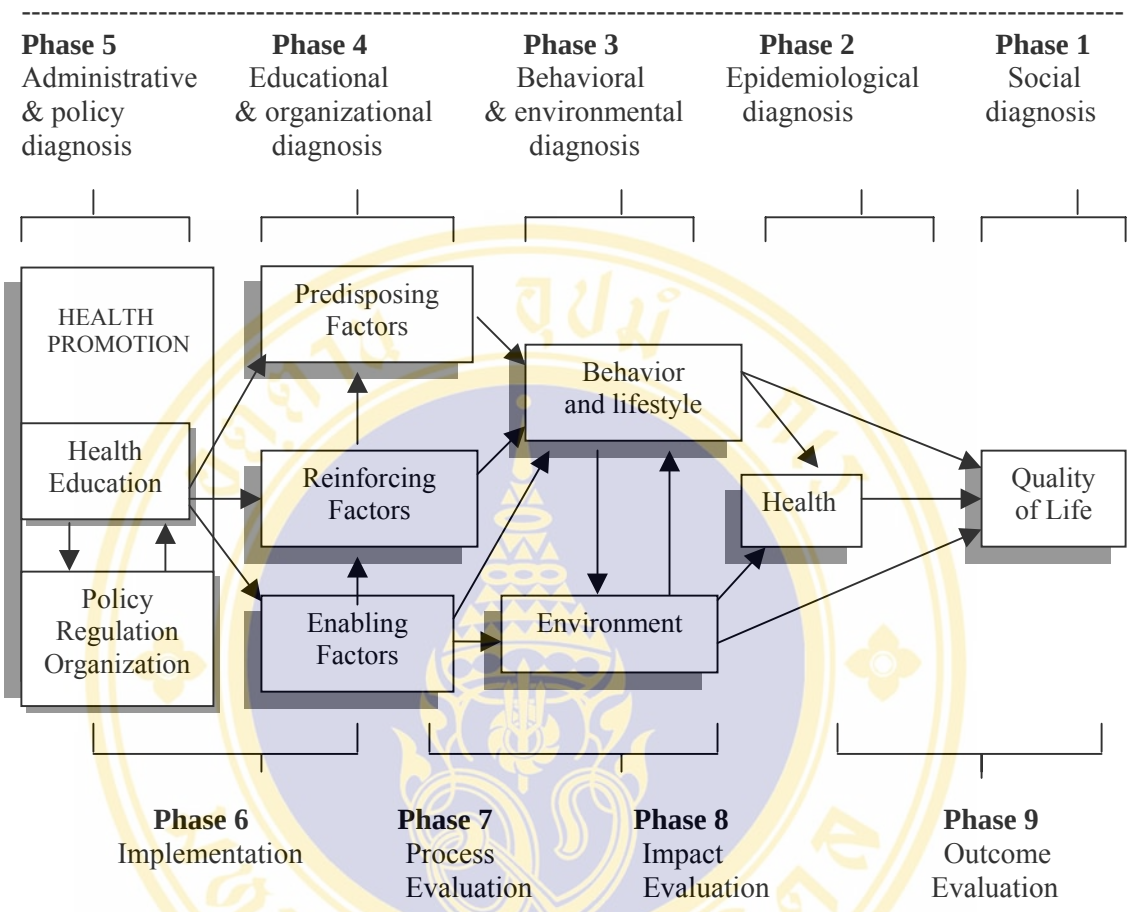

Figure 8 Precede Proceed Model

PRECEDE stands for "Predisposing, Reinforcing, and Enabling constructs in Educational Diagnosis and Evaluation." This segment takes into account the multiple factors that shape health status and help the planner arrive at a highly focused subset of factors as targets for intervention. It also generates specific objectives and criteria for evaluation.

The second segment, PROCEED stands for "Policy, Regulation and Organizational Constructs in Education and Environmental Development." The policy, regulatory and organizational components of this segment take the provider beyond education to the political, managerial and economic actions necessary to make social systems and environments more conducive to healthful lifestyles.

PRECEDE AND PROCEED, in cycle, provide a continuous series of steps or phases in the planning, implementation, and evaluation process. The identification of priorities and the setting of objectives in the PRECEDE phases provide the objects and criteria for policy, implementation, and evaluation in the PROCEED phases.

Phase 1: The quality of life is considered by assessing some of the general hopes or problems of concern to the target population (patient, family, community etc.) This is best accomplished by involving the people in a self-study of their needs and aspirations. For a community, these are often the social problems facing the community which serve as a barometer of its quality of life.

This is the social needs assessment or social diagnosis. This is the process of determining the community's perceptions of their needs or quality of life, and their aspirations for the common good. This diagnosis is achieved through broad participation and the application of multiple information-gathering activities designed to expand understanding of the community.

Phase 2: Identify the specific health goals or problems that may contribute to the social goals or problems noted in Phase 1. Through information generated by appropriate investigations, and epidemiological and/or medical findings, rank the several health problems, than select the specific health problem most deserving of educational and promotional resources which is most cases are scarce.

Phase 3: Consists of identifying the specific health-related behavioral and environmental factors that could be linked to the health problems chosen as most deserving of attention in Phase 2. Since these are the risk factors that the intervention is tailored to affect, they must be very specifically identified and carefully ranked. Both behavioral and environmental factors are linked to health and quality of life.

Phase 4: Hundreds of factors could be identified that have the potential to influence a given health behavior. The PRECEDE segment groups factors according

to the educational and organizational strategies likely to be employed in a health promotion program to bring about behavioral and environmental change.

Educational and organizational diagnosis examines those behavioral and environmental conditions linked to health status or quality of life concerns to determine what causes them. The educational and organizational diagnosis identifies factors that must be changed to initiate and sustain the process of behavioral and environmental change. These factors will become the immediate targets or objectives of the program.

According to the PRECEDE Framework, three categories: predisposing, reinforcing and enabling factors affect individual or collective behavior.

Predisposing factors: include a person's or populations' knowledge, attitudes, beliefs, values and perceptions that facilitate or hinder motivation for change. Demographics such as socioeconomic status, age, gender, family size may also predispose one to take action. Existing skills or capacity predispose one to take action, that is, those antecedents to behavior that provide the rationale or motivation for the behavior.

Enabling factors: those skills, resources, or barriers that can perform the desired behavioral changes as well as environmental changes. These skills can be viewed as barriers, created mainly by societal forces or systems, i.e., those antecedents to behavior that enable a motivation to be realized including the availability, accessibility, and affordability of health-care and community resources which facilitate the performance of an action.

Facilities and personal or community resources may be sufficient or inadequate, as may income or health insurance, and laws and statues may be supportive or restrictive.

The skills required for a desired behavior to occur also qualify as enabling factors. Enabling factors include all the conditions that make possible a desired change in behavior or in the environment. Enabling may include new skill development. Skills may include messages to resist peer pressure to continue the treatment.

Enabling factors are important targets of individual and community interventions. This requires resources and the skills as availability and accessibility of health services.

Reinforcing factors: The rewards received, and the feedback the learner receives from others following adoption of the behavior, may encourage or discourage continuation of the behavior, i.e., factors subsequent to a behavior that provide the continuing reward or incentive for the behavior and contribute to its persistence and repetition.

Consequences of action that determine whether the person receives positive (or negative) feedback and is supported socially after it occurs. Social support, peer influences, family, teacher, self, and others who control rewards can deliver reinforcing behaviors. In this study, phase 4 will be selected as an appropriate health promotion intervention.

Phase 5: Armed with the pertinent and systematically organized diagnostic information, the planner is ready to assess the organizational and administrative capabilities and resources for the development and implementation of a program. The

decision is based on their relative important and the resources available to influence them. It is between 5 and 6 that PRECEDE (the assessment portion of the model) ends and PROCEED (implementation and evaluation) begins.

Phase 6 Implementation: With appropriate resource in hand, planners are ready for phase 6, which the actual development and implementation of a program, all that remains is the selection of the methods and strategies for the intervention and implementation begins. **Phase 7, 8, 9** focus on the evaluation, process, impact and outcomes respectively and are based on the earlier phase of the model, when objectives were outlined in the assessment process, whether all three of these final phases are used depends on the evaluation requirement of the program, obviously, the resources needed to conduct evaluations of impact (phase 8) and outcome (phase 9) are much greater than those needed to conduct process evaluation (phase 7).

After reviewing the theory of Precede Proceed Model, the research will apply predisposing, enabling and reinforcing factors in phase 4 to apply with this study.

2.6 The Theory of Health Belief Model

Brief description (17)

The Health Belief Model (HBM) was originally developed as a systematic method to explain and predict preventive health behavior. It focused on the relationship of health behaviors, practices and utilization of health services. In later years, the HBM has been revised to include general health motivation for the purpose of distinguishing illness and sick-role behavior from health behavior. Originated around 1952. It is as the beginning of systematic, theory based research in health behavior.

The HBM was one of the first models that adopted theory from the behavioral science to health problems, and it remains one of the most widely recognized conceptual frameworks of health behavior, it was originally introduced in the 1950s as part of an effort by social psychologists working in the U.S. Public Health Service

(Hochbaum, Rosenstock, Leventhal and Kegeles) to explain the lack of public participation in health screening and prevention programs (e.g., a free and conveniently located tuberculosis screening project). They assumed that people feared diseases, and that health action were motivated in relation to the degree of fear (perceived threat) and expected fear-reduction potential of action, as long as that potential outweighed practical and psychological obstacle to taking action (net benefits).

The HBM states that the perception of a personal health behavior threat is itself influenced by three factors: general health values, which include interest and concern about health; specific health beliefs about vulnerability to a particular health threat; and beliefs about the consequences of the health problems. Once an individual perceives a threat to his/her health and is simultaneously cued to action, and his/her perceived benefits outweighs his/her perceived benefits, then that individual is most likely to undertake the recommended preventive health action. There may be some variables (demographic, sociopsychological, and structural) that can influence an individual's decision.

The HBM hypothesizes that health related behavior depends mainly upon two variables: **1.** the desire to avoid illness (or if ill, to get well); and **2.** the belief that a specific health action will prevent (or ameliorate) illness (ie. The individual's estimate of the threat of illness, and of the likelihood of being able, through personal action to reduce the threat).

Specially the Health Belief Consists of the following dimensions:-

Perceived susceptibility: Individuals vary widely in their feelings of personal vulnerability to a condition. Thus, this dimension refers to one's subjective perception of the risk of contracting a health condition.

Perceived severity: Feeling concerning the seriousness of contracting an illness or leaving it untreated also vary from person to person. This dimension includes evaluation of both medical and clinical consequences and possible social consequences.

Perceived benefits: While acceptance of personal susceptibility to a condition also believed to be serious was held to produce a force leading to behavior, it did not define the particular course of action that was likely to be taken; this was hypothesized to depend upon beliefs regarding the effectiveness of the various actions designed to reduce the threat of illness.

Perceived barriers: The potential negative aspects of a particular health action may act as impediment to undertaking the recommended behavior. A kind of cost benefit analysis is thought to occur wherein the individual weighs the action's effectiveness against perceptions that it may be expensive, dangerous, unpleasant, inconvenient, and so forth. These characteristics may lead a person away from taking the desired action.

Cues to action: This is a kind of stimulus necessary to trigger the decision making process. This might be internal (ie. Physical symptoms of the health condition) or external (ie. mass media communications, interpersonal interactions, or reminder postcard from health care providers) that motivate people to take action. Cues to actions is an aspect of the HBM that has not been systematically studied.

Socio-demographic variables: It was assumed that in any given instance, diverse demographic, sociopsychological, and structural variables might affect the individual's perceptions and thus indirectly influence health-related behavior.

Self-efficacy: The belief in being able to successfully execute the behavior required to produce the desired outcomes. (This concept was introduced by Bandura in 1997). The dimensions of Health Belief Model are depicted in figure 9.

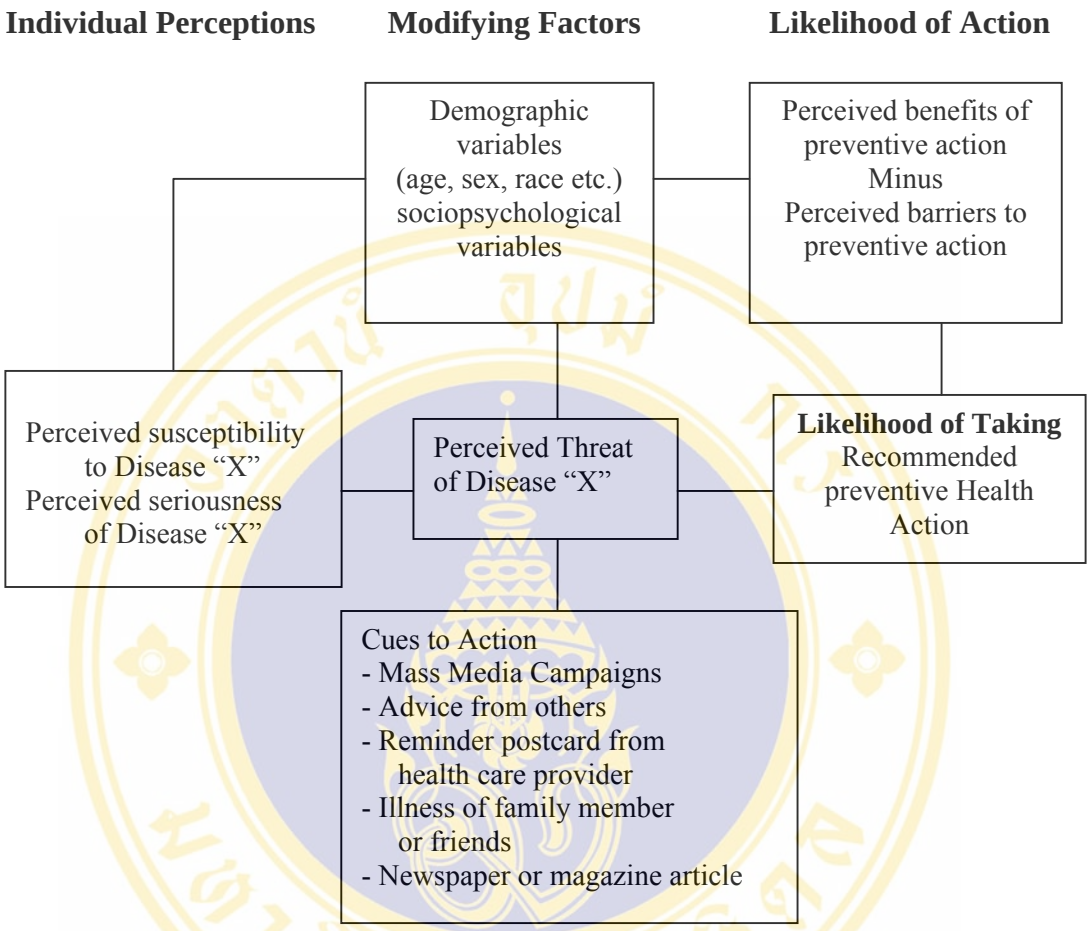

Figure 9 Basic elements of Health Belief Model

Source: Becker et al: "Selected psychosocial models and correlates of individual health-related behaviors" (18).

2.7 Social Support Theory

Social support is a theory that has been study for more than 30 years (since the mid 1970s). The theory was previously used in concrete terms, referring to an interaction or personal relationship. However, in the past 15 years, the term has become more and more abstract encompassing anticipation, conception, and quality of support, quality of supporting interaction, including abstract characteristic of a person, behavior, relationship or social systems (19).

It can be that, at present, they have been study concerning concepts and social support in various aspects. This study will mention only certain types of provided social support, the outcome of social support, and provision of social support to assist patients to receive complete treatment course.

Types of provided social support (20)

1. Emotional support; this support includes as mental support like acquaintance, affection, closeness, reliability, trust, respect and praise, care, and the support as a member of a society.

