FACTORS RELATED PATIENT COMPLIANCE WITH "DIRECTLY OBSERVED TREATMENT SHORT COURSE" IN POKHARA URBAN KASKI, NEPAL

HARI BAHADUR KUNWAR

A THESIS SUMITTED IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE OF MASTER OF PRIMARY HEALTH CARE MANAGEMENT FACULTY OF GRADUATE STUDIES MAHIDOL UNIVERSITY 2005

ISBN 974-04-5690-1

Thesis
entitled

FACTORS RELATED PATIENT COMPLIANCE WITH "DIRECTLY OBSERVED TREATMENT SHORT COURSE" IN POKHARA URBAN KASKI, NEPAL

.....
Mr. Hari Bahadur Kunwar
Candidate

.....
Assoc. Prof. Boonyong Keiwkarnka
Dr.P.H.
Major-Advisor

.....
Mr.Thaval Poblap
Ph.D.
Co-Advisor

.....
Lect. Jutatip Archapitak
Ph.D.
Co-Advisor

.....
Assoc. Prof. Rassmidara Hoonsawat
Ph.D.
Dean
Faculty of Graduate Studies

.....
Assoc. Prof. Sirikul Isaranurug
M.D., Dip. Thai Board of Pediatrics
Chair
Master of Primary Health Care Management
ASEAN Institute for Health Development

Thesis
entitled

FACTORS RELATED PATIENT COMPLIANCE WITH "DIRECTLY OBSERVED TREATMENT SHORT COURSE" IN POKHARA URBAN KASKI, NEPAL

was submitted to the Faculty of Graduate Studies, Mahidol University
for the degree of Master of Primary Health Care Management

on
March 14, 2005

.....
Mr. Hari Bahadur Kunwar
Candidate

.....
Assoc. Prof. Boonyong Keiwkarnka
Dr. P.H.
Chair

.....
Mr.Thaval Poblap
Ph.D.
Member

.....
Asst. Prof. Junya Pattaraarchachai
Sc.D.
Member

.....
Lect. Jutatip Archapitak
Ph.D.
Member

.....
Assoc. Prof. Rassmidara Hoonsawat
Ph.D.
Dean
Faculty of Graduate Studies
Mahidol University

.....
Assoc. Prof. Sirikul Isaranurug
M.D., Dip. Thai Board of pediatrics
Director
ASEAN Institute for Health Development
Mahidol University

ACKNOWLEDGEMENT

It is my pleasure to express my sincere and deepest gratitude to Assoc. Prof. Dr. Boonyong Keiwkarnka, my Major Advisor, for his extensive, direct, helpful comments and recommendations, since the beginning of my study, especially his thorough guidance in my accomplishing the thesis.

I am deeply indebted to my Co-advisors, Dr. Thaval Poblap, Lect. Dr. Jutatip Archapitak, and my External Examiner, Asst. Prof. Junya Pattaraarchachai, Sc.D. for their kind encouragement, support and valuable comments that helped complete this study in the right direction.

I would like to thank Mr. Rabin Khatiwada, Mr. Basanta Nath Bhattarai, Mr. Keshab Raj Sharma, Mr. Hari Bahadur Thapa and Kashi Ram Lamichhane for their valuable support in collecting the data.

I would like to thank Director of RTC, Dr. Sarat Chandra Verma, Dr. Mohan Kumar Prasai and Maiya Ranjitkar Chief of DPHO Kaski.

I am very much grateful to the Directors of NTC/ STC, Dr. K. K. Jha, Dr.P. Malla, Dr. Rajendra Pant, for their kind support.

I would like to express my thanks to all the teachers, MPHM office staff, library staff, ASEAN house staff and my classmates for their valuable cooperation and support during the study.

Last but not the least; I would like the express my deepest love to my wife Mrs. Laxmi Kunwar, my lovely daughter Ekta Kunwar, my brother Ram Bahadur Kunwar, Meena Kunwar, Shanghrsa and Suchata Kunwar for their huge economic, social and moral support during my long stay in Thailand.

Hari Bahadur Kunwar

FACTORS RELATED PATIENT COMPLIANCE WITH "DIRECTLY OBSERVED TREATMENT SHORT COURSE" IN POKHARA URBAN KASKI, NEPAL.

HARI BAHADUR KUNWAR 4737958 ADPM / M

M.P.H.M. (PRIMARY HEALTH CARE MANAGEMENT)

THESIS ADVISORS: BOONYONG KEIWKARNKA, Dr.P.H., THAVAL POBLAP, Ph.D., JUTATIP ARCHAPITAK, Ph.D.

ABSTRACT

A cross-sectional study was conducted at Pokhara urban Nepal in January 2005. The aim of determine the patient compliance with DOTS (Directly observed treatment short course). All sputum smear positive TB patients registered during 15th July 2004 to 15th January 2005 under the DOTS treatment were interviewed by using a structured questionnaire.

The findings of the study revealed that 72.97% of the respondents complied with the course. The majority of the respondents were 15-34 yrs. old, male, married, literate, laborers with a moderate level of family income. Similarly, majority of them positively answered about the availability of health staff, health education and TB drugs. More than half of them used a vehicle, has no need to pay traveling costs, lived less than 2 km away and had a traveling time under 15 minutes, the majority of them had a waiting time less than 5 minutes. About three-fifths of them had a high level of knowledge and perception on TB disease and the DOTS program.

The results showed that there were significant associations between knowledge level, availability factors such as availability of health staff, health education, TB drugs, and patient compliance with DOTS. Furthermore, overall perception toward disease and its treatment, perceptions of susceptibility, severity and benefits was also significantly associated with patient compliance. All of these were significantly associated with a level at p-value <0.05.

Compliance with DOTS could be improved by revising its service by provision of more information the disease and its treatment, effective expansion of the DOTS program near the patients' homes and involving the community in TB control activities.

KEY WORDS: TUBERCULOSIS / COMPLIANCE / DOTS

100 P. ISBN 947-04-5690-1

CONTENTS

CONTENTS (Cont.)

LIST OF TABLES

LIST OF TABLES (Cont.)

TABLE Page

LIST OF FIGURES

FIGURE Page

LIST OF ABBREVIATIONS

TB	:	Tuberculosis
NTC	:	National Tuberculosis Center
NTP	:	National Tuberculosis Programme
DOTS	:	Directly Observed Treatment Short-course
HIV	:	Human immune deficiency syndrome
AIDS	:	Acquired immune deficiency syndrome
MDR-TB	:	Multi-drug resistant
ARI	:	Annual risk of TB infection
BCG	:	Bacillus calmette Guerin
WHO	:	World Health Organization
NSS + ve	:	New smear sputum positive
NSS - ve	:	New smear sputum negative
SCC	:	Short course chemotherapy
EP	:	Extra-pulmonary
EPI	:	Expanded Programme on Immunization
Pop	:	Population
SD	:	Standard Deviation
NGO	:	Non-governmental organization
H B M	:	Health Belief Model
AIHD	:	ASEAN Institute for Health Development

CHAPTER 1
INTRODUCTION

1.1 Rationale and justification

Tuberculosis (TB) is caused by the Mycobacterium Tubercle bacillus which most commonly affects the lungs and also affects other parts of the body, such as glands, the abdomen, bones, and the brain. TB should be suspected if the person has coughed more than two weeks, has a fever and loss of weight. It spreads by air. When the infected persons cough, it can easily spread to the non-infected person (1).

Pulmonary Tuberculosis is still a major public health problem in many developing countries, such as India, China, Indonesia, and Pakistan. It is said that if the inefficient practice of TB control through the "Directly Observed Treatment Short course" DOTS program continues, there will probably be more TB patients in the world today than there were in the last 20 years, especially in countries with high levels of HIV(2). TB is an infectious disease, the fourth leading cause of death among adults (15-54 years) in the developing countries. TB kills more than 2 million people every year despite recent actions on the control of TB. It is estimated that 70 million people will die from TB between now and the year 2020, if the TB control program is not strengthened (3). This constitutes about 26% of the avoidable adult death in the developing world. TB causes more deaths than AIDS, malaria and diarrhea combined (4). About one billion people will be infected by TB and 200 million people will get sick, and nearly 35 million people will die from Tuberculosis between 2000 and 2020 if TB control is not prioritized (4).TB is a curable disease, if the TB patient regularly takes the full course of prescribed drugs for 8 months without interruption. If the TB patient interrupts drugs during the intensive and continuous phases, the bacteria will develop resistance to the TB drugs or Multi-drug Resistance (MDR-TB) will be developed. During the treatment time (taking drugs) the patient feels better because the bacteria is paralyzed within a two week period. The patient who interrupts the

drugs may develop multi drug resistance (MDR). MDR-TB cases can be treated, but it is 100 times more expensive to cure the TB patient (1).

According to the World Health Organization (WHO), there are 22 highest TB burdened countries, mainly in Asia and Africa, such as India, China, Pakistan, Cambodia, Vietnam, Indonesia, Thailand, the Philippines, and Afghanistan (5).

Table 1 TB incidence of high burden countries, 2000

Country	Population X(1000s)	Estimation incidence rate/100,000/ year (all cases)	Notification incidence rate/100,000/ year (all cases)	Nss + cases detection rate (%)	Treatment success rate (%)
India	1,008,937	184	805	42	82
China	1,275,133	107	36	36	96
Pakistan	1,141,256	175	7.6	3	70
Cambodia	13,104	572	144	44	93
Vietnam	78,137	189	115	80	92
Indonesia	212,092	280	32	12	50
Thailand	62,806	140	54	46	77
Philippines	75,653	330	170	60	87
Afghanistan	21,765	321	33	9.2	87
Bangladesh	137,439	242	55	26	81
Nigeria	113,862	305	23	12	75
South Africa	43,309	526	257	84	60
Ethiopia	62,908	397	145	29	76
Russia	145,491	132	95	30	65
Congo	50,948	320	119	51	69
Brazil	170,406	68	47	79	11
Tanzania	35,119	359	155	45	78
Kenya	30,669	484	209	47	78
Myanmar	47,749	168	65	48	81
Uganda	23,300	351	130	50	61
Mozambique	18,292	433	116	40	71
Zimbabwe	12,627	584	411	52	73

Sources: World Health Organization, Global Tuberculosis Report, 2002.
NSS+ = New sputum smear positive cases.

1.1.1 Global situations (1990-2000) of TB

Estimates of deaths from tuberculosis range from two to three million every year. WHO declared TB a global emergency in 1993, so great was the concern about the modern tuberculosis epidemic seven to eight million people develop TB every year. In estimates of TB morbidity for the decade, 1990-2000, there were an estimated 88 million new cases of TB of which 8 million cases were attributable to HIV infection (5).

When patients get the wrong drugs, wrong dose or irregular treatment it can create Multi-drug resistant TB. If the drug supply is unreliable, patients stop taking their medicines because the patient feels better and has poor motivation. Financial or other reasons can develop MDR-TB and its treatment is very expensive. Up to 50 million people are likely to be infected with multi drug- resistant MDR- TB (1).

In 1991 WHO recognized the growing importance of TB as a public health problem and the potential for cost-effective control using currently available tools (6). This led to a reassessment of ongoing TB control by governments, revealing poorly managed TB control programme, poverty, population growth and migration, and a significant rise of TB cases in HIV endemic areas. To help address the situation, a new framework for effective TB control was then developed (7) and a global strategy called DOTS was introduced. The five elements of the DOTS strategy, considered essential for global TB control, are: political commitment, case detection using sputum microscopy among persons seeking care for prolonged cough, standardized short course chemotherapy under proper case management conditions, including directly observed treatment, regular drug supply, and a standardized recording and reporting system.(8).

The well established TB control strategy DOTS has been proven the best way of controlling TB in the world. However, in the developing countries effective implementation of DOTS strategy is crucial, resources are limited and health services are poorly managed. Several challenges impede sustainable implementation and expansion of TB control activities. Many of these stem from a weak political will

failing to elicit the required health system and societal response to control TB. General public health services need to enhance their capacity to sustain and expands DOTS implementation without compromising the quality of case detection and treatment. Effective implementation of the DOTS strategy is needed to prevent occurrence of new multi-resistance (MDR-TB) cases as well as measures to cure existing MDR-TB cases.

1.1.2 TB situation in South East Asia Region

Nearly 40% of TB cases in the world live in the South East Asia region, about 3 million TB patients and 700,000 deaths due to the TB disease every year. Bangladesh, India, Indonesia, Myanmar and Thailand account for 95% of these deaths. Especially economically productive ages are between 15-60 years (4). When mortality and morbidity occur, it directly affects growth of the national economy. TB is the topmost public health problem in the South East Asian region. TB is complicated by Multi-Drug Resistance (MDR) and HIV/AIDS. Nearly 60% of AIDS cases develop TB is the most life-threatening opportunistic infection associated with HIV for women. TB kills more than 2000 people per day in this region (4).

1.1.3 Tuberculosis Situation in Nepal

TB is one of major public health problems in Nepal. About 5,000 to 7,000 people die every year from this disease, and about 45% of the total population is infected by TB; out of them, 60% are in the adult age group (15-54) years (9). DOTS strategy is an effectively successful treatment for TB patients. If this strategy is successfully implemented, it can reduce the number of deaths. Expansion of this cost effective and highly successful treatment strategy of DOTS has proved its efficacy in Nepal. DOTS strategy was started 1996 covering 1.7% of the population. It was implemented in four pilot areas of the country in that year (10). A cure rate of about 90% was found in the first cohort from these pilot areas. Then DOTS was gradually expanded to 335 DOTS treatment centers and 1407 DOTS sub-centers covering 94% of the population in 2002 (10).

A number of tuberculin surveys have been carried out in various parts of Nepal and it is estimated that the annual risk of TB infection (ARTI) is 1% in mountain areas, 1.5% in hills, 2.5% in flat areas and 4% in urban areas (11).

1.1.4 Tuberculosis situation in the Pokhara urban area in Kaski, district

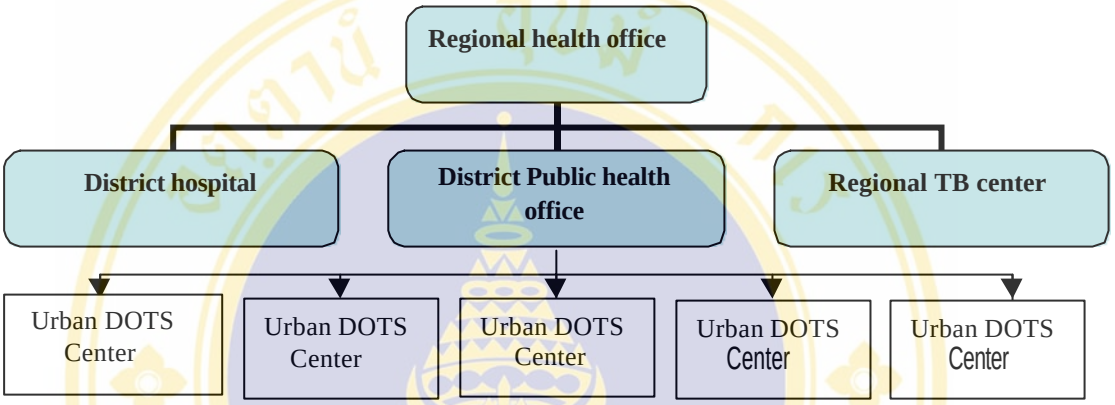


Figure 1 Structure of governmental organization TB control program in Pokhara

Pokhara is the western regional headquarters. There are 197681 people in the area. The area of Kaski is 2017 sq/km and the population density was 189 persons/sq km in 2001 (12).

The annual risk of TB infection in the Pokhara urban areas is 4%. It has been estimated that about 460 new TB cases occur every year. About half of them are new infectious pulmonary cases (11). During 2003, 420 TB patients registered in the DOTS centers of the districts. There were 255 males and 165 females. The cure rate in the district was 85%, and defaulter rate was more than 5% and the death rate was 4% (10). TB is a serious problem in the urban areas. Many people migrate from rural areas to urban areas to get opportunities like working in industries, factories, offices and carpeting, etc. About 80% of the urban population is under the poverty line and there is an increasing trend towards high migration from rural areas to urban areas (13).

Many studies show that due to poor knowledge about TB and its treatment, TB patients might stop their treatment when they feel better. Lack of specific knowledge, especially about the duration of treatment is a major factor in non-compliance (seen from Malaysia to Ethiopia) according to a study in 2002 (14). This education status is closely linked with compliance for patients with good education. They can then understand the impact of regular treatment (Boyles SJ Int. Tuberc Lung Dis in 2002) (15). Availability of daily health education at DOTS centers was the largest independent effect on improving compliance (Kathmandu Nepal study-2002) (16).These studies suggest that proper and specific health educations for TB patients regarding TB and its treatment increases compliance.

Because of poverty, sometimes patients can not afford the travel cost. It leads to poor compliance with treatment. Studies in other settings show that visiting health centers not convenient for some patients because of traveling expenses, transportation problems, physical inability or simply weakness; as a result, the treatment completion rate is poor (Morankar Suryawarishi N. Indian) (17). Some studies show that social pressure and stigma, especially among women, lead to be non-compliance. Higher lack of compliance has been observed in married (27.8%) compared to single persons (17.5%) (Islamabad study in 1997) (18). Married women face strong social pressure to complete or abandon treatment (Indian study in1998) (17).There are many causes of poor compliance with treatment among rural and urban people. Many people think that TB is the will of God. Some people think that TB is caused by heredity. Many rural and urban people who have TB are isolated from the community and also from their families (17).

When people get signs and symptoms of TB, such as cough, fever, chest pain, weakness, loss of appetite, blood vomiting, etc, these symptoms are the effect of doing hard work and they then rest. If they do not improve, they will visit the traditional healers, and they are treated traditionally due to the social stigma. They perceive TB seriously, though there is low willingness to get appropriate treatment in time. There are many possible reasons their poor compliance with treatment in the urban.