2. Information and cognitive support; Information and cognitive support is the giving of information or suggestion, which would help a person to understand how thing happen, help in problem solving, in adaptation, and the giving of reversed information on behaviors or people's conduct.

3. Tangible support; this support includes as material support like help by giving money, material or assistance, which would help a person in problem solving.

Positive outcome of social supports (20)

1. A person acknowledges affection, relationship, and care.

2. A person acknowledges self value, acceptance by others, and the value of being a member of society.

3. A person has motivation and readiness to change the behavior, and to adopt him to existing change.

4. A person to able to change method of problem solving, problem confrontation and stress management.

5. A person has better self-recognition and recognition of the environment.

6. A person is able to sustain good behavior and good help status.

After reviewing the theory of social support, the research will apply social support as mental, informational and material support from the family, health workers and community health volunteers in this study.

2.8 Findings from the previous research studies

2.8.1 The studies related to compliance on treatment among TB patients

Patient compliance with treatment depends upon the understanding trusts and good communication between health service provider and patients. The accurate gauging of patient's compliance required attempts at reduction of social distance between service provider and patient's and a bridging of barrier that are due to difference in education, social class, occupation status and ethnic identification. According to researches the service provider should explore and attempt to fulfill the patient's expectation for treatment (21).

A study of Mohamed NH 2003, Thailand reported that 88.6% of the TB patient had strict compliance with their treatment. About 57.8% were an economically productive age group. The study showed that about 76.7% compliance patients had a monthly family income of less than 5,000 Bhat. This study indicated that regarding the compliance with treatment among TB patient under family Based DOTS strategy. This strategy noticed that the patients had obviously gained much profit during their directly observed treatment at their home. The remarkable of the findings of this study was that easy access to health service/practice is being closer and appropriate in term of patient convenience, which can helps to increased compliance rate (22).

A study carried out in Kathmandu, Nepal in 2003, by Bam TS, reported that 61% of non-compliance TB patients interrupted their treatment due to lack of motivation. This study noticed that compliance patients had good emotional and informational support from family and friend (p-value <0.05) (23).

A study carried out by Port Elizabeth Municipality in 2001, to find out the effectiveness of the intervention which is community based support for TB patients and focused services of health workers in large urban primary health clinic of zwide, Port Elizabeth Municipality of South Africa. The study showed that after implementation of this intervention the sputum conversion rate increased from 67% to

84%. This means patients got a support from the community and health personnel (24).

2.8.2 The studies related to the socio-demographic characteristics and the patients compliance

Age:

Most productive age group has been infected with TB disease in the world; nearly 60% of adults are infected with TB in Nepal (7).

A study carried out in Kathmandu, Nepal in 2003, by Bam TS, reported that the proportion of compliance was high among younger (15-34) age group (p-value <0.05) (23).

A study of Kandel SL., regarding the compliance of tuberculosis patients with treatment in 2000, reported that compliance of the patients with treatment was not significant different among the age group (25). It indicates that age of patients has no impact on compliance of TB treatment.

Sex:

TB is the leading single infectious cause of female death in the world which kills over one million women every year, accounting for more then 2700 women dying of TB each day. A study showed that some impediments of treatment make clear the importance of curing women by using the DOTS strategy. DOTS allows women to be treated successfully and affordably near their homes (26).

A study conducted by Boyles SJ, showed that these was no statistically significant difference between the sex groups (p-value <0.05) (27). Other study of the Nguyen DH in Vietnam 2000, reported that there was no significant difference between the sexes (28).

Marital status:

A study of Morankar S. 2000, reported that women who get married are women about their husband's sexual behavior during the period of their treatment and the risk of his marrying another women due to the highly social stigma. This type of worry and tension compel then to complete the treatment as soon as possible. This study also describes that about 18% of married women stopped their treatment after disappeared the symptom of TB 2 to 5 month's treatment (29). A study carried out in Taiwan in 1997 by Lee RP and chiou YE, reported that the percentage of non-compliance behavior among widowed patients was significantly higher than single or married ones (30).

Occupation:

A study of Boyles showed that there was statistically significant in compliance among different levels of occupation. Non-compliance patient were more likely to be white collar workers ($P<0.01$) and students ($P<0.01$) whereas compliance patients were more likely to be not working ($P<0.01$) (23). But a study conducted in Thailand in 2000 by Kandel SL, reported that there was no significant in compliance among different types of occupations (25).

Education:

Education plays the vital role in TB treatment. If the patients have good education, they can understand good impact of regular treatment (27). A study conducted in Pakistan by Liefooghe R., Muynck AD., reported that illiterate patients had a higher risk of defaulting compared to literate patients (31).

Family income:

Most of the TB cases come from the poor society. People can't afford the travel costs. So income may affect the patient compliance of TB treatment. But the study of Thailand by Kandel SL., reported that there was no significant difference in compliance among the different income groups (25).

2.8.3 The studies related to the knowledge and the patients compliance

A study of Mohamed NH 2003, Thailand reported that there was highly significant association between patient knowledge of TB disease and the compliance of patient with treatment (p-value 0.037). This means that compliance patients have good knowledge on TB and its program (22).

A study was carried out in Ethiopia by Tekle B in 2002, regarding the defaulting from DOTS and its determinants. The study report showed that major factor contributing to high rates of defaulting were found to be lack of family support, inadequate knowledge about treatment duration and medication side effects. Control programs that take these factors into consideration should be successful in reducing defaulting (32).

A study of Liam CK et.al. 1999, among TB patients reported that patient had limited understanding and knowledge which was a negative correlation between patient age and tuberculosis knowledge score. The report showed that compliance with TB treatment was not affected by age, sex, ethnic group, educational level, occupation, symptoms of TB and duration of TB treatment. There was a trend toward poorer compliance among patients who equated disappearance of tuberculosis symptoms with cure of the disease (33).

2.8.4 The studies related to the perceptions and the patients compliance

A study of Mohamed NH 2003, Thailand reported that there was highly significant association concerning overall perception of illness and treatment (p-value 0.035) (22).

A study carried out in Taiwan by Lee RP, Chiou YE, informed that in terms of disease cognition and health belief model, a patients who had non-compliance behavior had lower disease cognition; their sensitivity to “susceptibility of the disease” and “severity of disease” was lower than those of the patients with compliance behavior. They had more problems adopting a healthy lifestyle. The compliance

behavior patients tended to have internal locus of control, and their support system and client-provider relationship were better than those of the non-compliance behavior ones (30).

A study carried out in India by Morankar S. in 2002, indicated that 20% women reported prior illness as the cause of TB. They had cough and fever and didn't eat anything and got the weakness and got eventually TB (29).

A study carried out in Pakistan by Khan A et al in 1999, reported that defaulters had highest rate of respondents not satisfied with treatment offered because they could not see any improvement and most were felt increasingly demoralized as initially strong family support became weaker. This study also indicated that the major reason of irregular collection of medication was dissatisfaction with treatment due to side effects caused by medication (34).

2.8.5 The studies related to the availability and accessibility of DOTS program and the patients compliance

A Study of Uplekar M., Rangan S., in India 1996, informed that patients drop out of the program because of lack of confidence in the service provided, shortage of drugs, absence of staff and poor infrastructural facilities. This study indicated that some patients refused their treatment due to the lack of proper health education (35).

A study carried out in South Africa by Dick J. et al in 1995, indicated that improve communication by healthcare personnel leads to better therapeutic outcomes, including the likelihood of enhanced patient adherence to therapy. A style of open communication promoted a deeper understanding of the issues involved, greater equity in decision making and a feeling of mutual trust. This study reported that during the treatment who got health education material or protocol had higher compliance rate compare to the other TB patient (36).

2.8.6 The studies related to the social supports and the patients compliance

A study carried out in Kathmandu, Nepal in 2003, by Bam TS, reported that compliance patients had good emotional and informational support from family and friend (p-value <0.05) (23).

A study conducted in India by Moranker S. in 2002, showed that those females who received a high level of support from family are found to be more optimistic about cure and are also more mentally stable. The study also pointed out TB patient faced problem not access to service in term of lack of support from health providers. On the other hand the rise of social stigma played a hindering role in access (29).

A study conducted by Lee RP and chiou YE in 1997, showed that those patients who had no financial support from the family had three times risk for defaulting. Material assistance from the social network such as regular visits from family and friends, assistance with the care of children in the home, with the job or studies, contributed to compliance (30).

In summary, from the literature review, concept and theory, and related research it is concluded that many factors have an effect on the treatment compliance among tuberculosis patients. Therefore, in this study, the researcher selected Precede Proceed model, phase 4 as an ecological assessment that included Predisposing, Enabling and Reinforcing factors were shown in figure 7, Health Belief Model as knowledge and perception of the disease and illness and Social Support Theory as social support in terms of mental, informational and materials from family, health workers and community health volunteers.

CHAPTER 3
RESEARCH METHODOLOGY

3.1 Study design

This was a cross sectional study, mainly employed with quantitative research method and supported by the qualitative technique. The quantitative data had been collected by interviewing through structured questionnaires. And for the qualitative data general conversation based on focus issues was used with some key informant patients. Its aims were to identify the patient compliance and its related factors as predisposing factor, enabling factor and reinforcing factor. Its duration of interviewing and general conversation were implemented between 6th Jan. to 29th Jan. 2005.

3.2 Study area

Palpa district was purposely selected due to it is the one district that had high incidence rate of TB cases in each annual year as shown in figure 4. More over this, the district had high defaulter and death rate of TB cases in each year as demonstrated in figure 3.

Palpa district is a mountainous area located at 300 kilometer away from Kathmandu, a capital city of Nepal. It consists of 65 villages and one municipality, where 49,942 households with total of 268,558 population living in it. 47% and 53% of them are male and 53% female respectively. Most (75%) are farmers. The transportation within the district is very difficult especially in the rainy season. For example many villages in the remote area can not be accessed during this season (11).

The district was divided into 4 parts by Community Based DOTS strategy program. TB patients must be registered in the treatment center before starting the treatment. From the treatment center, we can find out the registered patients for this study.

3.3 Study population

The target populations were all tuberculosis patients age ≥15 years old. They were registered during 1st July to 31st December 2004 in the treatment center. The patients who were under 15 years old and could not understand in additional to reply the questions well were excluded from the study.

3.4 Sampling technique and sample selection

3.4.1 Quantitative study

Under census survey technique, all the target population who still alive were included in the study. And the studied sample group was 101 persons.

3.4.2 Qualitative study

For the qualitative data, 6 key informant patients were selected from 101 interviewed respondents to find out more details about the study. They had been selected from whom had enough time to provide important information and also whom had willingness and could communicate easily in the conversation.

3.5 Research instruments

Structured questionnaire, check list form and guidelines for general conversation were constructed to collect the data related to this study as follows;

3.5.1 For the quantitative part

3.5.1 1 Checklist form for clinical information

This part was consisted of clinical information as patient ID No., treatment start date, disease type, registration category, treatment category, phase of treatment, compliance level up to present. This information had been taken from observation of TB register, TB treatment cards and laboratory register.

3.5.1 2 Predisposing factors

Socio-demographic characteristics of patients

This part had been consisted of those variables such as age, sex, marital status, occupation, education and family income.

Knowledge

There were 10 questions, from question number 7 to 16, regarding to the TB disease and practice of Community Based DOTS program.

Each respondent must select the only one answer from multiple choices that he/she thinks it should be correctly. The questions were divided to two groups as follows;

- Related TB disease there were 7 questions as Q7, Q8, Q9, Q10, Q11, Q12, Q13
- Related to practice of CBDOTS program were 3 questions as Q14, Q15, Q16

To measure knowledge, the range of score was 0-10, each correct answer give a score of 1, where as 0 score was given for every incorrect answer. According to Bloom's classification (37) the total knowledge had been categorized into 3 levels as follow:

a. High level is defined as more than 80% of scores (8-10 points).
b. Moderate level is defined as 60%-80% of scores (6-7 points).
c. Low level is defined as less than 60% of scores (less than 6 points).

Perception

To measure perception of patient towards TB disease and CBDOTS program. There were positive and negative statements. Patient would select the most correct one out of three blanks by marking a tick [√] according to their perception on susceptibility, severity of TB disease and perception toward the benefit and barrier of CBDOTS program as: agree, not sure, disagree measurement. Based on modified Likert scale, the statements were graded as follows;

- For the positive statements; Agree=3, Not sure =2, Disagree=1
- For the negative statements as Agree=1, Not sure =2, Disagree=3

There are 22 statements (from17 to 38) in this part and divided into 4 groups;

Group 1: the perception for susceptibility was consisted 5 statements (Q17-Q21).

There were 2 positive statements: Q20, Q21 and 2 negative statements: Q17, Q18, Q19.

Group 2: the perception for severity of illness was consisted 6 statements (Q22-Q27).

There were 3 positive statements: Q23, Q24, Q27 and 3 negative statements: Q22, Q25, Q26.

Group 3: the perception for benefit of CBDOTS program was consisted 5 statements (Q28-Q32).

There were 3 positive statements: Q28, Q30, Q32 and 2 negative statements: Q29, Q31.

Group 4: the perception for barrier of CBDOTS program was consisted 6 statements (Q33-Q38)

There were 3 positive statements: Q33, Q36, Q38 and 3 negative statements: Q34, Q35, Q37.

The range of scores is 22-66. Levels of the patient perception were scored according to the answer of all statements. Best's group rating criteria (38) had been

used to calculate the range of each level, by subtracting the maximum score with minimum score and then the outcome was divided by number of measuring level. This is depicted in the formula below;

$$\text{Range} = \frac{\text{Maximum scores} - \text{Minimum scores}}{\text{Number of measuring level}}$$

The result of perception had been written as;

a. High level was defined as 52 – 66 scores.

b. Moderate level was defined as 37 – 51 scores.

c. Low level was defined as 22 – 36 scores.

3.5.1.3 Enabling factors

Availability

The questions were related to availability of drugs, health education and available of health worker/community health volunteer in the treatment place. There were 3 questions from question number 39 to question number 41.

Accessibility

The questions regarded to access the clear information and communication measured in term of source of information and waiting time and appropriate time to get medicine measured in the treatment place. There were 3 questions from question number 42 to question number 44.

3.5.1.4 Reinforcing factors

To measure the opinion of TB patients about social supports from their family and health worker/community health volunteers. There were positive and negative statements. Patient would select the most correct one out of three blanks by marking a tick [√] related to the statements in term of mental, informational and material support from their family and health worker/community health volunteers. as: agree, not sure,

disagree measurement. Based on modified Likert scale, the statements were graded as follows;

- For the positive statements; Agree=3, Not sure =2, Disagree=1
- For the negative statements as Agree=1, Not sure =2, Disagree=3

There were 24 statements (from45 to 68) in this part and divided into 2 groups;

Group 1: Social support from their family was consisted 12 statements (Q45-Q56).

Mental supports: there were 4 statements (from Q45-Q48)

There were 2 positive statements: Q45, Q47 and 2 negative statements: Q46, Q48.

Informational supports: there were 4 statements (from Q49-Q52)

There were 2 positive statements: Q49, Q51 and 2 negative statements: Q50, Q52.

Material supports: there were 4 statements (from Q53-Q56)

There were 2 positive statements: Q53, Q54 and 2 negative statements: Q55, Q56.

Group 2: Social support from health worker/community health volunteers consisted 12 statements (Q57-Q67).

Mental supports: there were 4 statements (from (Q57-Q60)

There were 2 positive statements: Q57, Q58 and 2 negative statements: Q59, Q60.

Informational supports: there were 4 statements (from Q61-Q64)

There were 2 positive statements: Q61, Q64 and 2 negative statements: Q62, Q63.

Material supports: there were 4 statements (from Q65-Q68)

There were 2 positive statements: Q65, Q67 and 2 negative statements: Q66, Q68.

The range of overall scores was 24-72. Levels of overall social support were scored according to the Best's group rating criteria, same way as mentioned in the part perception part;

a. High level was defined as 24 – 40 scores.

b. Moderate level was defined as 41 – 56 scores.

c. Low level was defined as 57 – 72 scores.