This type of study has been conducted in other parts of the world and other urban settings in Nepal, but not in Pokhara. Therefore this study was conducted to identify the factors which affect patients' compliance with TB treatment, focusing on socio-demographic characteristics, availability and accessibility of DOTS services, knowledge and perception of TB patients regarding TB and its treatment in the Pokhara Urban. After determining the factors related to patient compliance with "Directly Observed Treatment Short Course" (DOTS), recommendations have been made to the National Tuberculosis Control Programme (NTP) in Nepal.

1.2 Research Question

Case holding is the highest priority in the TB control program. The goal is to cure positive cases and avoid drug resistance to TB medicine. Therefore, compliance with treatment is important in achieving this priority. The Question is:

What are the factors relating TB patient compliance with "Directly Observed Treatment Short Course" (DOTS)?

1.3 Research Objective

1.3.1 General objective

To study factors related to patient compliance with "Directly Observed Treatment Short Course" (DOTS) in Pokhara urban Kaski, Nepal.

1.3.2 Specific objectives

1. To find TB patient compliance with DOTS.
2. To identify the socio-demographic characteristics of TB patients.
3. To explain the availability and accessibility of DOTS services.
4. To describe the knowledge and perceptions (susceptibility, severity, benefits and barriers) about TB and its treatment its relation to TB patient compliance with DOTS.

5. To identify the relationship between socio-demographic factors and TB patient compliance with DOTS.

6. To identify the relationship between the availability and accessibility of DOTS services to patient compliance with DOTS.

7. To examine the relationship between knowledge about TB and compliance with DOTS programme.

8. To identify the relationship between perceptions about TB and its treatment and patient compliance with DOTS.

1.4 Research Hypothesis

Many studies have indicated that some factors associated with compliance with treatment of TB patients with DOTS. Factors increasing drug compliance included disease symptoms, knowledge about TB, perceptions about the illness and treatment, supervision of drug administration by health care personnel, and accessibility and availability of DOTS services. These factors are basic for DOTS service and are related to non-compliance of patients with TB treatment.

1. Socio-demographic factors are significantly associated to TB patient compliance with DOTS.

2. Those who have easy access / availability to DOTS services are significantly more compliant with DOTS.

3. Individuals who have more knowledge about TB and treatment are more likely to be compliant with DOTS.

4. Individuals who have a high positive perception about TB and treatment are more compliant with DOTS.

1.5 Conceptual framework

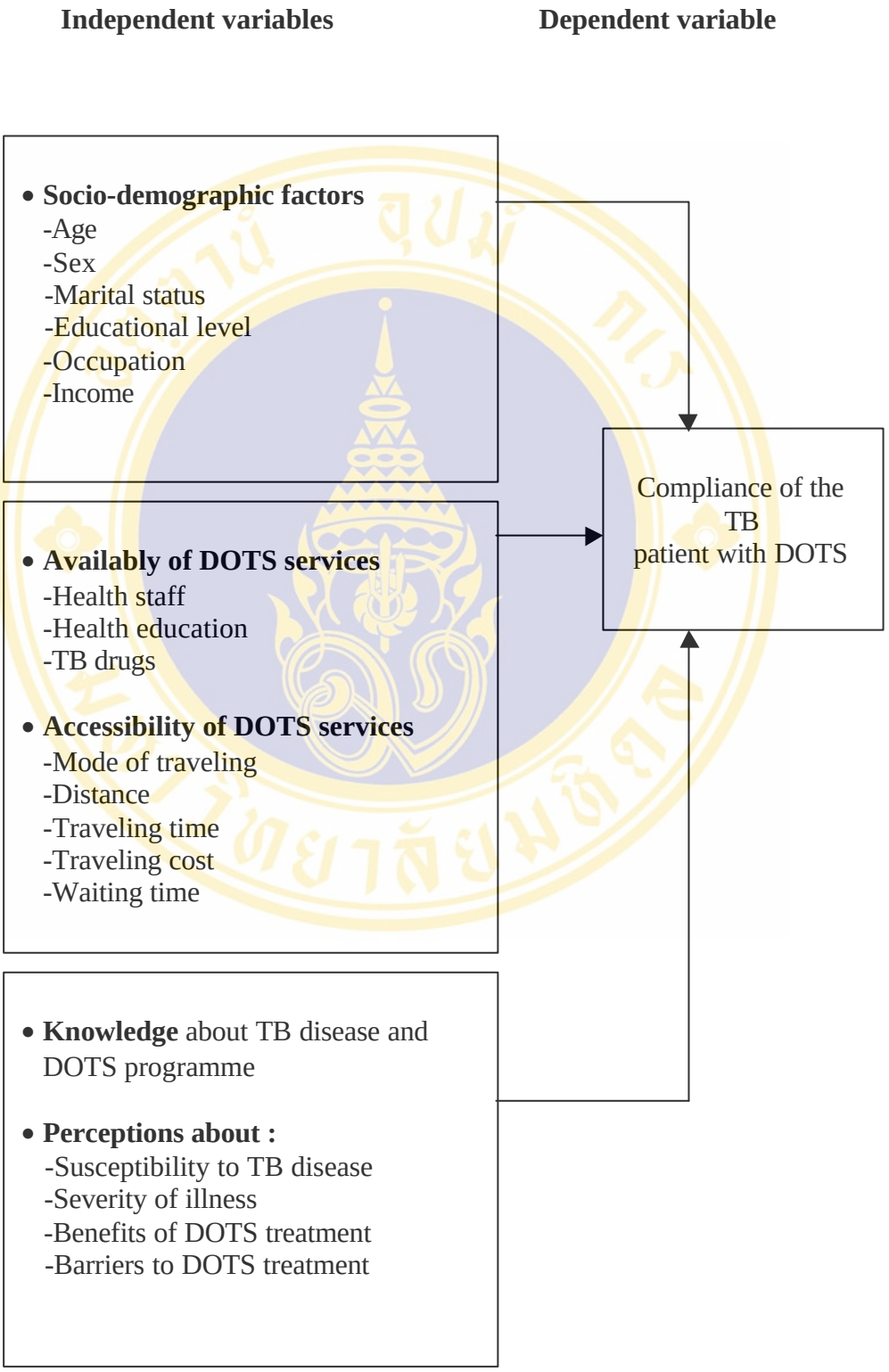


Figure 2 Conceptual framework

1.6 Operational definitions

"Directly Observed Treatment Short Course" (DOTS): - It refers to specific strategies for TB control, which are drug supply, patient's commitment, laboratory examination, directly observed treatment and recording and reportings system.

Treatment center: - It refers to the hospital and primary health centers where TB patients are diagnosed and the availability of the TB register, lab register, TB treatment cards and treatment provided with DOTS.

Health staff: - It refers to the health workers who are responsible to supervise the TB patient.

Smear positive TB patient: - It refers to the patient who is diagnosed by a sputum examination by microscopy.

Intensive phase: - It refers to the duration of treatment in the first two months, taking drugs daily under supervision of the health staff.

Continuation phase: - It refers to the period of treatment after the intensive phase, which is six months, when the and patient collects the TB drugs weekly from the centre.

Compliance: - It refers to the patient's obedience to commands or rules and regulations or instructions under the DOTS protocols given by the health worker, and patients who have not missed 7 consecutive doses of treatment.

Non-compliance: - Patients will be deemed to be non-compliant when they have missed more than 7 consecutive days of treatment. Source: Boyles SJ. Int. J Tubercle lung Dis 2002 April: (15).

Marital status: - It refers to married, single and others.

Occupation: - It refers to employment, such as farmer, laborer, housewife, service, and business people.

Education level: - It refers to illiterate, primary, secondary high school, high school and college.

Income: - It refers to the respondents who earn money, according to their monthly salary.

Knowledge about TB and DOTS programme: -

It refers to knowing that the cause of TB is mycobacterium tuberculosis, the most important symptom is cough for more than two weeks and fever, that the disease transmitted by the respiratory system, the main diagnosis method is sputum examination, benefits of DOTS is completely curing the disease, and the treatment duration is eight months.

Perceptions about TB and its treatment:-

Perceived susceptibility:-

Individuals own perceptions of the likelihood of experiencing a condition that would adversely affect one's health.

Perceived Benefits: -

Taking action in order to prevent disease or deal with an illness. This study includes patents' regular treatment with the correct dose in correct combination under DOTS.

Perceived Barriers: -

TB treatment may be inconvenient, expensive in terms of travel cost, and the unpleasant behavior of health workers.

Perceived severity: -

It refers to the beliefs a person holds concerning the effects. A given disease can be considered from the point of view of the difficulties that a disease would create. There will be pain and discomfort, loss of work time, economic burden and difficulties for the families. It is important to include the emotional and economic burden when considering the seriousness of a disease.

Availability and accessibility DOTS services

Availability factors: -

It refers to the availability of health staff, health education, by health workers in DOTS treatment centers.

Accessibility factors: -

It refers to the mode of traveling, distance from patient's home to the DOTS treatment centers, traveling time, traveling cost and waiting time to receive DOTS services at the DOTS centers.

1.8 Limitations of the study

1. The study will not show all the whole requirements for compliance in the urban areas in the Kaski district, and it will not represent the generalized country situation.
2. There are many factors related to non-compliance and this study cannot cover the all factors.
3. Patients may default after data collection so the results might not reflect the true situation.

CHAPTER 2
LITERATURE REVIEW

2.1 Brief History of TB

Tuberculosis has been a killer disease since the ice age. The Tuberculosis noted that traces of Tuberculosis lesions have been found in lungs of 3000 years-old Egyptian mummies (19). In 460 BC, Hippocrates described “phthisis”, meaning wasting away, as the most widespread disease at that time (20) in the age of Ancient Greece and the Roman Empire, Tuberculosis began to be recognized by Aristotle and Galen as a disease transmitted from man to man. Frascatorius (1483-1553) of the Middle Age predicted that TB might be spread in human beings by airborne living particles that he called “contagium vivium” (21).

In 1982 the German physician, Dr. Robert Koch, announced his discovery of tuberculosis bacilli and published an article within eight years that was “Etiology of TB.” He discovered an extract of dead bacilli to form tuberculin, Purified Protein Derivative (PPD) (19). It could be used as a diagnostic test for tuberculosis infection. The French scientists Calmettee and Guerin discovered BCG vaccine (Bacilli de calmette et Guerin). Now days it is used as a vaccine in the expanded program on Immunization to prevent tuberculosis in children (21). Initially, BCG was given orally from 1921 to 1925 and in 1927. The first human was vaccinated by intra-dermal techniques. BCG came in 1948, when it was accepted by tuberculosis workers from all over the world as a safe preventive measure. After that it has been used worldwide (22).

The modern era of TB control started in 1944. But the high efficacy of streptomycin PAS (Para amino Salicylic acid), discovered in 1949. Since then, it has remained an important component of all primary drug regimens, because it is highly effective with relatively low toxicity and it is inexpensive (23). A rapid succession of

anti-TB drugs appeared in the following years: PAS in 1949, Isoniazid in 1952, rifampicin in 1965. An intermittent regimen was used as an effective daily regimen in 1964. The regimens of drugs used after 1972 permit the conventional duration of treatment (24 months) to be reduced by approximately half (23).

In 1977 there was a remarkable success for the Short Course Chemotherapy (SCC) trial in Tanzania by Karel Styblo, a Dutch physician. Several other similar studies afterwards have confirmed that DOTS strategy is one of the most cost effective health interventions of the in1990s (24). Estimates of deaths from tuberculosis range between two to three million each year. WHO declared TB a global emergency in1993, so great was the concern about the Modern tuberculosis epidemic seven to eight million people develop TB every year. Estimates of TB morbidity for the decade, 1990-2000, revealed 88 million new cases of TB, of which 8 million people attributable to HIV infection (25). TB disease is complicated by multi-drug resistance and HIV/AIDS. TB is the topmost public health problem in this region. Nearly 60% of AIDS cases develop TB, indicating that is the most life-threatening opportunistic infection associated with HIV among women. TB kills more than 2000 people per day in this region (26).

2.2 TB in Nepal

2.2.1 Tuberculosis mortality and morbidity

There are many favorable situations for the spread of the TB in Nepal, such a large population of refugees (130,000) and rapid growth of population (2.24%) (13). Poverty is also strongly related with TB and Eight percent of the people living in urban areas are poor and 70% of the people living in rural areas are poor. Many poor people shift from rural to urban areas because they want services, increasing the spread of TB. There are 44,000 people who have with TB, around 20,000 new sputum positive cases per year in Nepal, by the calculation of Annual Risk of TB infection (ARI). TB was among the ten leading causes of mortality in 1999 and 2000, 4% and 5% fatality due to TB those years respectively (9).

2.2.2 Tuberculosis infection

About 45% of the population has been infected by tuberculosis. A number of tuberculosis surveys have been undertaken in Nepal; summarized in the five year plan for TB control. It is estimated that the average annual risk of infection is less than 1% in mountain areas, 1.5% in the hill areas, 2.5% in the Terai (plain area), and 4.0% in urban areas in Kaski (11).

2.2.3 Risk factors for tuberculosis disease

The highest risk factor for TB disease is HIV infection. HIV infection has not yet played a significant role in Nepal, but it is increasing in Nepal. Neighboring countries China and India have a large HIV problem. In 2001, the total number of AIDS cases in Nepal was 516 where as there were four cases in 1988 (27).

Three rounds of surveillance of HIV in people with TB have been conducted. HIV prevalence in TB patients was 0% in 1994, 0.6% in 1996 and 1.8% in 1998 (28). It means that prevalence of HIV is low but increasing. The national AIDS Centre and STD control show a recent increase in rates of HIV among commercial sex workers and those injecting drugs. It is expected that TB and HIV infection could become a serious problem in the future because they correlate each other.

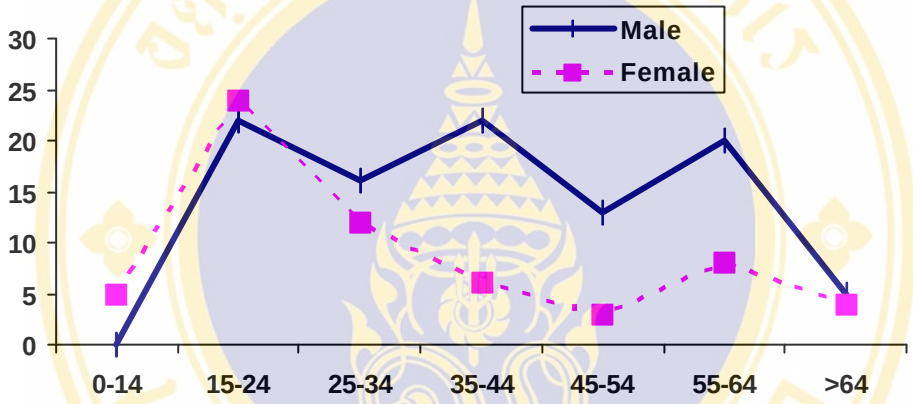
2.2.4 DOTS programme and the primary health care promotion in Nepal

The primary health care situation in Nepal is still highly segmented. The facts show that the tuberculosis is a curable disease. Free drugs are provided from the government to the DOTS centers and the primary health care system. DOTS treatment has the potential of affecting confidence-building measures between patients and the health care staff.

2.2.5 Tuberculosis situation in Pokhara urban Kaski

TB is one of the major serious public health problems in Pokhara urban Kaski, in Nepal. Annual risk of TB infection (ARI) is 4% per year in Pokhara urban Kaski (11). Slum areas are increasing in the urban area, and migration and poverty are the leading cause's poor adherence to TB treatment regimens. Due to the costly treatment,

most the TB patients cannot afford for their full course of treatment from private sector, hospitals and nursing homes and clinics. It means that it can create a MDR-TB problem and treatment non-compliance. Private sector health facilities are characterized by carelessness, low quality services and so on. In the Pokhara urban Kaski more than 10 private hospitals, more than 200 private clinics and medical colleges provide health services. Pokhara sub-metropolitan city and district public health offices are jointly working to control the disease of tuberculosis in the Kaski district.



Sources: National tuberculosis control program annual report 2003

Figure 3 Age and sexwise distribution of New +ve TB cases in Pokhara.

Table 2 Case findings in Kaski 2000-2003

TB cases	2000/2001	2001/2002	2002/2003
New sputum smear positive	189	160	173
New sputum smear negative	136	120	86
Re-treatment positive	35	52	52
New extra pulmonary	105	89	110
Total	465	421	421

Sources: National tuberculosis control program annual report 2003

Table 3 Result of treatment of new sputum smear positive cases 2000-2003

Outcomes	2000/2001	2001/2002	2002/2003
Cured	108	134	132
Completed	13	21	1
Failure	1	4	7
Died	5	6	7
Defaulted	19	23	8
Transfered out	5	0	5
Total	151	188	160

Sources: National tuberculosis control program annual report 2003

2.2.6 Contributing factors to the increase in TB

i HIV/AIDS is accelerating the spread of TB

HIV/AIDS weakens the human system in the human body. Someone who is HIV positive and infected with TB is many times more likely to become sick with TB than someone infected with only TB. TB is a leading cause of death among people who are HIV positive. It accounts for about 15% of AIDS case deaths worldwide. HIV is the most important factor determining the increase in TB in the last 10 years in Africa

ii Factors affecting poor management

If the management of TB is not effective TB is incurable. MDR-TB is always due to medical error. Now days MDR-TB threatens the tuberculosis control program. TB is caused by inconsistent or partial treatment, when a TB patient does not regularly take all the drugs for the required period because the patient starts to feel better, doctors prescribe the wrong treatment regimens, or the drug supply is an unreliable. A particularly dangerous form of drug resistant TB is defined as the disease due to TB bacilli resistance to at least two drugs, Isoniazid and Refampicin. They are most powerful anti-TB drugs MDR-TB is increasing at alarming rates in

some countries, especially in the former Soviet Union, and threatens global TB control efforts (8).

iii Spread (Transmission) of TB due to traveling of people

Nearly 40% of TB cases are among foreign-born people. A study was done in the United States of America; untreated tuberculosis spreads quickly in crowded shelters, crowded markets and refugee camps. It is more difficult to treat a mobile population in treatment for at least 6 months. Around 50% of the world's refugees may be infected by the TB (2).