3.5.1.5 Related compliance issues

This part had been included question number 69 to question number 72 related to the patient compliance. One question (Q69) had been asked to the every respondent and other questions were for those respondents who were noncompliance.

3.5.2 For the qualitative part

This part had been included to the following guidelines for general conversation with 6 key informant patients as;

- Opinion of compliance and noncompliance groups about their reasons of compliance or noncompliance on CBDOTS program.
- Their knowledge on TB disease and CBDOTS program
- Their perception towards TB disease and CBDOTS program
- Their opinion about accessibility and availability of CBDOTS program
- Their opinion about social supports from the various types and sources

3.6 Validity and Reliability testing

3.6.1 For quantitative

The questionnaire had been approved from the expert of thesis committee regarding to its content validity. The pilot study had been done in 30 TB patients in the same district, who were registered before July 2004 and had been taking treatment under the Community Based DOTS strategy. The aim of the pilot study was to find out the comments about lack of clarity in wording and testing its reliability of the questionnaire.

The questionnaire had been pre-tested for its reliability by using Cronbach's Alpha method for parts of perception and social support. Kuder Richardson 20 (K-20) had been used for another part of knowledge on TB and its program.

The pre test results with reliability analysis were as follows:

Knowledge: Reliability of KR20 = 0.69

Perception: Reliability of coefficient alpha = 0.7758

Social support: Reliability of coefficient alpha = 0.8361

The reliability analyses were high quality value. And these were not necessary to adjust or rewrite all the items and sentences in the questionnaire. Therefore the procedure of data collection had been continued.

3.6.2 For qualitative

To make sure of a qualitative instrument as guideline for general conversation had its content validity; it was checked up by thesis committee according to the main selected issues.

3.7 Data collection procedure

1. Before employing the data collection, English version of the questionnaire had been translated into Nepali language for interviewers.

2. A formal document indicating the aims and study processes from AIHD had been sent to the Chief of District Health Office, Palpa district, Nepal to request his permission.

3. After obtained the permission, the arrangements had been made for collecting the data.

4. During the data collection the patient lists had been taken from four DOTS treatment centers. To find out the compliance and non-compliance patients, the researcher would check patient treatment card to find out their general clinical information of compliance status.

5. For the individual interviewers, 5 Nepali interviewers had been trained before beginning on the quantitative data collection. They had been informed about

the study purposes and the confidentiality, which were considered throughout the study.

6. Both of quantitative and qualitative data collection were implemented during same period;

6.1 Quantitative data collection:

Before implementation of the interviewing each interviewee asked for their permission and informed the benefits of this study to the respondents. After that the processing of interviewing was performed according to the structure questionnaire.

6.2 Qualitative data collection:

The interviewee would screen and select the key informant patients (based on the criteria mentioned in sampling technique) to participate in general conversation with the researcher. The appointment time of general conversation was assigned and implemented after finishing the quantitative process with each his/her agreement.

3.8 Data analysis

3.8.1 For quantitative data

The data had been evaluated by using Minitab program. Number, percentage, mean, median, range and standard deviation had been used to describe the variables as descriptive statistics. Chi-square test and Mann-Whitney U test had been used as inferential statistics to find out the association between each independent variable and dependent variable. For all of statistical test used in this study, the significant level was set up at $\alpha = 0.05$.

3.8.2 For qualitative data

The results of qualitative data had been analyzed according to its content to support the result form quantitative data.

CHAPTER 4
RESULTS

The study was conducted from 6th to 29th January 2005 in Palpa district of Nepal. Four DOTS treatment centers and eight DOTS treatment sub centers were included in this study. The main purpose of the study was to describe compliance status on DOTS among TB patients during the CBDOTS treatment and identify its related factors as predisposing factors, enabling factors and reinforcing factors. The α error was kept at 0.05 for two sides test throughout the analysis. The results were presented as follows;

4.1 Compliance status among the respondents

There were 101 respondents who obtained during the study period. The respondents were interviewed and the patient treatment cards were examined to determine the compliance status among the patients. The patients who irregularly complied to TB treatment more than seven days were classified as a noncompliance group. Therefore the noncompliance TB patients were 39 persons (38.61%) and another 62 TB patients (61.39%) were a compliance group as showed in table 2.

Table 2 Number and percentage of TB patients classified by compliance on Community Based DOTS program

Compliance status	Number (N =101)	Percentage
Compliance	62	61.39
Noncompliance	39	38.61

4.2 Clinical information

Nearly to two thirds (64.36%) of the respondents were obtained from Palpa hospital DOTS treatment center, and 17.82% of the respondents were included from Rampur PHC DOTS treatment center. Only 12.87% of them from Khasauly PHC DOTS treatment center and a few (4.95%) of them were from Tahoon PHC DOTS treatment center as shown table in 3.

Table 3 Number ad percentage of TB patients classified by DOTS treatment center

DOTS treatment center	Number (N =101)	Percentage
Palpa Hospital	65	64.36
Rampur PHC	18	17.82
Khasauly PHC	13	12.87
Tahoon PHC	5	4.95

It was shown that nearly to equal proportion of compliance and noncompliance patients were registered in different DOTS treatment centers, while about 60% were classified as compliance and about 40% were as noncompliance TB patients. More details were demonstrated in table 4.

Table 4 Number and percentage of TB patients classified by DOTS treatment centers and compliance

DOTS treatment center	Compliance (N = 62)		Noncompliance (N = 39)	
	No.	%	No.	%
Palpa Hospital	40	61.54	25	38.46
Rampur PHC	11	61.11	7	38.89
Khasauly PHC	8	61.54	5	38.46
Tahoon PHC	3	60.00	2	40.00

Majority of the noncompliance TB patients (79.49%) interrupted their treatment during the continuation phase (after two months of starting TB treatment), while about 20% of the noncompliance TB patients interrupted the treatment during the intensive phase (the first two months of treatment). More details were illustrated in table 5.

Table 5 Number and percentage of noncompliance TB patients classified by DOTS treatment center and treatment periods

DOTS treatment center	Intensive phase (N = 8)		Continuation phase (N = 31)	
	No.	%	No.	%
Palpa Hospital	6	24.00	19	76.00
Rampur PHC	1	16.67	6	83.33
Khasauly PHC	1	20.00	4	80.00
Tahoon PHC	0	0.00	2	100.00
Total	8	20.51	31	79.49

The reasons given by noncompliance TB patients for interrupting the treatment were shown to that more than a little bit one-third of them (35.90%) said to the side effects of the drugs. Nearly to one-quarter of them (23.08%) said that it was due to feeling of cured/completed treatment. These were supported by qualitative data shown in Appendix D (I, 1 and 2). More details of the reasons were demonstrated on table 6.

Table 6 Number and percentage of reasons for noncompliance on Community Based DOTS program

Reason for not complying	Number (N = 39)	Percentage
Travel cost couldn't afford	4	10.26
Health workers are not friendly	4	10.26
Side effects of the drugs	14	35.90
Feeling cured/completed treatment	9	23.08
Lack of motivation	5	12.82
Others	3	7.69

4.3 Description on the independent variables

4.3.1 Predisposing factor

To consider the predisposing factor, it was included to socio demographic characteristics of TB patients (age, sex, marital status, educational status, occupation and monthly family income). Their knowledge and perception on TB disease and Community Based DOTS program were also considered too. Number and percentage were performed to describe these predisposing factors as follows;

4.3.1.1 Socio demographic characteristics

From table 7, it was indicated that nearly to two-fifth of the respondents (39.60%) were belong to younger age group (15-34) and 31.68% had age ranged 35-54 years old. And 28.72% of them were a residual group aged over 54 years old.

To concern about sex status, male patients were accounted to about two-thirds of them (65.35%).

Regarding to marital status, nearly to three-quarters of the respondents (74.26%) were belong to a married group, while15.84% were a single group.

To consider educational status, it was found that a little bit more than one-third of them (35.64%) graduated at secondary and over level education. Nearly to the same proportion, about one-fourth of them had primary level education (27.72%) and illiterate (28.71%).

Regarding to occupational status, a little bit over one-third of the respondents (34.65%) were involved in farming and more than one-fifth (21.78%) were belong to housewife/househusband group.

Monthly family income of the respondents was divided into two groups, it was shown that 52.48% of them had their income accounted to more than 3,000 Rupees and 47.52% of them had income lower than and equal to 3000 Rupees. More details were illustrated to table 7.

Table 7 Number and percentage of respondents classified by socio-demographic factors

Socio-demographic characteristics	Number (N = 101)	Percentage
Age groups (Years)		
15-34	40	39.60
35-54	32	31.68
>54	29	28.72
Mean ± SD = 42.47 ± 17.12, Min = 15, Max = 76, Q1 = 27, Q3= 56.5		
Sex		
Male	66	65.35
Female	35	34.65
Marital Status		
Single	16	15.84
Married	75	74.26
Widowed	8	7.92
Separated/Divorced	2	1.98
Educational status		
Illiterate	29	28.71
Primary school	28	27.72
Secondary and over	36	35.64
Informal education	8	7.93
Occupation		
Farmer	35	34.65
Govt./pvt. employee	17	16.83
Housewife/Househusband	22	21.78
Labor	10	9.90
Other	17	16.83
Income (Rs.)		
≤ 3000	53	52.48
> 3,000	48	47.52
Median 3,000, Q1 =1500, Q3 =5,000, Min = 100, Max = 20,000,		

4.3.1.2 Knowledge on TB disease and Community Based DOTS program

Three knowledge levels were made based on Bloom classification as mentioned earlier in chapter 3. Based on this criteria, about two-fifth of them had high and moderate level of knowledge about TB disease and Community Based DOTS program, accounted to 40.59% and 38.62% respectively. And one-fifth of them (20.79%) had low knowledge level as seen in Table 8.

Table 8 Number and percentage of respondents classified by level of knowledge on TB disaese and Community Based DOTS program

Level of knowledge	Number (N = 101)	Percentage
High (8 and over)	41	40.59
Moderate (6 to 7)	39	38.62
Low(less than 6)	21	20.79
Median = 7, Q1 = 5, Q3 = 8, Min = 1, Max = 10,		

Knowledge about TB disease and Community Based DOTS program were more assessed based on the cause of TB, mode of disease transmission, prevention of disease transmission, the most important symptoms of TB disease and method of disease diagnosis. The major side effects of TB drugs, management of side effects of TB drugs, duration of TB treatment and stopped of the treatment and impact of stop taking drugs before full course of treatment were also considered too.

According to the results, most of the respondents answered correctly in items numbered 4,5,7,8 and 9, which were related to symptoms of TB, diagnosis on TB disease, management of drugs side effects, duration of treatment and stop of TB drugs respectively. This was supported by qualitative data shown in Appendix D (II 2).

About half of the respondents answered correctly in items numbered 2, 3 and 10, which were related to method of TB transmission, prevention of TB transmission and

impact of irregular/stop taking TB drugs before full course of treatment. These were supported by qualitative data shown in Appendix D (II, 2 and 3).

A few cases answered correctly in items numbered 1 and 6, which were related to the cause of TB and major side effect of TB drugs. During general conversation some incorrect knowledge about the cause of TB could be shown from the patient sentences in Appendix D (II 4 and 5). More details of quantitative data were depicted in table 9.

Table 9 Number and percentage of respondents classified by correct answers related to knowledge about TB disease and Community Based DOTS program

Knowledge Questions	Correct answer	
	Number (N = 101)	Percentage
1. What is the cause of TB?	39	38.41
2. How is TB transmitted?	47	46.53
3. How can you prevent TB disease transmit to others?	56	55.45
4. Which one is the main symptom of TB?	87	86.14
5. Mainly, how Tuberculosis is diagnosed?	78	77.23
6. What is the major side effect of TB drugs?	25	24.75
7. When having TB drugs & get some its side effects, what will you do?	90	89.11
8. What is the duration of TB treatment?	89	88.12
9. When will you stop taking TB drugs?	90	89.11
10. What will happen if you stop taking TB drugs before full course of treatment?	50	49.50

4.3.1.3 Perception on TB disease and Community Based DOTS program

According to the results (Table 10), more than half of the respondents (55.45%) had moderate perception level; the lower proportion had high and low

perception level (34.65% and 9.90%) toward TB disease and Community Based DOTS program respectively.

Table 10 Number and percentage of respondents by overall level of perception on TB disease and Community Based DOTS program

Level of perception	Number (N = 101)	Percent
High (52 - 66)	35	34.65
Moderate (37 - 51)	56	55.45
Low (22 - 36)	10	9.90
Median = 49.00, Q1 = 45.00, Q3 = 53.50, Min = 27.00, Max = 66.00,		

More details than this, the perception of TB patients were also categorized to their perception toward susceptibility of TB disease, severity of TB illness, benefits and barrier of CBDOTS program. Regarding to the susceptibility, more than half of the respondents (54.46%) had its moderate level and a little bit different proportion of them had low and high level of susceptibility respectively (23.76% and 21.78%).

About the perception to severity of TB illness, nearly to half of the respondents (48.51%) were on moderate level of perception. About one-fourth of them had its low and high level respectively (26.73% and 24.75%).

As far as the benefits for CBDOTS was concerned in this section, most of the respondents (64.36%) had its high perception level and the rest of them had the moderate and low perception level respectively (25.74% and 9.90%).

To consider the perception on barrier, 45.54% and 40.59% of the respondents had its moderate and high level respectively. And the rest (13.86%) had its low level. More details were depicted as table 11.

Table 11 Number and percentage of respondents answer regarding to level of each type of perception on TB disease and Community Based DOTS program

Perception level	Number (N = 101)	Percentage
Susceptibility		
High (12 - 15)	22	21.78
Moderate (9 - 11)	55	54.46
Low (5 - 8)	24	23.76
Mean ± SD = 9.95 ± 2.55, Q1 = 9.00, Q3 = 11.00, Min = 5.00, Max = 15.00,		
Severity		
High (15 - 18)	25	24.75
Moderate (11 - 14)	49	48.51
Low (6 - 10)	27	26.73
Mean ± SD = 12.68 ± 2.83, Q1 = 10.00, Q3 = 14.50, Min = 7.00, Max = 18.00,		
Benefit		
High (12 - 15)	65	64.36
Moderate (9 -11)	26	25.74
Low (5 - 8)	10	9.90
Median = 13.00, Q1 = 11.00, Q3 = 14.00, Min = 5.00, Max = 15.00,		
Barrier		
High (15 - 18)	41	40.59
Moderate (11 - 14)	46	45.54
Low (6 - 10)	16	13.86
Median = 14.00, Q1 = 12.00, Q3 = 16.00, Min = 6.00, Max = 18.00,		

Regarding to the perception of susceptibility in its more details, 55.45% of the respondents disagreed on “You do not re-infected with TB, when you get in close contact with other TB patient”. Same percentage of them (73.27%) agreed on “Eating food together with TB patient, it is easily to infect with TB disease” and “Any family member infected with TB, other members may develop TB”. A little bit more than

three-fifth of them (62.38%) agreed on “Strong person and weak person have equal opportunities to infect with TB” and most of them (69.31%) disagreed on “You live in TB crowed environment, it is easy to get TB infection”.

To concern more about the perception of severity, nearly to three quarters (73.27%) of them agreed on “Feeling sick with TB, it can lose much of your working time”. This was supported by qualitative data shown in Appendix D (III, 1). Majority of them (82.18%) of them agreed on “TB is a serious disease, you may have fatal outcome if untreated”. Nearly to two-thirds (63.37%) of them disagreed on “While having TB sickness, you can work to earn income as usual”. Similar percentage (44.55% and 43.56%) of them disagreed and agreed on “TB patients are disliked/hated from community members”. This was supported by qualitative data shown in Appendix D (III, 2 and 3). More than a half of them (53.47%) agreed on “It is your bad luck to infect with TB disease” and majority of them (89.11%) agreed on “TB disease is the one disease which can be cured easily”.