2.3 The Theory of Health Belief Model (HBM)

The Health Belief Model (HBM) was in the beginning developed as a systematic method to make clear and predict health behavior. It is related to health behavior, utilization of health services and general health motivation for the purpose of distinguishing sick-role behavior from health behavior. HBM studies were conducted in the 1950's and 1960's. These studies scientifically explain preventive health behavior. (Godfrey Hocabaum's research on the HBM in 1952). He identified TB cases early finding by using a chest x-ray (29). The definitions of compliance suggest yielding to the wish, request or commands of another. Researchers who have studied health behavior have employed a number of other words in view of compliance terms such as adherence, obedience, cooperation, coordination collaboration and therapeutic alliance. M. Dimatteo and D. Dinicolo have suggested that compliance reflects an overly authoritative approach to patient care which implies as obligation on the part of the patient to follow the practitioners order blindly (30).

2.3.1 Description of the HBM

The health belief model has been applied to all types of health behavior. This model is used for prediction and explanation of preventive health behavior. There are three categories of personal motivation to indicate take a health behavior. These are individual perceptions, modifying behaviors, and probability action. Individual perceptions are factors that affect perceptions about the disease. They deal with the

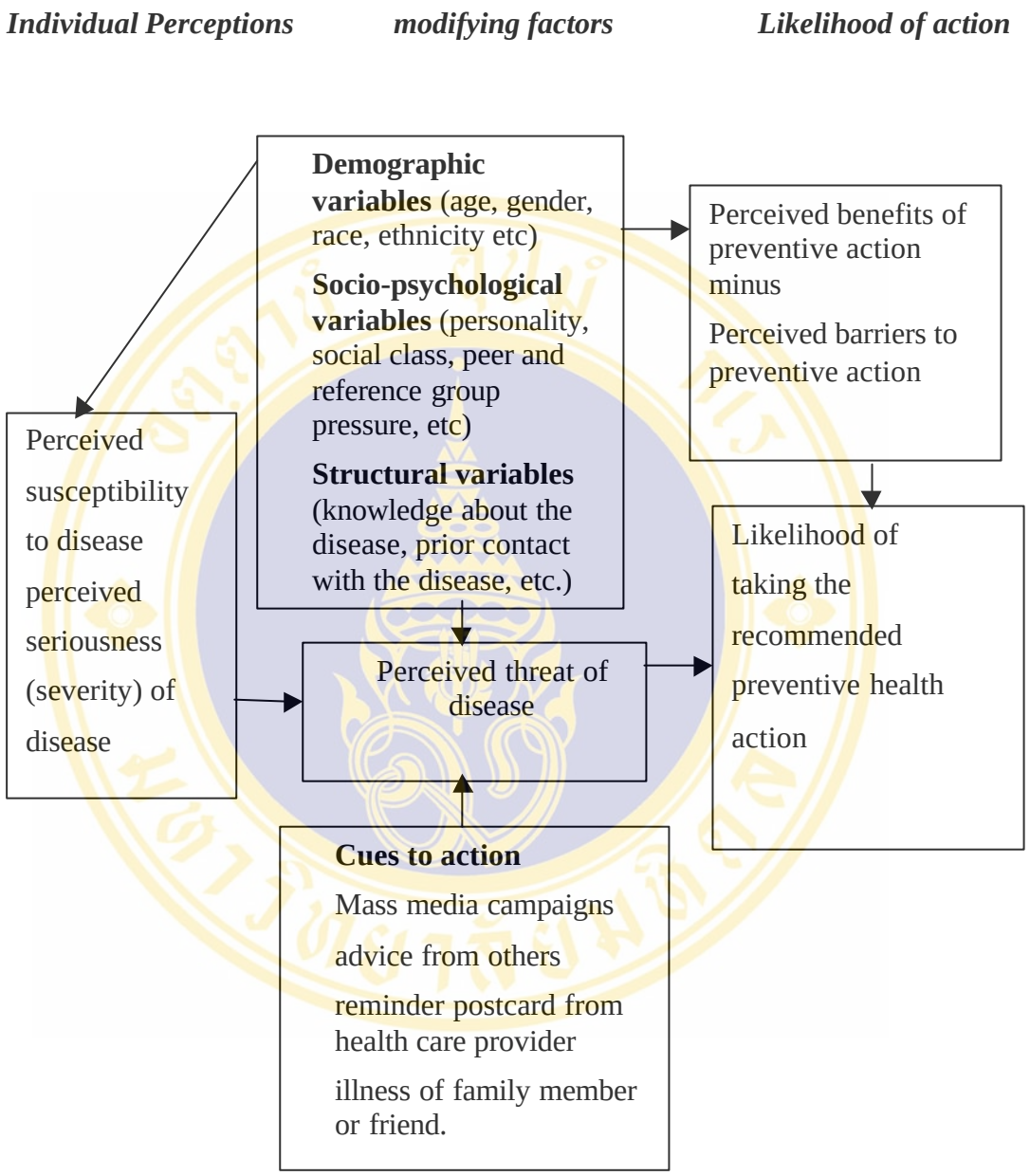
importance of health to the individual. Perceived susceptibility, Perceived benefits, perceived barriers and perceived severity are modifying factors, they are demographic variables and others.

Probability of action is proper health behavior. It is the recommended taking of preventive health action. These three factors combine because a response that often manifests itself into action is provided. It is accompanied by a national alternative course of action (29).

The health belief model states that personal health behavior risk is itself predisposed by at least three factors: general health values, which are related to health; specific health beliefs about susceptibility to a particular health threat; and beliefs about the consequences of the health problems. An individual perceives a threat his/her health, and simultaneously exhibits probability to action. A perceived benefit determines then that he/she is likely to undertake the recommended preventive health action. Some variables influence an individual's decisions, such as demographics and knowledge about TB and its treatment (29).

2.3.2 Key description

Perceived seriousness refers to the beliefs a person holds concerning the effects of a given disease. These effects can be considered from the point of view of the difficulties that a disease would create, for instance, financial burdens, loss of work time, pain and discomfort. Difficulties are considered the seriousness of a disease.



Source: Medical Sociology, William C. Cockerham, 1998.

Figure 4 The Health Belief Model

2.4 The Theory of Precede-Proceed Model

The PRECEDE-PROCEED Model (PPM) was designed to provide a systematic approach to the planning, delivering and evaluating of health promotion programs. The core principle of this model is that behavioral change is a voluntary activity. As such, the basic theory of PPM is to get individuals to take an active role in defining problems and goals and to developing and implementing action plans.

Precede: is an acronym for predisposing, reinforcing, and enabling causes in educational/ecological diagnosis and evaluation (Green & Kreuter, 1999).