As regards to the perception towards benefits of CBDOTS, little bit more than third-quarters of them (76.24%) agreed on “To administer TB drugs according to the schedule it can cure TB disease completely”. 39.60% of them disagreed on “Community Based DOTS can’t interrupt the transmission of TB disease”. Nearly to two-thirds of them (63.37%) agreed on “After finishing your treatment, you can do your work as usual”. This was supported by qualitative data shown in Appendix D (III, 4) A little bit more than a half of them (53.47%) disagreed on “To practice yourself according to the recommendations from health workers/community health volunteers it can not cure you from the disease more rapidly”. Majority of them (86.14%) agreed on “To smoke and drink alcohol it yields effects to TB treatment”.

Concerning to the perception towards barrier for CBDOTS, a little bit more than one-fourth of them disagreed (28.71%) on “After getting TB treatment, you can make contact with friends and neighbors as usual”. These were supported by qualitative data shown in Appendix D (III, 5 and 6). More than a half (53.47%) of them disagreed on “You feel much boring to take TB drugs for 8 months”. A little bit more than three-

fifth of them (61.39%) disagreed on “When your symptoms are relieved, you can reduce drug doses or stop taking the drugs”. Most of them (79.21%) agreed on “Even though you have so much busy time, you can get to meet or collect the drugs from the health worker or community health volunteer at the appointed time”. Most of them agreed (62.38%) on “Due to you must take the TB drugs, your TB illness is worse than previous time”. Nearly to a half of them (46.53%) disagreed on “Administering the drugs for long times it cause you depend on the drugs”. More details as shown in table 12.

Table 12 Percentage of respondents classified by perception towards TB disease and Community Based DOTS program

No	Statement	Level of agreement		
		Agree %	Not sure %	Disagree %
	Susceptibility			
1.	You do not re-infected with TB, when you get in close contact with other TB patient	31.68	12.87	55.45
2.	Eating food together with TB patient, it is easily to infect with TB disease	73.27	7.92	18.81
3.	Any family member infected with TB, other members may develop TB	73.27	10.89	15.84
4.	Strong person and weak person have equal opportunities to infect with TB	62.38	7.92	29.70
5.	You live in TB crowed environment, it is easy to get TB infection	18.81	11.88	69.31
	Severity			
6.	Feeling sick with TB, it can lose much of your working time	73.27	3.96	22.77
7.	TB is a serious disease, you may have fatal outcome if untreated	82.18	11.88	5.94
8.	While having TB sickness, you can work to earn income as usual	30.69	5.94	63.37
9.	TB patients are disliked/hated from community members	43.56	11.88	44.55
10.	It is your bad luck to infect with TB disease	53.47	1.98	44.55
11.	TB disease is the one disease which can be cured easily	89.11	4.95	5.94

Table 12 Percentage of respondents classified by perception towards TB disease and Community Based DOTS program (cont.)

No	Statement	Level of agreement		
		Agree %	Not sure %	Disagree %
Benefits				
12.	To administer TB drugs according to the schedule it can cure TB disease completely	76.24	11.88	11.88
13.	Community Based DOTS can't interrupt the transmission of TB disease	32.67	27.72	39.60
14.	After finishing your treatment, you can do your work as usual	63.37	15.84	20.79
15.	To practice yourself according to the recommendations from HW/CHVs it can not cure you from the disease more rapidly	28.71	17.82	53.47
16.	To smoke and drink alcohol it yields effects to TB treatment	86.14	4.95	8.91
Barriers				
17.	After getting TB treatment, you can make contact with friends and neighbors as usual	68.32	2.97	28.71
18.	You feel much boring to take TB drugs for 8 months	40.59	5.94	53.47
19.	When your symptoms are relieved, you can reduce drug doses or stop taking the drugs	32.67	5.94	61.39
20.	Even though you have so much busy time, you can get to meet or collect the drugs from the HW/CHVs at the appointed time	79.21	3.96	16.83
21.	Due to you must take the TB drugs, your TB illness is worse than previous times	20.79	16.83	62.38
22.	Administering the drugs for long times it cause you depend on the drugs	40.59	12.87	46.53

4.3.2 Enabling factor

4.3.2.1 Availability of Community Based DOTS services

Availability of Community Based DOTS services was assessed in term of availability of TB drugs from daily observer in every visit, health education and daily observers. It was shown on table 13 that nearly to two-thirds of the respondents (63.37%) agreed to there had available TB drugs from daily observer in every visit. Nearly three-fifth of them (58.42%) received the health education from daily observer and also 54.46% answered that there had available daily observer in every visit.

Table 13 Number and percentage of respondents classified by availability of Community Based DOTS service

Availability factors	Number (N = 101)	Percentage
Availability of TB drugs from daily observers in every visit		
Available	64	63.37
Not available	37	36.63
Availability of health education		
Available	59	58.42
Not available	42	41.58
Availability of daily observer in every visit		
Available	55	54.46
Not available	46	45.54

4.3.2.2 Accessibility of Community Based DOTS services

Accessibility of services were measured in term of average time to get medicine in treatment place, appropriate time to get TB drugs and the easiest source for patients to get TB information.

According to the results, nearly to two-thirds of the respondents (65.35%) got TB medicine in treatment place within 15 minutes. Regarding to appropriate time, a half of them (50.50%) had appropriate time to get TB drugs in the morning.

For the easiest source, a little bit more than two-fifth of them (40.59%) got it from health worker, nearly to one-fourth of them got from radio and community health volunteers ((23.76% and 22.77% respectively). This was supported by qualitative data shown in Appendix D (IV, 1). More details of quantitative data were illustrated in table 14.

Table 14 Number and percentage of respondents classified by accessibility of Community Based DOTS service

Accessibility factors	Number (N = 101)	Percentage
Average time to get medicine in Rx place		
< 15 min.	66	65.35
15 – 30 min.	22	21.78
31 - 60 min.	11	10.89
> 60 min.	2	1.98
Appropriate time to get TB drugs		
All time	13	12.87
Morning	51	50.50
Evening	20	19.80
Afternoon	17	16.83
Easiest source to get TB information		
Radio	24	23.76
Health worker	41	40.59
Community health volunteer	23	22.77
Village leader	4	3.96
TV	6	5.94
Other	3	2.97

4.3.3 Reinforcing factor

4.3.3.1 Overall social supports

As mentioned in the chapter 3, opinion of the respondents about social support from family and health worker/community health volunteers were made based on three categories as high, moderate and low social support.

According to the results, most of the respondents (71.29%) were gotten high social support from their family and health workers/community health volunteers, exactly one-fifth of them (20.79%) had its moderate social support. More details were presented in table 15.

Table 15 Number and percentage of respondents classified by their opinion towards overall social supports

Level of social support	Number (N = 101)	Percentage
High (57 - 72)	72	71.29
Moderate (41 - 56)	21	20.79
Low (24 - 40)	8	7.92

Median = 64.00, Q1 = 55.00, Q3= 68.00, Min = 31.00, Max = 72.00,

4.3.3.2 Levels of social support from personal sources

Regarding to the family support, table 16 showed that nearly to three-fourth of the respondents (72.28%) were gotten high level of social support, a little bit less than one-fifth (17.82%) and only 9.90% of them had moderate and low level of social support respectively.

To consider the social support from health workers/community health volunteers, it was showed that a little bit more than three-fifth of the respondents (62.38%) had high level social support, a little bit less than one-third (30.69%) had moderate level of social support and only a few, 6.93% of them had its low level.

Table 16 Number and percentage of respondents classified by their opinion towards social support from family members and health workers/community health volunteers

Level of social support	Number (N = 101)	Percentage
From family members		
High (29 - 36)	73	72.28
Moderate (21 - 28)	18	17.82
Low (12 - 20)	10	9.90
Median = 34.00, Q1 = 28.00, Q3 = 36.00, Min = 12.00, Max = 36.00,		
From health workers/ community health volunteers		
High (29 - 36)	63	62.38
Moderate (21 - 28)	31	30.69
Low (12 - 20)	7	6.93
Median = 31.00, Q1 = 26.00, Q3 = 33.00, Min = 16.00, Max = 36.00,		

4.3.3.3 Types of social support

The consider types of social support, it was shown as follows;

For the mental support, nearly to three-fourth of the respondents (71.29%) were received its high level. 18.81% had the moderate mental support.

With regards to informational support, more than two-thirds of them (70.30%) were received high level of informational support. The rest of them had its moderate and low informational support (17.82% and 11.88% respectively).

To consider the material support, a little bit more than three-fifth of them (61.39%) were received high material support and 28.71% received its moderate level.

Table 17 Number and percentage of respondents' opinion regarding level of social support classified by types

Level of social support	Number (N = 101)	Percentage
Mental support		
High (8 - 14)	72	71.29
Moderate (14 - 19)	19	18.81
Low (20 - 24)	10	9.90
Median = 21.00, Q1 = 18.00, Q3 = 24.00, Min = 8.00, Max = 24.00,		
Informational support		
High (8 - 14)	71	70.30
Moderate (15 - 19)	18	17.82
Low (20 - 24)	12	11.88
Median = 22.00, Q1 = 18.00, Q3 = 23.00, Min = 8.00, Max = 24.00,		
Material support		
High (8 - 14)	62	61.39
Moderate (15 - 19)	29	28.71
Low (20 - 24)	10	9.90
Median = 20.00, Q1 = 17.50, Q3 = 22.00, Min = 10.00, Max = 24.00,		

4.3.3.4 Levels of social support from personal sources and types

From family member

Regarding to the mental support, most of the respondents (72.28%) agreed on "At present, you feel that your family have as good as relationship with you as before" and 69.31% disagreed on "Since your TB diagnosis, you can't consult your distress and sickness with your family". Most of the respondents (78.22%) agreed on "You are getting better care from family since diagnosis" and 70.30% disagreed on "Your family members are not accept your ideas and suggestion".

With regards to informational support, majority of them (85.95%) agreed on "You are informed to go to the health post/hospital at right time by your family members" and 81.19% agreed on "You are reminded regularly to take the TB drugs by your family members". A little bit more than two-thirds of them (69.31%) disagreed on "After getting disease, none of your family members informed you to take the nutritious foods" and 65.35% disagreed on "Your family does not tell you about how to practices yourself during your TB sickness".

For the material support, majority of the respondents (87.13%) were still getting nutritious food and 79.21% were still getting the enough financial support from their family members. Same percentage of them (74.26%) disagreed on the statements of "Nobody takes care of your clothing after diagnosed with TB disease" and "Nobody takes care of your eating instruments after diagnosed with TB disease".

Above mentioned these were supported by qualitative data shown in Appendix D (V, 1).

From health workers/community health volunteers

Regarding to the mental support, a little bit more than three-fourth of the respondents (77.23%) agreed on "Health worker / community health volunteers ask you about your health regularly in the visit". Most of them (79.21%) agreed on "Health worker / community health volunteers provide you enough time to listening your problem". A little bit more than three-fourth of them (76.24%) disagreed on "During the visit time the HW/CHVs are impolite with you".Most of them (71.29%) disagreed on "During the visiting time, the HW/CHVs do not motivate you to follow the drug schedule".

With regards to informational support, a little bit more than three-fifth of them (62.38%) agreed on "Health worker / community health volunteers always ask about the side effects of TB drugs". More than a half of them (53.47%) disagreed on "When you ask for TB information, the HW/CHV provide you with little information". Majority of them (84.16%) disagreed on "You are not reminded regularly to take the

TB drugs by Health worker / community health volunteers". Nearly to two-thirds of them (66.34%) agreed on "Before giving CBDOTS and TB drugs information, HW / CHV can give consultations about information of hygienic practices related to TB disease".

For the material support, majority of them (94.06%) agreed on "Health worker / community health volunteer provides you correct medicine with free of charge". A little bit more than to two- thirds of them (69.31%) disagreed on "HW/CHV does not provide sufficient drinking water when taking TB drugs". Nearly to two-thirds of them (65.35%) disagreed on "Health worker / community health volunteer provides you sufficient health education materials". A little bit less than three-fourth of them (73.27%) disagreed on "HW/CHV does not provide you with comfort sitting place when taking TB drugs".

Above mentioned these were supported by qualitative data shown in Appendix D (III, 1). Concerning qualitative data more details were as illustrated in table 18.

Table 18 Percentage of respondents classified by each items of social support towards TB disease and Community Based DOTS program

No	Statement	Level of agreement		
		Agree %	Not sure %	Disagree %
	From family member			
Mental support				
1.	At present, you feel that your family have as good as relationship with you as before	72.28	8.91	18.81
2.	Since your TB diagnosis, you can't consult your distress and sickness with your family	24.75	5.94	69.31
3.	You are getting better care from family since diagnosis	78.22	5.94	15.84
4.	Your family members are not accept your ideas and suggestion	23.76	5.94	70.30
Informational support				
5.	You are informed to go to the health post/ hospital at right time by your family members	85.15	0.99	13.86
6.	After getting disease, none of your family members informed you to take the nutritious foods	26.73	3.96	69.31
7.	You are reminded regularly to take the TB drugs by your family members	81.19	2.97	15.84
8.	Your family does not tell you about how to practices yourself during your TB sickness	26.73	7.92	65.35
Material support				
9.	You are still getting nutritious food from the family member	87.13	1.98	10.89
10.	You are still getting the enough financial support from the family members	79.21	2.97	17.82
11.	Nobody take care of your clothing after diagnosed with TB disease	24.75	0.99	74.26
12.	Nobody take care of your eating instruments after diagnosed with TB disease	24.75	0.99	74.26

Table 18 Percentage of respondents classified by each items of social support towards TB disease and Community Based DOTS program (cont.)

No	Statement	Level of agreement		
		Agree %	Not sure %	Disagree %
	From health worker/community health volunteer (HW/CHV)			
Mental support				
1.	Health worker / community health volunteers ask you about your health regularly in the visit	77.23	3.96	18.81
2.	Health worker / community health volunteers provide you enough time to listening your problem	79.21	5.94	14.85
3.	During the visit time the HW/CHVs are impolite with you	19.80	3.96	76.24
4.	During the visiting time, the HW/CHVs do not motivate you to follow the drug schedule	21.78	6.93	71.29
Informational support				
5.	Health worker / community health volunteers always ask about the side effects of TB drugs	62.38	10.89	26.73
6.	When you ask for TB information, the HW/CHV provide you with little information	37.62	8.91	53.47
7.	You are not reminded regularly to take the TB drugs by Health worker / community health volunteers	13.86	1.98	84.16
8.	Before giving CBDOTS and TB drugs information, HW / CHV can give consultations about information of hygienic practices related to TB disease	66.34	8.91	24.75
Material support				
9.	Health worker / community health volunteer provides you correct medicine with free of charge	94.06	5.94	0.00
10.	HW/CHV does not provide sufficient drinking water when taking TB drugs	28.71	1.98	69.31
11.	Health worker / community health volunteer provides you sufficient health education materials	17.82	16.83	65.35
12.	HW/CHV does not provide you with comfort sitting place when taking TB drugs	25.74	0.99	73.27

4.4 Relationship between patient compliance on Community Based DOTS program and the independent variables

4.4.1 Relationship between patients compliance Community Based DOTS program and predisposing factor

This section showed the relationship between socio-demographic characteristics of TB patients, knowledge and perception on TB disease and Community Based DOTS program and patients' compliance with Community Based DOTS. Cross tabulation, Chi-square test and Mann Whitney test were carried out in this analysis.

4.4.1.1 Relationship between socio demographic characteristics and patient compliance

It was found that younger age group had higher percentage of compliance compared to the older age group. There was significant relationship between age and patient compliance with Community Based DOTS (p-value 0.022).

The compliance rate was different among the different level of family income among the respondents. It was found that patient who had higher family income, would have higher proportion of compliance on DOTS than another group. The results indicated that there was significant relationship between family income and patient compliance with Community Based DOTS (p-value 0.024).