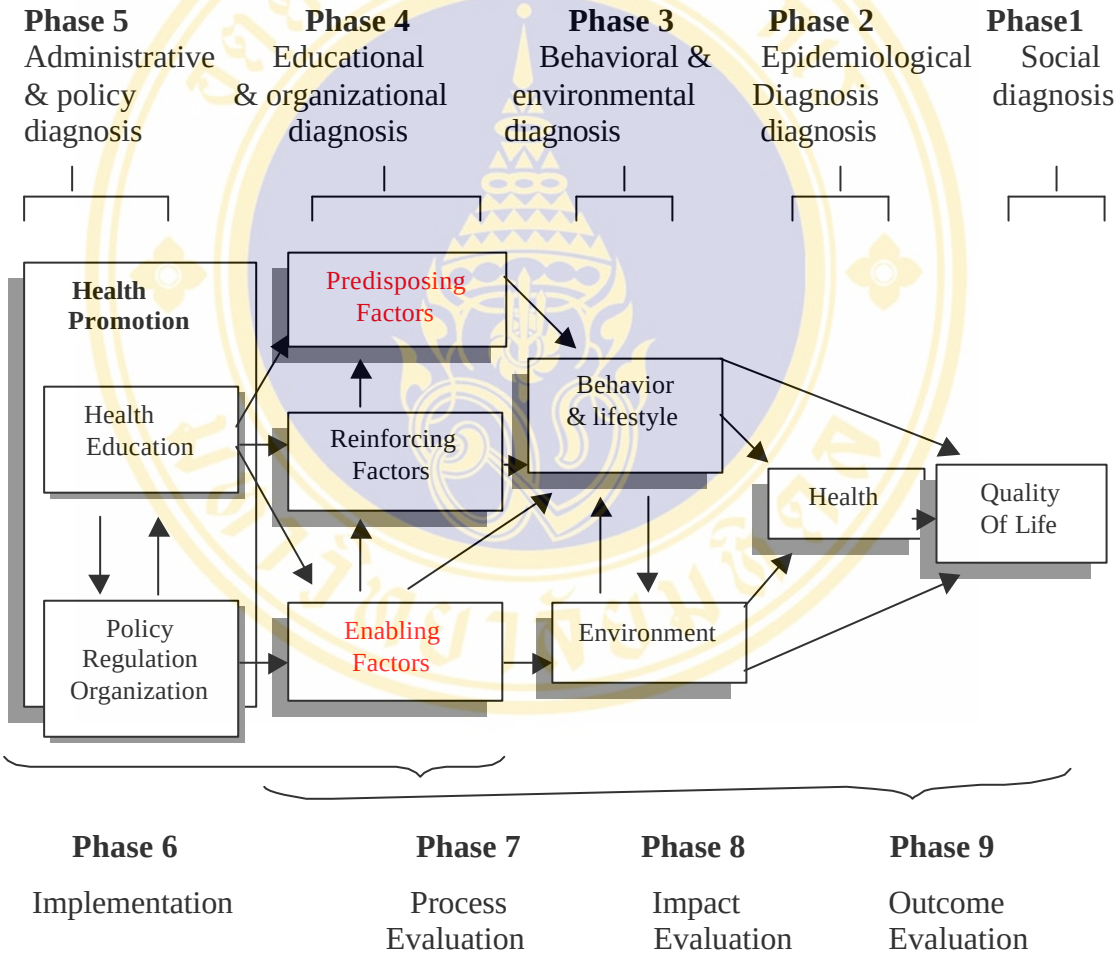
Proceed: stands for policy, regulatory, and organizational constructs in educational and environmental development.

Figure 5 illustrates the structure and various components of the PPM. As shown, the model is comprised of 9 phases, with the first 5 phases (PRECEDE), being diagnostic and the second 4 phases (PROCEED), dealing with implementation and evaluation. Social diagnosis identifies and evaluates the social problems that may impact the quality of life of the given population. Epidemiological diagnosis helps determine which, and how, health issues impact quality of life. Behavioral and environmental diagnosis ascertains which health practices impact the health issues identified in the previous phases, as well as the environmental factors that impact health status outside of behavioral practices. Educational diagnosis assesses the predisposing, enabling and reinforcing factors that guide the health behaviors in the previous stage. Administrative and policy diagnosis addresses the administrative and organizational concerns prior to program implementation.

The remaining phases include actual implementation and evaluation. Process evaluation determines the capability and efficiency of the process. Impact evaluation assesses the effectiveness of the program to change predisposing, enabling and reinforcing factors that were determined to be barriers to performing the desired health behavior. Outcomes evaluation measures the program's impact on overall health status and quality of life of the population.

PPM is a very strong program method that follows the rigors of a properly instituted research design. It starts with the identification of a problem, develops and implements the targeted intervention and ends with measurement and evaluation. As such, the PPM is very suitable for disease management programs willing to invest the time and resources to take a comprehensive approach to changing health behaviors.

Precede Proceed Model



Source: From health promotion planning: by Lawrence w. green and Marshall w. Kreuter

Figure 5 The Precede Proceed Model

Phase 1 Social assessment: The first model is called social assessment and seeks to subjectively define the quality of life problems and priorities of those in the target population. This is best accomplished by involving the target population in identifying their needs and aspirations.

Phase 2 Epidemiological assessment: In this step the planners use data to identify and rank the goals or problems that may contribute to the needs identifed in phase1. Those data might include disability, discomfort, fertility, fitness, morbidity, mortality, psychological risk factors and their dimensions. It is important to note that ranking the health problems in this phase is critical, because there are rarely, if ever, enough resources to deal with all or multiple problems. Also, this phase of the model is used to plan health programs.

Phase 3 Behavioral and environmental assessment: Involves determining and prioritizing the behavioral and environmental risk factors and risk conditions that might be linked to the health problems and health goals that were identified in phase 2. The behavioral factors could be the behavior or actions of individuals, groups, or communities. Behavioral indicators include such things as compliance, consumption patterns, preventive actions, self care and utilization that can be expressed in the dimensions of frequency, persistence, promptness, quality and range. Environmental factors are those determinants outside an individual that can be modified to support behavior, health and quality of life. Environmental indicators include economic and physical services and their social dimensions (access, affordability and equity). It is essential that they be identified very specifically and carefully ranked by importance and changeability and then put into the 2x2 matrix presented in figure 6.

Contents	More important	Less important
More changeable	High priority for program focus (quadrant 1)	Low priority except to demonstrate change for political purposes (quadrant 3)
Less changeable	Priority for innovative program; evaluation crucial (quadrant 2)	No program (quadrant 4)

Figure 6 Prioritization Matrix

Phase 4 Educational and ecological assessment: Examines the educational and ecological approaches likely to be used in a health promotion to affect behavioral and environmental change. These approaches are grouped according to predisposing factors, enabling factors, reinforcing factors. Predisposing factors include knowledge, attitude, beliefs, values, and perceptions that hinder or facilitate motives to change, and can be altered through direct communication. Enabling factors include access to health care facilities, availability of resources, lack of income or barriers that can help or hinder the desired behavioral or environmental changes. The skills and knowledge required for a desired behavior to occur also qualify as enabling factors. Reinforcing factors comprise the different type of feedback and rewards that those in the target population receive after behavior change, the result of which may be either to encourage or to discourage the continuation of the behavior. Family, friends, teachers, self and others who control rewards can deliver reinforcing behaviors.

Phase 5 Consists of administrative and policy assessment: In this phase the organizational and administrative capabilities and resources needed to develop the program are assessed. At this point the planner is called on to decide exactly which of the factors making up the three classes is to be the focus of the intervention. The decision is based on their relative important and the resources available to influence

decisions and the resources available to influence them. It is between phase 5 and 6 that Precede (the assessment portion of the model) ends and proceed (implementation and evaluation) designs. However, there is no clean break between the two phases.

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

2.5 Factors related to TB patient compliance studies:

There are many factors which are related to patient compliance with DOTS treatment. These are described as followings ways;

2.5.1 Socio-demographic factors

Age

In this variable, mainly the most productive age group (15 to 49) has been infected with tuberculosis around the world. Nearly 60% of TB cases occur in this age group and similar figures Pokhara urban kaski, Nepal as well (22). It is also confirmed are true in the NTP annual report, that the cure rate is less than 85% in the Pokhara urban Kaski district.

Age and TB treatment compliance are closely related to each other. A study was done by Kandel SL. in Thailand regarding the compliance of tuberculosis patients with treatment in 2000. It showed the compliance of the patients with treatment. There was no significant association between the different age groups (p-value 0.442).

Sex

In developing countries, health behavior is poor in women. Females die more often than males due to the various religious, community, and health-related elements. In Nepal more male patients are diagnosed early and treated early, the ratio of males to females is 2: 1 (22). However among registered TB cases in 2000, the cure rate among females was above 85%, whereas cure rate among males was less than 80% (22). A study conducted by Boyle (15) showed that there was no statistically significant association between the groups for sex difference a similar study was done by Nguyen in 2000; it showed that there was no significant association between sexes (31).

Occupation

TB patients figure among the work for their everyday life. Therefore, TB patients are engaged in different kinds of occupations. In developing countries, most of the TB patients are closely associated with farming and laboring. So it is claimed that occupation affects the way TB patients take daily medicine dose using DOTS. A researcher, Boyles, showed that there was statistically significant association in compliance among different levels of occupations (15). Non-compliant patients were more likely to be white collar workers ($p<0.01$) and students ($p<0.01$), whereas compliant patients were more likely to be not working ($P<0.01$) (15). A study was conducted by WHO the reasons for inability to adhere to treatment. Different compliance rates have been reported for men and women; while men dropped out due to pressures to return to work or due to alcohol and drug addiction, women dropped out because of the pressures of housework and the strain of keeping their condition secret (32).

Marital Status

When a females gets the disease, she tries to hide her disease because she is afraid to get be divorce by her husband. In Nepal, also, highly stigmatized societies still exist both in rural and urban areas. Marital status affects patient compliance using DOTS. A study conducted in India, in 2000 by Morankar (17), showed that married women are worried about their husband's sexual behavior during the period of their

treatment and the risk of his marriage to another woman due to the high social stigmatization. This tension compels them to complete the treatment as soon as possible. The researcher also states that about 18% of married women stopped their treatment after the symptoms of TB disappeared using two to five month treatment (17). A study report carried out by Liefooghe (18) in 1997 indicated that single patients had half of the default rate (6.1%) of married patients (12.6%), while those widowed, separated or divorced had a higher proportion (14.3%) (18). A study in Taiwan in 1997 by Lee and Chiou; (33) showed that the percentage of non-compliant behavior among widowed patients was significantly higher than single or married ones (33).