Nearly to equal proportion of compliance and noncompliance respondents was found in both sexes. Concerning to other variables, the respondents who were married group, govt. employee and graduated at primary and over level education had higher proportions of compliance than other groups. However, these results shown that there were not significant relationship between sex, marital status, education level, occupation and patient compliance with Community Based DOTS (p-value >0.05). For more details these were shown in table 19 below.

Table 19 The distribution of patient compliance on Community Based DOTS program classified by socio-demographic characteristics

Characteristics	Compliance (N =62)	%	Non-compliance (N = 39)	%	χ^2 (df)	p-value
Age groups					7.620 (2)	0.022
15 – 34	26	65.00	14	35.00		
35 – 54	24	75.00	8	25.00		
> 54	12	41.38	17	58.62		
Sex					0.049 (1)	0.825
Male	40	60.61	26	39.39		
Female	22	62.86	13	37.14		
Marital status					0.941 (2)	0.625
Single	9	56.25	7	43.75		
Married	48	64.00	27	36.00		
Others	5	50.00	5	50.00		
Occupation					3.061(4)	0.548
Farmer	25	71.43	10	28.57		
Govt./pvt. employee	9	52.94	8	47.06		
Housewife/husband	12	54.55	10	45.45		
Labor	5	50.00	5	50.00		
Other	11	64.71	6	35.29		
Education					2.498 (3)	0.476
Illiterate	15	51.72	14	48.28		
Primary school	19	67.86	9	32.14		
Secondary school & over	24	66.67	12	33.33		
Informal education	4	50.00	4	50.00		
Family income					5.131 (1)	0.024
≤ 3000	27	50.94	26	49.06		
> 3,000	35	72.92	13	27.08		

Median 3,000, Q1 =1500, Q3 =5,000, Min = 100, Max = 20,000,

4.4.1.2 Relationship between knowledge on TB disease and Community Based DOTS program and patient compliance

From the results, it was shown that the respondents who had high, moderate and low knowledge level had proportion of compliance on DOTS accounted to 78.05%, 47.62% and 51.28% respectively. The result showed that the respondents who had high knowledge level had higher proportion of compliance on DOTS program than the respondents who had moderate and low knowledge level. It was concluded the knowledge on TB disease and Community Based DOTS program was significant relationship with the patient compliance (p-value 0.017). More details were depicted in table 20.

Table 20 Comparison level of knowledge of respondents between compliance and noncompliance group

Variable	Compliance (N =62)	%	Non-compliance (N = 39)	%	χ^2 (df)	p-value
Knowledge level					8.161 (2)	0.017
High	32	78.05	9	21.95		
Moderate	10	47.62	11	52.38		
Low	20	51.28	19	48.72		

4.4.1.3 Relationship between perception on TB disease and Community Based DOTS program and patient compliance

It was shown that the median score of overall perception score for the compliance group was 50 which was higher than the noncompliance group (median score = 47). It was found that there was statistical significant difference overall perception between the compliance and noncompliance groups (p-value 0.018). More details were depicted in table 21.

Table 21 Comparison of overall perception of respondents between compliance and noncompliance group

Variable	Compliance status	Number	Median (P_{25}^{th}, P_{75}^{th})	Z*	P- value (2-sided)
Perception				2.361	0.018
	Compliance	62	50.00 (46.00, 54.25)		
	Noncompliance	39	47.00 (35.00, 52.00)		

* Mann Whitney Test

The result in table 22 showed to the comparison between the total score of perception on susceptibility with the compliance status. The data was presented that the median score for the compliance group (median score = 10) was higher than the noncompliance group (median score = 9). It was also found to statistical significant difference perception of susceptibility between the compliance and noncompliance groups (p-value 0.044).

In part of their perception on severity of TB illness, it was found that the median score of the compliance group (median score = 13) was higher than the noncompliance group (median score = 11). There was statistical significant difference perception of severity between the compliance and noncompliance group (p-value 0.005).

As regard to the comparison between the total score of perception on benefits with the compliance status, the median score of perception in the compliance group (median score = 13) was higher than the noncompliance group (median score = 11). There was statistical significant perception on benefit of CBDOTS between the two groups (p-value 0.038).

However, there was no significant difference perception on barrier of Community Based DOTS program between the compliance and noncompliance group (p-value 0.107). More details were illustrated in table 22.

Table 22 Comparison of perception about TB disease and Community Based DOTS program between compliance and noncompliance group

Variable	Compliance status	Number	Median (P_{25}^{th}, P_{75}^{th})	Z*	P- value (2-sided)
Perception of susceptibility				2.010	0.044
	Compliance	62	10.00 (9.00, 11.25)		
	Noncompliance	39	9.00 (7.00, 11.00)		
Perception of severity				2.795	0.005
	Compliance	62	13.00 (12.00, 15.00)		
	Noncompliance	39	11.00 (9.00, 14.00)		
Perception of benefit				2.074	0.038
	Compliance	62	13.00 (12.00, 14.00)		
	Noncompliance	39	11.00 (9.00, 15.00)		
Perception of barrier				1.613	0.107
	Compliance	62	14.00 (12.00, 16.00)		
	Noncompliance	39	14.00 (10.00, 16.00)		

* Mann Whitney Test

4.4.2 Relationship between enabling factors and patient compliance

4.4.2.1 Relationship between availability of Community Based DOTS services and patient compliance

It was indicated that patients who got TB drugs from their daily observer in every visit, would have higher proportion of compliance than another group and there was significant relationship between patient compliance on DOTS and getting TB drugs from daily observer in every visit (p-value 0.046).

The respondents who got health education from daily observer in every visit accounted to 71.79% had higher proportion of compliance than those who did not get it accounted to 47.62%. It was found that there was significant relationship between patients' compliance and availability of health education from daily observer (p-value 0.016).

The patients who met a daily observer in every visit accounted to 72.73% had higher proportion of compliance than those who did not meet him/her accounted to 47.83%. There was significant relationship between patients' compliance and availability of daily observer in every visit (p-value 0.010).

Table 23 Relationship between availability of Community Based DOTS services and patient compliance

Availability factors	Compliance (N = 62)	%	Noncompliance (N = 39)	%	χ^2 (df)	p-value
Available of TB drugs from daily observer in every visit					3.997 (1)	0.046
Available	44	68.75	20	31.25		
Not available	18	48.65	19	51.35		
Available of health education					5.749 (1)	0.016
Available	42	71.19	17	28.81		
Not available	20	47.62	22	52.38		
Available of daily observer in every visit					6.553 (1)	0.010
Available	40	72.73	15	27.27		
Not available	22	47.83	24	52.17		

4.4.2.2 Relationship between accessibility of Community Based DOTS services and patient compliance

The patients who took less time (less than 15 minutes) to get the drugs had higher proportion of compliance (74.24%) than another group. It was indicated that, there was significant relationship between the patient compliance and the time spent to get TB medicines in the treatment place (p-value <0.001).

About the appropriate time to get TB drugs, there was no significant relationship between the patient compliance and their appropriate time to get the drugs (p-value >0.05).

Concerning to the easiest source, it was found that the respondents who said that the easiest source to get TB information for them were health workers and community health volunteers had higher proportion of compliance status than the others. There was significant relationship between patient compliance status and the easiest source to get TB information (p-value 0.031).

Table 24 Relationship between accessibility of Community Based DOTS services and patient compliance

Accessibility factors	Compliance (N = 73)	%	Noncompliance (N = 28)	%	χ^2 (df)	p-value
Average time to get medicine in Rx place					13.281 (1)	<0.001
< 15 min.	49	74.24	17	25.76		
15 and over min.	13	37.14	22	62.86		
Appropriate time to get TB drugs					2.461 (3)	0.482
All time	6	46.15	7	53.85		
Morning	33	64.71	18	35.29		
Afternoon	12	70.59	5	29.41		
Evening	11	55.00	9	45.00		
Easiest source to get TB information					8.852 (3)	0.031
Radio	10	41.67	14	58.33		
Health worker	31	75.61	10	24.39		
Community-health volunteer	15	65.22	8	34.78		
Other	6	46.15	7	53.85		

4.4.3 Relationship between reinforcing factors and patient compliance

4.4.3.1 Relationship between overall social support and patient compliance

The compliance and noncompliance group had median score of overall social support equal to 64.5 and 59 respectively. The compliance group had higher median score of social support than noncompliance group. There had statistical significant difference overall social support between the two groups (p-value 0.007).

Table 25 Comparison of overall social support scores of respondents between compliance and noncompliance group

Variable	Compliance status	Number	Median (P_{25}^{th}, P_{75}^{th})	Z*	P- value (2-sided)
Overall social support				2.700	0.007
	Compliance	62	64.50 (57.75, 68.25)		
	Noncompliance	39	59.00 (45.00, 66.00)		

* Mann Whitney Test

4.4.3.2 Relationship between personal source of social support and patient compliance

In part of social support from their family members, it was found that the median score of the compliance group (median score = 34) was higher than the noncompliance group (median score = 30). There was statistical significant difference social support from family between the compliance and noncompliance group (p-value 0.001).

As regard to the comparison between the total score of respondents' social support from health workers/community health volunteers with compliance status, the median score for the social support in the compliance group (median score = 31.5) was higher than the noncompliance group (median score = 30). It was also found to be statistically significant difference social support from health workers/community health volunteers between compliance and noncompliance groups (p-value 0.049).

Table 26 Comparison of social support from family members and health workers/community health volunteers between compliance and noncompliance group

Variable	Compliance status	Number	Median (P_{25}^{th}, P_{75}^{th})	Z*	P- value (2-sided)
Social support from family				3.281	0.001
	Compliance	62	34.00 (30.00, 36.00)		
	Noncompliance	39	30.00 (22.00, 34.00)		
Social support from health workers/community health volunteers				1.972	0.049
	Compliance	62	31.50 (27.00, 34.00)		
	Noncompliance	39	30.00 (23.00, 32.00)		

* Mann Whitney Test

4.4.3.3 Relationship between types of social support and patient compliance

From table 27, it was showed to the comparison between the total score of mental support from their family and health worker/community health volunteers with their compliance status. The median score among the compliance group (median score = 22) was higher than the noncompliance group (median score = 20). There was statistical significant difference mental support between the two groups (p-value 0.004).

As regard to the comparison between the total score of informational support from their family and health worker/community health volunteers with the compliance status, the median score of informational support in the compliance group (median score = 22) was higher than the noncompliance group (median score = 20). It was also found to be statistical significant difference informational support between the compliance and noncompliance groups (0.032).

Nevertheless, there was no significant difference material support from their family and health worker/community health volunteers between the compliance and noncompliance groups (p-value 0.115).

Table 27 Comparison of each type of social support between compliance and noncompliance group

Variable	Compliance status	Number	Median (P_{25}^{th}, P_{75}^{th})	Z*	P- value (2-sided)
Mental support				2.847	0.004
	Compliance	62	22.00 (20.00, 24.00)		
	Noncompliance	39	20.00 (16.00, 23.00)		
Informational support				2.149	0.032
	Compliance	62	22.00 (19.00, 23.00)		
	Noncompliance	39	20.00 (12.00, 23.00)		
Material support				1.577	0.115
	Compliance	62	20.50 (18.00, 23.00)		
	Noncompliance	39	20.00 (16.00, 22.00)		

* Mann Whitney Test

CHAPTER 5
DISCUSSION

The preliminary concern of this chapter was to discuss the compliance status and its related factors as predisposing factors, enabling factors and reinforcing factors of the TB patient during the treatment with Community Based DOTS.

5.1 Compliance status among the respondents

With regard to patient compliance on Community Based DOTS program, it was found that the compliance TB patients were 62 (61.39%) and another 39 (38.61%) TB patients were noncompliance. This proportion was still very high compared with the defaulter target of National TB Control Program set by Ministry of Health, Nepal which proposed that should be less than 10%, the defaulter rate among the TB patient. A TB patient who missed the drugs doses more than 60 days can be defined as a defaulter, But in this study noncompliance is defined as a patient who has had interrupted treatment more than one week or any patient who does not follow the treatment schedule properly. Although, the definitions of defaulter and noncompliance are different, but noncompliance behavior will developed to be defaulter patients. The proportion of noncompliance group was also high with the result of previous study done by Bam TS (2003) (25) showed that 25% of the TB patients were noncompliance with DOTS treatment. Similarly, the result of field trial study, in India (1988) (39), showed that the overall noncompliance rate among TB patient were about 20%. However, this study was low compared with Fox (1985) (40), who estimated that about 65% of the diagnosed tuberculosis cases in India remained non-adherence.

As mentioned to two main reasons for noncompliance practice among the respondents, it was found that more than a little bit one-third of them (35.90%) interrupted their treatment due to the side effects of TB drugs and 23.04% interrupted due to feeling of cured/completed treatment.

To consider about the side effects of the drugs, we can say that the proportion was still very high compared with the previous study done by Bam TS (2003) (25). He found that about 14% of the noncompliance patient were interrupted their treatment due to this reason. It may be happened from that during the first two months of the treatment period, the patient must be taken at least 4 types of the drugs. Different types of drugs can produce different side effects. Some patient may worry about its side effects and stopped their treatment. Some may have not correct knowledge about it. As shown in this study most of the respondents perceive to that jaundice was the symbolic effect of drug danger and only a few of them (24.75%) knew that it does not cause any danger for them. This may be influenced from improper health education or not enough information provided by health workers. In this study there were still some problems related to health education that 26.73% of the respondents disagreed about health worker always asked them side effects of the drugs and 37.62% of them agreed about health worker provided them with little information (Table 18). Good communication or health education from the health personal is still importance to persuade the patient to adhere the drug regimen. Caplan et al (1976) said to this like that because of their primary contact with the patient, health care providers can strongly affect the patient's commitment to a correct regimen, particularly by means of clear communication about the disease and its treatment (41).

About another reason for noncompliance practice, this was due to their feeling of cured/completed treatment. Accounted to 23.04% of them thought like this. This proportion was still very lower compared with the study of Bam TS (2003) (25) which noticed that about 35% of the noncompliance patients were interrupted their treatment due to feeling it. Some of the noncompliance patients may feel that their TB disease is completely cured from their observation toward symptoms of TB disappearance. And they may perceive that they can do their work as usual as they ever did it before. This is supported by the study of Toman K (1979) (42) about that most patient drop out of treatment when they feel symptom-free usually after 1 or 2 months of effective chemotherapy. Similarly, Barnhoorn's study (1992) (43) noticed that patient ask medicine if they are hindered by the disease and drop out of treatment if they feel better.

Furthermore, it is still occurred from their inappropriate perception or misperception towards TB disease and CBDOTS. Therefore it was also demonstrated that 55.45% and 9.90% had moderate and low perception to TB disease and CBDOTS program respectively too (Table 10). Some perceptions yield barriers for regular treatments. 32.67% perceived that CBDOTS can't interrupt the transmission of disease. 40.59% of them said that they were felt much boring to take TB drugs for 8 months (Table 12). Someone felt ashamed from the community. Someone had low awareness of TB disease and its treatment. It can be said that these perceptions were inappropriate and needed to change or adjust correctly. Barnhoorn F and Adriaanse H (1992) (43) study argued that for patient who lived under harsh conditions, it is very difficult to continue chemotherapy when bodily perceived "cues" are omitted.

To consider about social support, even though moderate and low level social support scores of the patient accounted to about 29%. The result also showed that the social support score was lower in noncompliance group. This proportion was higher compared with the study of Bam TS (2003) (25). It may be that some of the noncompliance patients do not get enough mental, informational and material support from the various sources. From the result, it can be supported that some of them were gotten low and moderate level of social support from their family and health worker/community health volunteers as shown in table 16 and 17. More details of these; 23.76% of them agreed that their family members were not accept their ideas and suggestion. 26.76% and 24.75% of them agreed that none of their family member inform them to take nutritious food and nobody took care their clothing respectively. More than one-third of them (37.62%) agreed that the health worker/community health volunteers provided them with little information and only 17.82% of them agreed that the health worker/community health volunteers provided them sufficient health education materials. During the treatment some kind of social support from the various sources might be encouraged and supported to the patient for its treatment completion. Haynes's study (1979) (44) argued that perceived social support from family and other sources on cooperation with medical treatment is considerable.

5.2 Predisposing factors

5.2.1 Socio-demographic characteristics

The result of this study found that 71.29% of respondent belongs to the economically productive age group (15-54). It may be that the chance of exposing with disease in young age group is high during their working period and seeking the jobs in different places. The young age group had higher compliance compare to the higher age group. And there was significant association between age group and patient compliance. This was similar to the study of Bam TS (2003) (25). Further more the young age group might have high knowledge and can seek information from various sources.

With regards to the sex, 65.35% of respondents were male. This was similar to the study done by Mohamed NH (2003) (18) and Long NH et al (1999) (45). They suggested that men were perceived to get TB more often than women. They were more exposed to risk factors during both their works and leisure time. It can be said that males are still at higher risk of tuberculosis infection because they play a major role in farming and others careers that require physical hard labor; such as overworking, whereas women remained at home and did the household chores. The impact of work environment and outdoor activities could attribute to higher prevalence of TB infection in male than female.

About marital status, nearly to three-fourth of the respondents (74.26%) were married. The result was higher with the studies done by Kandel SL (2002) (27), and Nguyen DH (2000) (30). In this study the compliance rate was found higher (64.00%) in the married group. It might be the cause that they obtain considerable mental support from their spouse as compared with the single. However, there was not significant association between marital status and patient compliance. While similar result was found with the study done by Nguyen DH (2000) (30).

The result of the occupational status found 34.65% of the respondents were farmer. This proportion was high with the study done by Bam TS (2003) (25). It might be that they are working in the field and have chance to exposing with environment and pesticides. Another reason, their socio-economic status is normally quite poorer than other and has shortage of nutritious food. Due to these reasons the chance of infection with TB among the farmer group is higher. However, this study showed that there was no statistically significant association between occupation and patient compliance. Similar result was found with the study conducted by Kandel SL (2002) (27), while contrast result had been highlighted in the study of Boyles SJ (2002) (29).

To consider about educational status, more than 63% of them were school level education (primary school and over) and it was also found that the compliance proportion was higher among those who had school level education (primary school and over) compare to illiterate. However, there was no significant association between educational status and patient compliance. Similar result was found in the studies done by Nguyen DH (2000) (30) and Bam TS (2003) (25).

In the aspect of monthly family income of the respondents, more than half of them (52.48%) were belong to the Rupees ≤ 3000 and rest of them were belong to the Rupees > 3000. This proportion was lower than the study done by Bam TS (2003) (25). The result showed that compliance proportion was higher in higher level of income group as compared to other. And there was significant association between family income and patient. The consistency result was found with the studies done by Shan WJ (1996) (46) and Shrestha KB (1991) (47). It can be said that higher family income and higher economic sufficiency level seemed to affect treatment compliance. Perhaps those patients, who had low income, might have temporary or daily wages employee. If they absent might have loose their earning money. And sometimes can not afford travel expenses too. In this condition they might be worry about their own job in earning their living that they sometimes neglected their medical condition. Farmer (1997) (48) said like that “economic factors chiefly determined compliance with treatment and the poor have no options but to be at risk for TB”. This result can be supported that patient who had higher family income had high level of knowledge

about disease and its treatment than other groups (Table 1 Appendix C). It may be that higher family income group might have higher education and can get enough information from many sources. They might have enough time to listening radio, watch TV and also can read news paper.

Regarding the overall socio-demographic factors the similar result was found with the result of study done by Barnhoorn F and Adriaanse H (1992) (43). It was found low association between demographic and socioeconomic variables and compliance, except income level. Although TB drugs were given free of charge but additional costs such as fare of transport or loss of daily wages can become insurmountable.

5.2.2 Knowledge on TB disease and Community Based DOTS program

The result of this study showed that 38.61% and 20.79% of the respondents had moderate and low level of knowledge. This proportion was lower with the study done by Bam TS (2003) (25). The result also showed that the respondents with moderate and low level of knowledge were higher proportion of noncompliance than the groups of respondents within high level of knowledge as demonstrated in table 20.

In this study, the knowledge of TB and CBDOTS was proven to associate with patient compliance with treatment. The result was consistency with Barnhoorn F and Adriaanse H (1992) (43). Similarly, the study of Menzies et al (1993) mentioned that correct understanding of the disease and especially of the treatment has been significantly associated with a higher compliance (49). But, the different study result was mentioned by WHO (2002) that the researcher found no correspondence between knowledge of TB and completion of treatment (50).

The remarkable point is that the knowledge score of the noncompliance group was less. It can be said that either information about tuberculosis not being given, or information not being understood for them. It is due to the health worker might be fear for TB infection from the TB patient during the health education period. The result

also supported that about two-fifth of the patients said that health education were not available and about half of them said that they did not met daily observer in every visit as shown in table 13. Barnhoorn F and Adriaanse H (1992) (43) argued that patient with low knowledge on specific aspect of the disease might have chance to increased the noncompliance behavior. It can be said that noncompliance patients are more likely to think they are cured when their symptoms has relieved, even though the full course of treatment has not been completed. This is also supported as result shown in table 6 that 23.08% of the noncompliance patient interrupted their treatment due to feeling cured/completed treatment.

Furthermore, the study also shown that respondents' education was significantly associated with respondents' knowledge about TB disease and CBDOTS program as shown in table 1 Appendix C. Similarly respondents' knowledge about TB disease and CBDOTS program was significantly associated to their perception as presented in table 2 Appendix C. Therefore it can be mentioned that TB patients with high education also have high knowledge and with the high knowledge also have high perception towards TB disease and CBDOTS. And these will yield their good compliance practice significantly.

5.2.3 Perception on TB disease and Community Based DOTS program

The findings of this study were revealed that more than half of the respondents had (55.45%) moderate and 9.90% of them had been found low level of overall perception towards TB disease and CBDOTS program as demonstrated in table 10. This proportion was higher than the study done by Bam TS (2003) (25).

The result was also found that there was significant difference overall perception between the compliance and noncompliance TB patients. The result was similar with the studies done by Lee RP, Chiou YF (1997) (32), Demissie M. et al (2003) (51) and Liefooghe et al. (1995) (52). It can be said that noncompliance patients would have low level of perception. Some of them in this study had misperception in part of perception on susceptibility, severity, benefit and barriers of TB disease and CBDOTS

program. For examples, 31.68% of this study perceived that they did not re-infect with TB, when they got in close contact with other patient. 18.81% believed that it was not easy to get infection, if they lived in TB crowed environment. 73.27% and 32.67% perceived that feeling sickness with TB, it could lose much working time and CBDOTS couldn't interrupt the transmission of disease (Table 12). These misperception or negative attitude of TB disease and CBDOTS program are needed to changed positively or suitably, if we want to improve compliance rate among the patients. Lee RP, Chiou YF (1997) (32) and Demissie M. et al (2003) (51) argued that patients who had an open attitude towards TB were more likely to be compliant. The negative views on TB may also make sufferers reluctant to reveal their disease. Liefooghe et al. (1995) (52) said like that patients often denied their TB diagnosis and rejected the treatment due to fear of social consequences. Therefore it should be changed their attitudes accordingly.

To support the issues mentioned earlier, the qualitative study also indicated that young TB patients may have difficulty in finding a couple, and engagements may be broken. Difficulties may even be experienced in making marriage arrangements for family members other than the TB patient. Parents therefore may be reluctant to send their children, especially girls of marriageable age, for treatment. A similar attitude has been observed in the Wardha district, India (43). Divorce was another common indirect consequence of TB infection. This type of social consequence makes difficult to follow the proper practice of Community Based DOTS program significantly.

Furthermore, it was also found that there was significant association between knowledge about TB disease and Community Based DOTS program and their perceptions as mentioned in part of knowledge. It can be said that if the patients have high perception or high attitude towards TB disease and CBDOTS, it may contribute them to have good knowledge of TB disease and practices of its program.

Susceptibility of TB disease

It was found that 54.46% of the respondents had moderate and 21.78% of them had low level perception of susceptibility towards TB disease. This proportion was

lower than the study done by Bam TS (2003) (25). And there was significant difference perception of susceptibility between the compliance and noncompliance group (p-value <0.05). This result was very similar with the study conducted by Morankar S, Suryawanshi N (2002) (31). It may have the negative perception among noncompliance patients that TB occurs due to their smoking, drinking alcohol as well as punishment of spiritual power. This kind of traditional beliefs still rooted in the society. The study of Vietnam done by Long NH et al (1999) (45) said to like that even TB patients had good knowledge about disease and its transmission but due to the traditional beliefs, they strongly perceived that disease can be transmitted through sharing utensils, smoking, eating in the food stores, going out, gathering and talking with the other people. And these may make them not aware or concern to susceptibility of TB infection in its real cause.

Severity of TB illness

It was found that nearly half of them (48.51%) were on moderate and 24.75% of them were low level perception to severity of TB illness. This proportion was higher than the study done by Bam TS (2003) (25). The study also showed that there was significant different perception on severity of illness between the compliance and noncompliance groups. This result was similar to the study done by Morankar S, Suryawanshi N (2002) (31). It could be the reasons that some of the patients perceive that TB is a serious disease and if there has no good diagnosis and treatment facilities, it can yield fatal outcome (see in table 12). Another reason is the case fatality from tuberculosis largely depends on the site and severity of the disease and timely diagnosis for its treatment.

Benefits of Community Based DOTS

About 36% of them had moderate and low level of perception towards benefits of CBDOTS. This proportion was higher than the study done by Bam TS (2003) (25). More details, nearly one-third of them perceived CBDOTS can't interrupted the transmission and about 37% of them perceived after finishing their treatment they can not do their work as usual as shown in table 12. It may be that the noncompliance group had low level of perception towards benefits. The result also showed that there

was statistically significant difference perception of benefit between the compliance and noncompliance groups. This result was very similar with study conducted by Bam TS (2003) (25). Concerning the noncompliance patients, they might have lack of motivation and incomplete information about benefits of TB treatment and new strategy as Community Based DOTS.

Barrier of Community Based DOTS

Based on the results, 45.54% of them had moderate and 40.59% of them had high level of perception toward barrier of CBDOTS. However, there was no significant difference perception of barrier between the two groups. This result was very similar with study conducted by Bam TS (2003) (25). It might be that to provide CHVs as one observer of DOTS treatment, can reduce the sense of perceived barrier among both groups. Patients may have wrong attitude on TB disease but regarding to their treatment they might be found easier practice because most of the TB patients are observed by the Community Health Volunteers nearby their village.

5.3 Enabling factor

5.3.1 Availability of Community Based DOTS services

From this study, about two-third of them said that the drugs was available for them (as shown in table 13). This proportion was lower than the study result done by Uplekar M (1996) (37). There was significant association between available of TB drugs from daily observer in every visit and the patient compliance. The drug is very important for long period of treatment. It may be that continuous uninterrupted drug supply is one of the key elements of DOTS, which should be ensured by the National Tuberculosis Program.

In this study about two-thirds of them said that health education was available for them. This proportion was lower than the study result done by Bam TS (2003) (25). There was also significant association between available of health education and the patient compliance. The result was consistent with the study done by Nguyen DH

(2000) (30). It might be said that those who receive health education may increase their knowledge on disease and treatment and also change their attitude towards disease and its treatment. The result of this study also showed that there was significant association between available of health education and overall perception (Table 5 Appendix B). Barnhoorn F and Adriaanse H (1992) study also supported that patients who had an active orientation toward tuberculosis were more likely to be compliant than patients who fostered a more fatalistic approach (43).

To consider about availability of daily observer, more than a half of them (54.46%) met daily observer in every visit. The result also showed that those patients who visited to daily observer in every visit had higher compliance rate (72.73%) than who did not visit. It was found that there was significant association between available of daily observer in every visit and the patient compliance. The result was contrast with the study done by Bam TS (2003) (25). It can be said that the patient group, who visited daily observer in every visit, might have more motivation than another group. Another reason, it might be that daily observer should provide most essential information to patients during the treatment such as; the importance full course of treatment and the risk of not follow the treatment that may so yield the development of multi-drug resistant and recurrence of the disease, these induce the patients to comply on DOTS program significantly.

5.3.2 Accessibility of Community Based DOTS services

Regarding the time, nearly to two-thirds of them (65.35%) took time less than 15 minutes to get medicine in treatment place. The compliance proportion was higher (74.24%) among the group who took this than other. It can be seen that there was significant association between the time to get medicine in treatment place and the patient compliance (p-value <0.05). Long time spent to get medicine might obstacle patients' compliance. Both Toman K (1979) (42) and Rouillon A (1972) (53) found similar result with this study that inconvenient consulting hours were also included in the main reasons of irregularity at first, and of default afterwards.

To consider about an appropriate time, half of them had appropriate time to get TB drugs in the morning. The compliance proportion was higher (70.59%) among those who had the appropriate time in the afternoon compared to others. It can be said that they might have busies in the morning for their works. For example, they must do their works in the agriculture field or households works. However, there was no significant association between appropriate time to get TB drugs and patient compliance.

In the study it was found that among those who had the easiest source to get TB information from health worker, 75.61% of them were compliance. The significant association between the easiest source and compliance status among the patients was found in this study, but the contrast result was found in the study done by Liem LT (1999) (54). Although many action plans of health education on TB control program were launched to disseminate the basic knowledge about TB for people, but absolute number of the compliance respondents must be depended on the easiest source to get TB information from health workers. They might be believed to more health workers than community health volunteers and other sources. Another reasons might be that majority of the patient is poor, lowly educated, they have to spend all their time for hard working, they have to run with hardship in daily life, not have to watch TV and not have to listen radio.

It can be suggested that service providers must pay attention to provide the services service accessible for every consumer. The World Health Organization has also emphasized one components of the triple strategy of TB control as an integral part of primary health care in the program accessibility (55). Farmer's study (1997) (48) demonstrated that patients were more compliant when treatment programs were made more accessible, regardless of their traditional cultural explanations of tuberculosis disease.

5.4 Reinforcing factor

5.4.1 Social supports

Social supports in this study were very important reinforcing factors to support the patient comply on complete treatment especially from family members and health workers/community health volunteers. In relation to TB disease and its treatment, social supports are backbone compliance treatment among the TB patient.

From the study, 71.29% of the patients received overall social support from family and health worker/community health volunteers. This proportion was lower than the study result done by Bam TS (2003) (25). And there were significant different overall social support scores between the compliance and noncompliance groups. The result was similar with the study done by Demissie M. et al (2003) (51). It can be said that during the treatment the patients may face more financially and socially problems. They may also feel social isolation. Especially female are usually dependent their husband as well as discarded from their society. Patients who know that the attitude of their family and health worker regarding to the regular intake of medicine is positive might have more likely to be compliant on DOTS treatment. It can be supported that there was significant association between marital status and social support (Table 6 Appendix C). And it is also supported that the noncompliance patient had lower level of mental and informational support than compliance patient from family and health worker/community health volunteers (Table 27).

Social Support from family

About the social support from family members, the result showed that 72.28% of the respondents had high level of social support from the family members. It can be seen that those patients who were compliance had higher level of social supports from their family members compare to the noncompliance patients. There was significant difference social support from the family members between the compliance and noncompliance groups. The result was similar to the studies done by Morankar S, Suryawanshi N (2002) (31) and Bam TS (2003) (25). It might be happen that noncompliance patients are isolated with more “poor relationship” than the

compliance patients. Another reason, family member of the noncompliance group might have lack of information and lack of material to provide them during the treatment period. This is supported that there were also significant different mental and informational support between the two groups (Table 27).

The result of this study was also showed that those respondents who had single marital status had lower level of social support from their family. And there was also significant association between their marital status and social support levels (Table 6 Appendix C). It can be said that respondents with single marital status might have received less support in term of mental, informational and material by their family members than married groups during the treatment period.