Education

If people have a high level of education, their performance will be also high. Likewise, educational status is also closely linked with TB patient compliance. If the patients have a good education level, they can understand the good impact of regular treatment and the bad impact of irregular treatment. But those who are illiterate are simple and innocent, but difficult to convince regarding regular treatment using DOTS. Therefore, education plays a vital role in TB treatment. Significant differences were found among the groups for level of education in the study of Boyles (15). A study conducted in Pakistan by Liefooghe R, (18) showed that illiterate patients had a higher risk of defaulting (RR = 1.8; CI: 1.1; 3.0) compared to literate patients (18). Remarkably, none of the higher educated females defaulted (18). The compliance behavior among the TB patients in Hualian district, Taiwan, was correlated with civil status and educational level, which was found in the study report of Lee and Chiou (33).

Income

In Nepal about 40% of people are under the poverty line (13). In the urban areas the number of poor people is increasing quickly. Most TB cases come from the poor society and poor community. TB patient cannot pay the travel costs to go to the DOTS center to get the TB drugs. Therefore income may affect patient compliance with treatment under DOTS treatment.

2.5.2 Availability and accessibility factors

A study was done by Wafaa in 2000 (34) suggested that adherence to treatment will be improved if patients are manage at the health institutions closest to their homes. A study was conducted by Uplekar in 1996 (35). He suggested that patients drop out of the programme at public facilities because of the widespread lack of confidence in the services provided, shortages of drugs and supplies, absence of staff and poor infrastructural facilities. Patients may also refuse treatment because of the inconvenience of frequently reporting to clinics with inconvenient opening hours situated far from their homes (35). No significant association was found in the study conducted by Tara between compliance and non-compliance in terms of perceived severity to illness (16) but contrasting results were shown in the study of Sudhakar Morankar (17). He mentioned that the respondents with a high perception of the severity of the illness had high rates of compliance.

Cost

A study was done by Srinivasan S, in 2002 (36). He mentioned that the most important reason for defaulting, according to the report reviewing this programme, was “economic conditions of the TB patient’s unstable, irregular employment, lack of family support when TB patient stops earning due to his illness”. A study conducted by Jagota Pin 1996 revealed that having contracted TB, 15% of female patients rural and urban faced rejection by their families, 11% of school going children of women TB patients discontinued studies and an additional 8% took up employment to support the family. This types of social pressure makes the patients discontinuity to treatment (37) A study conducted in Malaysia by Boyles (15) indicated that, for non-compliant patients, reaching the treatment centre entailed greater cost ($p<0.005$) and travel time ($p<0.005$) compared to compliant patients. Cost of transportation was the cause most frequently given for non-attendance (15).

Distance:

A study done by Morankar S, in 2000 (17) reported that patients have to travel up to 15 km for six months on alternate days to collect drugs if they follow the “Directly Observed Treatment Short Course” (DOTS). Most of the female (69%) of

the respondents said that visiting health centers is not appropriate for them because of their being in charge of small children, the traveling expenses, and transportation problems, and physical inability to come to the clinic, such as the inability to walk, or simply weakness (17). Therefore the treatment rate of completion is poor.

2.5.3 Knowledge and Perception on TB disease and its treatment

A study done by Prapasi S, Buri EA et al in 1987 (38) mentioned that the emphasis in enhancing compliance and reducing default should be the monitoring and supervision of health clinic attendance, detection of the problem and retrieving defaulters. What factors affect the compliance of the patient, according to the view of medical sociology, are psychosocial factors. An unfavorable psycho-social condition with a low standard of living might be difficulties in regular treatment. The default rate is high with low compliance (38).

Knowledge

For tuberculosis patients, knowledge about the cause of disease, the main symptoms, the transmission of disease, the method of diagnosis, the duration of treatment, the common side effects of drugs and benefits of DOTS are most important. If the patient has poor knowledge about these subjects, the compliance rate could be poor. As a result, multi-drug resistance (MDR-TB) and the mortality rate will be increased.

A study was done in Ethiopia by Tekle B, (14), regarding defaulting from the DOTS treatment and its determinants. The study report showed that the overall rate of defaulting from DOTS was calculated to be 11.3%, while the rate in sputum smear-positive cases was 11.6%. The defaulting rate was highest (81%). During the continuation phase of treatment, major factors contributing to high rates of defaulting were found to be lack of family or friends' support and a low level of knowledge about the duration of treatment and its side effects. The National Tuberculosis Programme that takes these factors into reflection should be successful in reducing rate of default in TB cases (14).

A study was conducted in Tanzania; the researchers found that there was no association between completion of treatment and knowledge about TB. It was reported by the World Health Organization, in TB notes, 2002 (39).

Perception

Perceived susceptibility

A study conducted by Tara in Kathmandu urban, Nepal 2002 (16) showed that most of the respondents had perceived a high level (91%) of susceptibility to disease. The study showed that compliance was greater in those with heightened awareness of susceptibility. Similar findings were found in the study of Lee and Chiou (33). It indicates that non-compliant behavior patients had had lower disease cognition and susceptibility.

Perceived severity

A study was done in India by Morankar S. It mentioned that TB patients, aged about 40 years, who have completed their family responsibilities and roles (marriage and leaving of children), often feel alone and have often no will to be alive and to be cured. TB is perceived as a “bad disease”, “dangerous illness” or a “serious disease”. Hence perceptions regarding the possibility of cure are like “it may be cured completely but a small portion always remains uncured and can occur again in future”. This perception has an impact on female patients’ help-seeking behavior and leads often to missing doses and becoming finally treatment defaulters (17). The patient cannot put out the effort needed for regular visits to the doctor for long treatment and the cost of the treatment was another most essential constraint. A significantly negative correlation was observed between the motivation for the treatment and perceived barriers found in the study report of Liefooghe R, in 2001 (18).

Perceived benefits

Perceived benefits of DOTS treatment have been noted significantly high among compliant patients (90%) (16).

Perceived barriers

Liefooghe R. mentioned that for TB patients, constraints leading to lower compliance included difficulties with the long duration of daily treatment and financial problems (18). But a study carried out by Tara Bam described that only (78/234) of the respondents felt that going for daily treatment was difficult (16).

CHAPTER 3
RESEARCH METHODOLOGY

3.1 Research Design

This research was a cross-sectional study. The data was collected through interviews. The study explored knowledge and perception levels of patients with TB who were in DOTS program. General information included socio-demographic factors, availability and accessibility of DOTS services, knowledge about TB the and DOTS program and perceptions about TB and the DOTS program.

3.2 Study population

Sputum smear positive TB cases who were at least 15 years old and who registered in DOTS centers during the period from 15th July 2004 to 15th January 2005 were included in the study (either they were currently on treatment or had defaulted). Sputum smear negative and extra-pulmonary cases and also those who were under 15 years old were excluded.

3.3 Sample size/ Sampling technique

All sputum smear positive TB cases 15 years old or over that registered from 15th July 2004 to 15th January 2005 were used in the study. The total population of this study was 111.

3.4 Study site

Nepal has five development regions. The regions consist of the Eastern development region (16 districts), the Central development region (19 districts), the Western development region (15 districts), the Mid-western region (15 districts), and

the Far-western development region (9 districts) with almost different geographical setting (13). Pokhara urban area is the study site of this project. It is situated in the western development region of the country. All DOTS centers located in this urban area were included in the study.

3.5 Research instrument

A structured questionnaire was used to get information from the respondents. Initially the questionnaire was prepared in English, and then translated into Nepali. It consisted of questions to obtain general information, socio-demographic characteristics, information about availability and accessibility of services, and knowledge, perception and compliance status of the respondents.

3.6 Validity and Reliability

This questionnaire was used after approval by the experts regarding its validity. A pre-test was done before real data collection in Katmandu urban with 30 patients in order to improve the questionnaire.

The pre-test result, with a reliability analysis –scale (alpha), was as follows:

Knowledge: Reliability of coefficient alpha KR 20 = 0.66

Perception: Reliability of coefficient alpha = 0.6233

The results show that low standard of reliability. So it was necessary to readjust and correct some questionnaire items for the data collection. According to the advice of the thesis committee, therefore, it was modified and readjusted. Some questions items were changed knowledge and perception.

Regarding the previous questions of knowledge part, some questions as Q.15, Q.16, Q.18, Q.19 and Q.21 were changed for making more simply and clearly understandable. For the perception part, some statements of its reliability were less than 0.20 values. Therefore Q.25, Q26, Q.28, Q.33, Q.35 and Q.38 were changed its version for getting higher standard quality and started its real data collection.

After finished the data collection its reliability was as follows:

Knowledge: Reliability of coefficient alpha KR 20 = 0.71

Perception: Reliability of coefficient alpha = 0.7812

The result showed that its high standard quality of reliability because of both results of this test were more than 0.70 of its value.

3.7 Procedure of data collection

Information was provided about the purpose of the research to the National Health Research Council and the National Tuberculosis Control Programme at the national, regional and district levels. The principal researcher recruited five interviewers. They were trained by the principal researcher. The principal investigator played the role of observer during the data collection and also examined its quality day by day. Verbal consent was taken from the TB patients before the interview and confidentiality was maintained throughout the study.