Social Support from health worker/community health volunteers

To consider about social support from health workers/community health volunteers, the result of analysis in this study showed that 62.38% of the respondents had high level of social support. The result also showed that those patients who were compliance had high level of social support from the health workers/community health volunteers compare to the noncompliance patients. There was significant different social support from health workers/community health volunteers between the two groups. The result was similar with the study done by Morankar S, Suryawanshi N (2002) (31) and contrast with the study done by Bam TS (2003) (25). It can be said that those patients who are frequently visit to health worker/community health volunteers might have fell higher mental and informational support. Another reason is that the compliance patient might have feel more convenient to collect the drug from familiar daily observer who are living same community or society and be encouraged from these to take regular treatment.

In this study noncompliance group had inadequate support from the health workers/community health volunteers. Either it might be poor relation between patient and health workers/community health volunteers or might be increased abandon from the health workers/community health volunteers. Some of the health workers/CHVs would fear for TB infection from the TB patients.

CHAPTER 6
CONCLUSION AND RECOMMENDATION

6.1 Conclusion

This study was aimed to describe the patient compliance on CBDOTS program in Palpa District, Nepal and identify its related factors. The population was whole TB patients who were registered in the four DOTS treatment center during 1st July to 31st December 2004. A structured questionnaire was used to interview the respondents.

It was found that 61.39% of the respondents were compliant and 38.61% of them were noncompliant. The reasons were found that 35.90% of noncompliance respondents interrupted their treatment due to side effects of the drugs; while 23.08% of them interrupted their treatment due to feeling cure/complete the treatment.

In this study most of the respondents were male and accounted to 65.35%. More than two-thirds of them (71.29%) were accounted to most economically productive age groups (15-54). Most of the respondents (74.26%) were married group and one-third of them (25.74%) were single and other groups. Regarding their educational level, approximately 36% of them had secondary and over level, while about similar percentage 28.71% and 27.72% of them illiterate and primary school level respectively. About one-third of them (34.65%) were farmer and 21.78% were housewife/husband. More than a half of them (52.48%) had current family income ≤ 3,000 Rupees per month.

With regards to their total knowledge score about TB disease and CBDOTS program, 40.59% of them had high level of knowledge, while 38.62% and 20.79% of them had moderate and low level of knowledge respectively.

As well as their total perceptions, more than half of them (55.45%) had moderate level of perception. For each type of perception, 54.46%, 48.51% and 45.54% of them had moderate level of perception of susceptibility, severity and barriers on TB disease and CBDOTS program respectively. When these were compared with perception to benefits, nearly to two-thirds of them (64.35%) had high level of perception.

Regarding to availability of CBDOTS services nearly to two-thirds of them (63.37%) agreed to there had available TB drugs from daily observer in every visit. Nearly to three-fifth of them (58.42%) received the health education from daily observer and also 54.46% answered that there had available daily observer in every visit.

To consider about accessibility, 65.35% of them got TB medicine in treatment place within 15 minutes, a half of them (50.50%) had appropriate time to get TB drugs in the morning and two-fifth of them (40.59%) had easiest to get TB information from health worker.

As far as social supports for the TB patients, 71.29% of them received high level of overall social support. For personal sources of social support, 72.28% and 62.38% of them received high level of social support from family and health worker/community health volunteers respectively. Similarly, for each type of social support, 71.23%, 70.30% and 61.39% of them received high level of mental, informational and material support respectively.

To consider the relationship between compliance status and socio-demographic characteristics, the significant association were only found between age group, family income and the patient compliance (p-value <0.05); the rest of socio-demographic characteristics and the patient compliance were not significant.

With regarding to the patients' knowledge of TB disease and CBDOTS, statistical significant association was found between the overall knowledge scores and the patient compliance (p-value <0.05).

For part of the perception, the result found that, the difference compliance status yielded significant difference median score of the perception (p-value <0.05). Out of four types of perception, the difference median scores of perception in part of disease susceptibility, severity of illness and benefits of CBDOTS program were also significantly different between the two groups (p-value <0.05). But the perception on barrier of CBDOTS program was no significantly different between the two groups.

Concerning to the availability of services, there were significant associations between availability of TB drugs, availability of health education, availability of daily observer in every visit and the patient compliance (p-value <0.05).

Among factors related to the accessibility of CBDOTS services, there were significant association between average time to get TB drugs, source of TB and CBDOTS information and patient compliance (p-value <0.05). However, the appropriate time and the patient compliance were not significantly associated together.

To consider social supports for the TB patients, there was significant difference overall social support score between the compliance and noncompliance groups (p-value <0.05). For personal sources of social support, there were significant different social support score from family and health worker/community health volunteers between the two groups (p-value <0.05). Furthermore, each type of social support, there were also significant different mental and informational support score between the compliance and noncompliance groups (p-value <0.05). But the material support score was not significant different between the groups.

6.2 Recommendation

6.2.1 For implementation

Based on research results, it is noticeable that patient compliance is affected by various factors. The following recommendations were suggested in order to increase compliance proportion of TB patient under the Community Based DOTS strategy.

1. From the study, most of the TB patients had moderate and low level knowledge. There had some problem especially in part of major side effects, cause, mode of transmission and impact of irregular treatment of TB disease. About two-thirds of them had moderate and low overall perception towards TB disease and CBDOTS program. Besides, nearly half of them also had moderate perception towards susceptibility, severity and its barrier. Misperception found in some respondents of this study were that they did not re-infected with TB, it was not easy to get infection from TB crowed environment, TB sickness could lose much their working time, CBDOTS can't interrupt the transmission of disease and some of them felt much boring to take TB drugs for 8 months.

For solving this problem, health education program must be intensively done. Contents of the educational talks should be concentrated on the most important information, problems or knowledge by focusing on issues mentioned earlier. During the treatment, health education of side effect of drugs, cause of disease, mode of its transmission, impact of non-adherence and its treatment is the most crucial. The misperception may also obstacle the continuing treatment. More over these, it is necessary to revise the contents of information related to preventive measurement focusing on re-infection can be happened in TB crowed environment and CBDOTS can break the transmission of TB disease and to change negative attitude of social to the disease and TB patients in addition to its treatment.

2. Due to some especial groups as government/private employee, laborer had high noncompliance proportion found from this study. They may have busy work time in their place. These groups would like to work mainly in an urban working area, which is a catchments area of the DOTS treatment centers. So it is suggested that the treatment centers should be opened more than formal time for their convenient to get the TB drugs.

3. From the observation of this study most of the TB patients were taking their treatment under the direct supervision of Community Health Volunteers (CHVs). It was found that CHV gave a little information about disease and its treatment. One

reason may be that they don't have enough knowledge and skill of communication with TB patient. Another reason is that they sometimes lack of incentive forces to do their responsibility works. Therefore they should be received training on basic knowledge about health care and communication skill. And also it is necessary that they should be enhanced capacity for providing TB information appropriately and accurately. Besides these, they should be received some special incentives such as special study tour or special reward from government. It may be hoped that they will be reinforced and will be sincere with their responsibilities.

4. Service providers should pay further attention to patients with advantages of accessibility and availability of services because their subjective perception may interfere with their compliance to treatment. It is suggested that daily observer should be arranged to stand by to provide TB drugs for the patients' need in appropriate time. Health worker should supervise and motivate them to function it efficiently.

5. This study was found that the social support from family members and community health volunteers has been predictable issue. If the patients are gotten high support from their family members and CHVs, the noncompliance will be changed to compliance behavior. Therefore the orientation and interaction activities should be carried out involving with community people, family members, and community health volunteers or friendly interact under these groups with TB patients. It could help to increase not only the compliance rate but include to minimize social stigma and enhance the patient relationship with his/her family members and community health volunteers. And the patients do not be isolated from their community.

6.2.2 For future research

The following recommendations are given for better further research:

1. There are many kinds of DOTS strategy implemented in the country. It should be needed to find out that which strategy is higher effectiveness in the field of Tuberculosis Control Program. To success the particular program, it is also depend upon the high performance of health care provider. Therefore it can be suggested to

the comparative study of effectiveness on CBDOTS launched by CHV and health personnel.

2. This study showed that most of the TB patients were taking their treatment under the direct observation of Community Health Volunteers. It has been proved that CHVs are main pillar of the Community Based DOTS program. Therefore it is suggested that further study should be carried out towards the performance of community health volunteer on CBDOTS program in the other comparative or large scale of study.

3. Some techniques of qualitative research such as in-depth interview or focus group discussion should be carried out to study among TB patients who were noncompliance and its more details related to sensitive social and cultural factors such as social consequences or stigmatization from TB disease. By the technique, it should give more details of their specific rationality of non-adherence treatment. And from this technique should investigate the reasons of enough or not enough provided health education and readiness of HW/CHV to actively support the TB patient.

4. From this study, it was found that the patients needed to supports from every aspect during their medication. Therefore it is necessary for health workers or social workers to find out appropriate strategies or models for promoting TB patients adherence on CBDOTS program. Or contribute TB clubs and local groups to participate in TB control activities. Participatory Action Research (PAR) is the one technique that can be mainly used to empower or strengthen community organizations in TB solving activities. Under this technique they can share their ideas and suggestion in the same direction. During being on the learning process, they will be stimulated by the process to share perceptions, understanding and acceptances towards the problems of TB control program. They participate to find out the ways to tackle or struggle with the TB problems. Finally, it will lead them to engage in decision making about activities or performances for solving the problems appropriately. It is expected that the patients will actively demand services and the family members, the treatment centers will also actively respond or support the patient demand efficiently too.

However, before using this technique with the target groups, health workers or social workers as its main users should be intensively and directly trained with expert lecturers. It will make them to have good knowledge, work skills and confidences to implement the technique with TB patients in community.

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APPENDICS

APPENDIX A

QUESTIONNAIRES

This questionnaire is prepared for the master thesis entitled "**Compliance with DOTS among TB patients under Community Based DOTS strategy in Palpa District, Nepal**" by ***Anant Kumar Nepal*****, MPHM-student ASEAN Institute for Health Development, Mahidol University, Thailand**. Your response will be kept secret and will not be exposed to any one for any other purposes against your interest; therefore your honest responses are highly appreciated. Wish you had a good health!

Please fill in the blank spaces:

Name of the respondent (TB patient) _____ID Number _____

Registration date_____ Treatment start date_____

Date of Interview ____/_____/_____ (dd/mm/yy)

Name of Interviewer _____

Address of Interviewee: _____

Part-I Checklist of clinical information

(Observation on clinical records)

1. Category of TB

( ) Smear positive, new case ( ) Smear negative, new case

( ) Extra pulmonary, new case (please specify affected organ) _____

( ) Re-treatment, specify_____

( ) Transfer in ( ) Other

2. Treatment category

( ) Category I ( ) Category II

( ) Category III ( ) Other (specify) _____

3. Phase of treatment

( ) Intensive phase ( ) Continuation phase

(Interview with patient)

Part-II Predisposing factors

Socio-demographic characteristics

Please mark (√) the following answer according to yourself situation.

1. Age: ……..years

2. Sex: ( ) Male ( ) Female

3. What is your marital status?

( ) Single ( ) Married ( ) Widowed

( ) Separated / divorced

4. What is your education level?

( ) Illiterate ( ) Primary school

( ) Secondary school ( ) Certificate degree level

( ) Bachelor degree level and over ( ) other (specify) _____

5. What is your occupation?

( ) Farmer ( ) Govt. employee

( ) Housewife /Househusband ( ) Labor

( ) Private employee ( ) other (please specify) _____

6. How much is your average monthly family income? _____ in NRs.

Knowledge about TB and Practice of Community Based Program

(Which one is the right answer choice for you)

7. What is the cause of TB?

A. ( ) Heredity B. ( ) Smoking

C. ( ) Germs D. ( ) Spiritual

8. How is TB transmitted?

A. ( ) Sharing towels B. ( ) Eating food together

C. ( ) Mosquito biting D. ( ) By Airway

9. How can you prevent TB disease transmit to others?

A. ( ) Cover mouth and nose when sneezing or coughing

B. ( ) Not do any things C. ( ) don't eat food together

D. ( ) Not share a towel

10. Which one is the main symptom of TB?

A. ( ) Back pain B. ( ) Cough for 2 weeks or more with fever

C. ( ) Headache D. ( ) Jaundice

11. Mainly, how Tuberculosis is diagnosed?

A. ( ) Sputum examination B. ( ) Chest X-ray

C. ( ) Blood examination D. ( ) Stool & Urine examination

12. What is the major side effect of TB drugs?

A. ( ) Vomiting B. ( ) Dizziness C. ( ) Jaundice

D. ( ) Itching of skin

13. When having TB drugs & get some its side effects, what will you do?

A. ( ) Consult with health worker/doctor B. ( ) Continue the drugs

C. ( ) Stop the drugs and nothing will do D. ( ) Use herbal medicine

14. What is the duration of TB treatment?

A. ( ) 12 months B. ( ) 8 months

C. ( ) 6 months D. ( ) 4 months

15. When will you stop taking TB drugs?

A. ( ) Once TB symptoms are disappeared B. ( ) When feeling healthy

C. ( ) A and B D. ( ) After declaring TB cured / completed by health worker

16. What will happen if you stop taking TB drugs before full course of treatment?

A. ( ) TB drugs can't work B. ( ) Disease will not be cured

C. ( ) Disease will be cured D. ( ) A and B

Perception about TB and Practice of Community Based Program

Please mark (√) under the level of agreement with your opinion on the following statements (from # 17- 38). **(For positive statement agree = 3, not sure = 2, disagree = 1 and for negative statement agree = 1, not sure = 2, disagree = 3)**

	Statement	Agree	Not sure	Disagree
	Susceptibility of TB disease			
17	You do not re-infected with TB, when you get in close contact with other TB patient			
18	Eating food together with TB patient , it is easily to infect with TB disease			

19	Any family member infected with TB, other members may develop TB			
20	Strong person and weak person have equal opportunities to infect with TB			
21	You live in TB crowed environment, it is easy to get TB infection			
Severity of TB illness				
22	Feeling sick with TB, it can lose much of your working time			
23	TB is a serious disease, you may have fatal outcome if untreated			
24	While having TB sickness, you can work to earn income as usual			
25	TB patients are disliked/hated from community members			
26	It is your bad luck to infect with TB disease			
27	TB disease is the one disease which can be cured easily			
Benefits of Community Based DOTS program				
28	To administer TB drugs according to the schedule it can cure TB disease completely			
29	Community Based DOTS can't interrupt the transmission of TB disease			
30	After finishing your treatment, you can do your work as usual			
31	To practice yourself according to the recommendations from health workers/community health volunteers it can not cure you from the disease more rapidly			
32	To smoke and drink alcohol it yields effects to TB treatment			

Barriers of Community Based DOTS program				
33	After getting TB treatment, you can make contact with friends and neighbors as usual			
34	You feel much boring to take TB drugs for 8 months			
35	When your symptoms are relieved, you can reduce drug doses or stop taking the drugs			
36	Even though you have so much busy time, you can get to meet or collect the drugs from the health worker or community health volunteer at the appointed time			
37	Due to you must take the TB drugs, your TB illness is worse than previous times			
38	Administering the drugs for long times it cause you depend on the drugs			

Part-III Enabling factors

Availability

39. Do you get TB drugs in every visit from your daily observer?

( ) 1 = Yes ( ) 2 = No

40. Do you mostly get the health education from your daily observer?

( ) 1 = Yes ( ) 2 = No

41. Do you meet your daily observer in every visit?

( ) 1 = Yes ( ) 2 = No

Accessibility

42. What is the average time in which you have to get TB drugs in treatment place?

( ) 1 = < 15 minutes ( ) 2 = 15 to 30 minutes

( ) 3 = 31 to 60 minutes ( ) 4 = > 60 minutes

43. What is the appropriate time for you to get TB drugs?

( ) 1 = All time ( ) 2 = Morning

( ) 3 = Evening ( ) 4 = Afternoon

44. What is the easiest source for you to get TB information?

( ) 1 = Radio ( ) 2 = Health worker

( ) 3 = Community health volunteer ( ) 4 = Village leader

( ) 5 = TV ( ) 6 = other (specify) _____

Part-IV Reinforcing factors

Please mark (√) under the level of agreement with your opinion on the following statements (from # 45-68). **(For positive statement yes = 3, not sure = 2, no = 1 and for negative statement yes = 1, not sure = 2, no = 3)**

	From family members	**Yes**	**Not sure**	**No**
	Mental support			
45	At present, you feel that your family have as good as relationship with you as before			
46	Since your TB diagnosis, you can't consult your distress and sickness with your family			
47	You are getting better care from family since diagnosis			
48	Your family members are not accept your ideas and suggestion			
	Informational support			
49	You are informed to go to the health post/hospital at right time by your family members			
50	After getting disease, non of your family members informed you to take the nutritious foods			
51	You are reminded regularly to take the TB drugs by your family members			
52	Your family does not tell you about how to practices yourself during your TB sickness			
	Material support			
53	You are still getting nutritious food from the family member			

54	You are still getting the enough financial support from the family members			
55	Nobody take care of your clothing after diagnosed with TB disease			
56	Nobody take care of your eating instruments after diagnosed with TB disease			
From health workers / community health volunteers				
Mental support				
57	Health worker / community health volunteers ask you about your health regularly in the visit			
58	Health worker / community health volunteers provide you enough time to listening your problem			
59	During the visit time the health workers/community health volunteers are impolite with you			
60	During the visiting time, the health workers or community health volunteers do not motivate you to follow the drug schedule			
Informational support				
61	Health worker / community health volunteers always ask about the side effects of TB drugs			
62	When you ask for TB information, the Health worker / community health volunteers provide you with little information			
63	You are not reminded regularly to take the TB drugs by Health worker / community health volunteers			
64	Before giving CBDOTS and TB drugs information, health worker / community health volunteer can give consultations about information of hygienic practices related to TB disease			
Material support				

65	Health worker / community health volunteer provides you correct medicine with free of charge			
66	Health worker / community health volunteer does not provide sufficient drinking water when taking TB drugs			
67	Health worker / community health volunteer provides you sufficient health education materials			
68	Health worker / community health volunteer does not provide you with comfort sitting place when taking TB drugs			

Part-V Related to compliance

69. Do you take your drugs regularly from the starting treatment date?

( ) Yes ( ) No

If no,

70. How many days you left your treatment?

( ) Less than 7 days

( ) 7 or more days

71. When you have left your treatment?

(Please give date also)

1……

2……

3……

72. What are main reasons of missing TB treatment? (Multiple selection)

( ) Could not effort travel cost ( ) Health Workers are not friendly

( ) Side effect of TB drugs ( ) Feeling cured / completed

( ) No body suggested me for regular treatment

( ) other (specify) _____

APPENDIX B
GUIDELINE FOR GENERAL CONVERSATION

For the qualitative research, the following guideline was used for general conversation with 6 key informants;

1. Opinion about the reasons of compliance or noncompliance on CBDOTS program.
    1.1 Why you are continuing your treatment? (For compliance patient)
    1.2 What are the reasons of your stopping or un-continuous treatment? (For noncompliance patient)
2. Knowledge on TB disease and CBDOTS program
    2.1 What is the cause of TB and how can you prevent its transmission?
    2.2 How can you suspect TB and diagnose it?
    2.3 What are the methods of diagnosis and its duration of treatment?
    2.4 When will you stop taking TB drugs?
    2.5 What are the side effects of TB drugs and how can you manage it?
3. Perception towards TB disease and CBDOTS program
    3.1 How do you feel about severity of TB illness?
    3.2 How do you perceive about benefits of this treatment process?
    3.3 What are the barriers to complete your treatment?
4. Opinion about accessibility and availability of CBDOTS program
    4.1 How do you get TB drugs and health education from your daily observer?
    4.2 Where do you get information about TB disease and its treatment?
5. Opinion about social supports from various types and sources
    5.1 Do your family members support you? How do they support?
    5.2 Do health worker/community health volunteers support you? How do they support?

APPENDIX C

ANALYSIS OF ASSOCIATION BETWEEN INDEPENDENT VARIABLES

Table 1 Relationship between socio demographic characteristics and knowledge on TB and Community Based DOTS services

Socio demographic factors	Knowledge level						χ^2 (df)	p-value
	High	%	Moderate	%	Low	%		
Age groups							3.348 (4)	0.501
15 – 34	20	50.00	8	20.00	12	30.00		
35 – 54	10	31.25	8	25.00	14	43.75		
> 54	11	37.93	5	17.24	13	44.83		
Sex							0.885 (2)	0.643
Male	29	43.94	13	19.70	24	36.36		
Female	12	34.29	8	22.86	15	42.86		
Marital status							3.414 (4)	0.491
Single	8	50.00	2	12.50	6	37.50		
Married	30	40.00	18	24.00	27	36.00		
Others	3	30.00	1	10.00	6	60.00		
Education							21.517 (6)	0.001
Illiterate	5	17.24	6	20.69	18	62.07		
Primary school	11	39.29	7	25.00	10	35.71		
Secondary level and over	24	66.67	5	13.89	7	19.44		
Other	1	12.50	3	37.50	4	50.00		
Family income							4.080 (2)	0.130
≤ 3,000	20	37.74	8	15.09	25	47.17		
>3,000	21	43.75	13	27.08	14	29.17		

Table 2 Relationship between patient knowledge on TB and Community Based DOTS services and its perception

Group	Knowledge level: High	%	Moderate	%	Low	%	χ^2 (df)	p-value
Overall perception level							21.409 (4)	<0.001
High	22	53.66	18	43.90	1	2.44		
Moderate	7	33.33	14	66.67	0	0.00		
Low	6	15.38	24	61.54	9	23.08		

Table 3 Relationship between patient knowledge on TB and Community Based DOTS services and availability of CBDOTS

Availability factors	Knowledge level: *High*	*%*	*Moderate*	*%*	*Low*	*%*	χ^2 *(df)*	*p-value*
Available of health education							4.166 (2)	0.125
Yes	28	47.46	13	22.03	18	30.51		
No	13	30.95	8	19.05	21	50.00		
Available of daily observer in every visit							8.438 (2)	0.015
Yes	29	52.73	11	20.00	15	27.27		
No	12	26.09	10	21.74	24	52.17		

Table 4 Relationship between socio demographic characteristics and overall perception on TB and Community Based DOTS services

Socio demographic factors	Overall perception level						χ^2 (df)	p-value
	High	%	Moderate	%	Low	%		
Age groups							1.407 (4)	0.843
15 – 34	13	32.50	23	57.50	4	10.00		
35 – 54	11	34.38	19	59.38	2	6.25		
> 54	11	37.93	14	48.28	4	13.79		
Sex							3.721 (2)	0.156
Male	27	40.91	34	51.52	5	7.58		
Female	8	22.86	22	62.86	5	14.29		
Marital status							24.025 (2)	<0.001
Married	28	37.33	46	61.33	1	1.33		
Others*	7	26.92	10	38.46	9	34.62		
Family income							0.468 (2)	0.791
≤ 3,000	20	37.74	28	52.83	5	9.43		
>3,000	15	31.25	28	58.33	5	10.42		

* 16 were single and 10 were widowed, divorced/separated.

Table 5 Relationship between patient overall perception on TB and Community Based DOTS services and availability of CBDOTS

Availability factors	Overall perception level						χ^2 (df)	p-value
	High	%	Moderate	%	Low	%		
Available of health education							10.728 (2)	0.005
Yes	22	37.29	36	61.02	1	1.69		
No	13	30.95	20	47.62	9	21.43		
Available of daily observer in every visit							2.864 (2)	0.239
Yes	21	38.18	31	56.36	3	5.45		
No	14	30.43	25	54.35	7	15.22		

Table 6 Relationship between socio demographic characteristics and overall social support level

Socio demographic factors	Overall social support level						χ^2 (df)	p-value
	High	%	Moderate	%	Low	%		
Age groups							4.050 (4)	0.399
15 – 34	31	77.50	5	12.50	4	10.00		
35 – 54	22	68.75	9	28.13	1	3.13		
> 54	19	65.52	7	24.14	3	10.34		
Sex							1.990 (2)	0.370
Male	46	69.70	16	24.24	4	6.06		
Female	26	74.29	5	14.29	4	11.43		
Marital status							17.362 (2)	<0.001
Married	57	76.00	17	22.67	1	1.33		
Others*	15	57.69	4	15.38	7	26.92		
Family income							0.945 (2)	0.623
≤ 3,000	36	67.92	13	24.53	4	7.55		
>3,000	36	75.00	8	16.67	4	8.33		

* 16 were single and 10 were widowed, divorced/separated.

Table 7 Relationship between overall social support level and availability of CBDOTS

Availability factors	Overall social support level: High	%	Moderate	%	Low	%	χ^2 (df)	p-value
Available of TB drugs from daily observer in every visit							10.082 (2)	0.006
Yes	50	78.13	13	20.31	1	1.56		
No	22	59.46	8	21.62	7	18.92		
Available of health education							4.186 (2)	0.123
Yes	45	76.27	12	20.34	2	3.39		
No	27	64.29	9	21.43	6	14.29		
Available of daily observer in every visit							6.176 (2)	0.046
Yes	42	76.36	12	21.82	1	1.82		
No	30	65.22	9	19.57	7	15.22		

Table 8 Relationship between patient knowledge on TB and Community Based DOTS program and social support

Group	Social support level: High	%	Moderate	%	Low	%	χ^2 (df)	p-value
Knowledge level							8.901 (4)	0.064
High	31	75.61	9	21.95	1	2.44		
Moderate	16	76.19	5	23.81	0	0.00		
Low	25	64.10	7	17.95	7	17.95		

APPENDIX D
THE RESULT OF CONTENT ANALYSIS IN GENERAL CONVERSATION

I. Opinion of noncompliance group about their reasons of noncompliance

1. Initial stage of the treatment, different types of drugs can mainly produce different side effects. Body itching is an example of minor side effects of the TB drugs. When it was appeared patient fear with its effects. And he interrupted his treatment without any consultation to health personnel. From these can be shown from a spoken sentence of one noncompliance patient.

"*I was worried when itching was presented to all over my body and it was appeared red patches, therefore I had left my treatment*" (a noncompliance patient).

2. Usually the patient feels TB symptoms disappeared after 2 months of its treatment. One patient perceived that he could do his work as usual as he ever did it before. Therefore he thought that no need to take more treatment and stopped it. A next noncompliance patient said about this as;

"*I have felt cured because I have no cough and chest pain now. I thought that no need to take treatment more. I am not feeling any symptoms of weakness and I can do my work as before*".

II. Knowledge of TB patients on TB disease and CBDOTS program

1. A TB patient had experiences on suffering from cough and needed to examine her sputum before diagnosis. After diagnosis a health worker advised her its duration of TB treatment. Therefore she was known to correct answer about it. A spoken sentence from her as shown below;

"*Cough is main symptoms of TB, because since three months I have suffering from cough. I have examined my sputum smear because it is reliable for diagnosis and*

health worker suggested me to take treatment for 8 months. *Therefore its duration is at least 8 months*" (a TB patient).

2. One TB patient had good knowledge about its mode of transmission and its prevention as one his spoken sentence;

"It can be transmitted through airways and its transmission can be prevented if the patient covers his mouth at the time of coughing" (a TB patient).

3. However, a next patient had incorrect knowledge about its mode of transmission. A spoken sentence was demonstratred as;

"Disease can be transmitted by sharing utensils" (a TB patient)

4. One TB patient used to smoke and was suffered from TB disease; he thought that its cause was due to his smoking behavior. So, he had incorrect knowledge regarding its cause. A spoken sentence can be shown as;

"*I used to smoke since long years; therefore smoking should be cause of my disease" (a TB patient)*

5. A next TB patient had also incorrect knowledge about its cause. He thought that it was due to heredity because his father had TB disease. A spoken sentence was shown as;

"Cause of TB is heredity because my father was a TB patient before 18 years, and now I have suffering from this disease" (a TB patient)

III. Perception of TB patients toward TB disease and CBDOTS program

(Severity)

1. One respondent perceived on feeling sickness with TB, it could lose much of his working time and also lose his much income. A TB patient said about these as;

"I have a lot of work in the field, due to sickness I can't able to do. I am not sure that after finished my treatment, I can do my work as usual or not. Feeling

sickness interrupted my source of income, I have taken loan from my neighbor, and sometimes I think that I can't pay to him" (an ex-foreign labor TB patient).

2. A TB patient perceived that he was respected from their neighbor and community people even he was TB patient. From general conversation he said that;

"*I am not feeling ashamed from my neighbors and relatives because they are still coming to me for making some suggestion*" (a 68 years old TB patient).

3. Someone perceived that he was hated from his friend, neighbor and community people due to his disease. A spoken sentence from one out of them as;

"*I feel uneasy, when my friends and neighbors don't talk to me. I think that they don't like to me and wanted to away from me*" (a young TB patient).

(Benefits)

4. Two TB patients perceived similarly that they could not able to do their work as usual. From these can be shown from spoken sentence as;

"*I have a lot of work in the field. I am not sure that after finished my treatment, I can do my work as usual or not*."

(Barrier)

5. Someone perceived that he could not make contact with their family, friends and neighbor as usual. A spoken sentence as;

"*Last time when I got TB, I used to sleep in separated house, but this time I am sleeping in same house but in separated room. If I sleep in same room with my family it may be transmitted to them"* (a relapse patient).

6. One young TB patients had difficulty in finding a couple, and engagements. She perceived that she was felt ashamed from their community as well as their partners. Her marriage could be broken due to her TB sickness. Her spoken sentence can be shown as;

"I haven't any problem from family concerning this disease, but I am afraid if my friends and neighbors know about my disease, it will be problem. They will be

hated to me and I could not able to marry because every boy will be refused to me" (a college lady student).

IV. Opinion of accessibility and availability of CBDOTS program

1. One respondent could not believe to advices of Community Health Volunteers and he felt that CHVs had little knowledge about TB disease and its treatments. Therefore he only wanted to consult with health worker. His spoken sentence as;

"If I have some problem I can consult with health worker, which is easy and suitable for me because CHV can't advice me due to her little knowledge about disease and treatment" (an educated TB patient).

V. Opinion of social support from the various types and sources

1. One TB patient had his opinion about social supports from their family had different as compared between before and after TB infection. He had received better care when he was not a TB patient, but after getting TB disease he had felt isolated from his family in every aspect of family life. From these can be shown from spoken sentences of the patient.

"*Previous time I was not any problem from the family. They provided me sufficient nutritional foods. My wife also provided me better care. And my wife and child took together food with my plates. But now, I have suffering from TB disease, I haven't any income and I can't do any job. I have problems of money and my family separated my eating instruments and cloths. They are busy in their work; they are decided by themselves about some important work regarding to family"* (an ex-governmental officer TB patient).

2. Three respondents had similar opinion about social support from health worker/community health volunteers, which had not properly. They did not receive a minimum care and supports. Even they did not provide sufficient safe drinking water as well as comfortable sitting place. Their spoken sentences were shown as;

"*I am feeling weakness, sometimes I could not able to catch vehicle due to high charge. I have tried to meet staffs in the treatment center, they are very busy but I can get medicine from the students. Staffs don't care about drinking water, this water and glass is not clean because they don't change water daily. I have not any chair to stay. On the bench students are sitting and talking loudly, it is disturbed to me"* (a TB patient).

BIOGRAPHY

NAME	Anant Kumar Nepal
DATE OF BIRTH	February 19, 1971
PLACE OF BIRTH	Palpa, Nepal
INSTITUTION ATTENDED	Tribhuvan University, Nepal Bachelor in Humanities and Social Science -1993
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