3.8 Data analysis procedure

After finished the data collection, it was checked finally to find out any lacking or missing value in the fulfilled questionnaire. Data entry was done by using Minitab computer software. During the data entry procedure it was also cleaned and repeated to check up be confidence for not mistake to enter some values in computer. The appropriate tests were selected for analysis of the data.

For describe the variables number, percentage, mean, range and standard deviation were used as inferential statistics. To find out the association between dependent and independent variables, cross tabulation, testing of hypothesis (chi-square test, Fisher's exact test) were used as bivariate analysis. Since an observation frequency in 2x2 tables was 0, the chi-square test can not be applied. That is why to manage the problem fisher's exact test was applied to analyze in the part of availability of TB drugs with patients compliance.

In the knowledge part, the patients' knowledge about TB and its treatment with the DOTS programme was assessed by ten questions. One point was given for each correct answer and 0 for wrong answers, for a maximum score of 10 and minimum score of 0. This was leveling, and was analyzed according to Bloom's classification (16) as over 80% = high, 60%-80% = moderate, and less than 60% = low.

In the perception part, for positive perception statements, questions were graded according to a modified Likert scale, as Agree = 3, Not sure = 2 and Disagree = 1. For the negative perception statements, statements was graded Agree = 1, Not sure = 2 and Disagree = 3. Best's group rating criteria were used to calculate the range of each level, by subtracting the maximum score, then dividing by the number in the group to measure the level. For each section of the perception to susceptibility to TB, severity of illness, benefits of DOTS and barriers to treatment, a patient average score was calculated as to the same types of knowledge mentioned earlier.

CHAPTER 4
RESULTS

All smear sputum positive TB cases were registered in DOTS treatment centers from 15th July 2004 to 15th Jan 2005. They were the study population of this study. The total number of the respondents was 111.

This study was a cross-sectional descriptive study on factors to related patient compliance with "Directly Observed Treatment Short Course" in Pokhara Urban Kaski, Nepal. The total population of this study was 111. The results of this study can be categorized into five main categories;

1. Compliance status of the respondents
2. Socio-demographic characteristics such as age, sex, marital status, educational level, occupational status and monthly income
3. Availability and accessibility of DOTS services
4. Knowledge about TB and the DOTS programme
5. Perception about TB and DOTS treatment.

4.1 Compliance status

Concerning the compliance status, TB patients who were regular in following the treatment schedule are classified as compliant, but those who were irregular and interrupted their treatment for more than one week are classified as non-compliant. It was found from this study that nearly three-quarters of the respondents (72.97%)were compliant and the rest of them (27.03%) were non-compliant.

Table 4 Number and Percentage of the Respondents Classified by Compliance Status

Compliance status	Number = 111	Percentage
Compliance	81	72.97
Non-compliance	30	27.03

4.2 Socio-demographic characteristics

This study included certain background and socio-demographic characteristics like age, sex, marital status, education level, occupation, and monthly income. Number and percentage were calculated to indicate the frequency distribution of these socio-demographic characteristics, as shown in Table 5.

The results show that more than half of the respondents (57.66%) belong to the ranged 15-34 years-old age group, followed by nearly one-fourth of them (23.42%) belonging to the 35-54 years age group.

As for the sex, the proportion of the distribution indicates that more than two-thirds (69.37%) of respondents were male and nearly one-third (30.63%) of them were female. Similarly, the results show that the majority (75.68%) of the respondents belong to the married group, while less than one-fourth (24.32%) of them were single.

Concerning the educational level, the results indicate that nearly two-fifths (38.74%) of them were illiterate, more than one-fifth (22.52%) of them had primary level education and a few of them (10.81%) had college level education.

It was found that more than one-fifth (21.62%) of respondents were involved in labor, followed by less than one-fifth (18.02%) of respondents who were housewives. Similarly 14.41%, 13.51% and 18.02% of them were involved in business, service and other occupations, respectively.

Monthly incomes, as mentioned by respondents, were categorized into three groups. The first group was the respondents with an income equal or less than Rs. 2000; the second group was between Rs.2000 and Rs.5000, and third was more than Rs. 5000. It was found that nearly one-third (34.23%) of the respondents had a monthly income less than Rs. 2000. Nearly two-fifths (41.44%) of them mentioned that they earned between Rs.2000 and Rs. 5000, and the remainder (24.32%) reported that their monthly income was more than Rs. 5000.

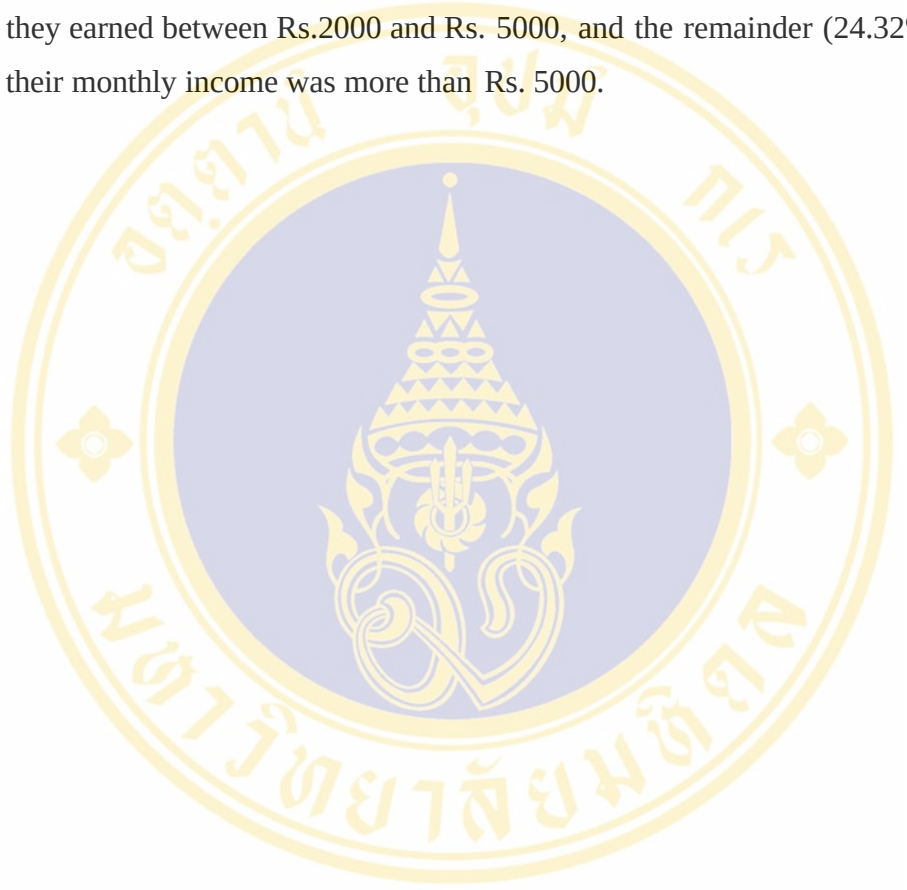


Table 5 Number and Percentage of the Respondents Classified by Socio-demographic Characteristics

Socio- demographic characteristics	Frequency (n=111)	Percentage
Age Groups (years)		
15-34	64	57.66
35-54	26	23.42
>54	21	18.92
Mean ± SD= 35.45 ± 16.03, Min. = 15, Max. = 79		
Sex		
Male	77	69.37
Female	34	30.63
Marital status		
Single	27	24.32
Married	84	75.68
Educational level		
Illiterate	43	38.74
Primary School	25	22.52
Junior High School	19	17.12
High School	12	10.81
College	12	10.81

Table 5 Number and Percentage of the Respondents Classified by Socio-Demographic Characteristics (Cont.).

Socio-demographic characteristics	Frequency (n=111)	Percentage
Occupational status		
Agriculture	15	13.51
Labor	24	21.62
Housewives	20	18.02
Service	16	14.41
Business	16	14.41
Others	20	18.02
Income group		
<2000	38	34.23
2000-5000	46	41.44
>5000	27	24.32
Mean ± SD = 3854 ± 3792, Min. =0000, Max. = 25000, Medium=3000		

4.3 Availability of DOTS services

Availability of DOTS services should be assessed in terms of availability of health staff, health education for the TB patients, and availability of TB drugs at each visit to the DOTS center during treatment. Table 6 shows that a majority (79.28%) of the respondents answered positively and only one-fifth (20.72%) of them answered negatively about the availability of health staff in DOTS treatment centers. The majority (80.18%) of them mentioned that they got adequate health education from the health staff. Similarly, a majority (85.59%) of the respondents agreed that TB drugs had been available but a few (14.41%) of them mentioned that they had not been available in the DOTS treatment center.

Table 6 Number and Percentage of the Respondents Classified by Availability of DOTS Services

Availability factors	Frequency (n=111)	Percentage
Availability of health staff		
Available	88	79.28
Not available	23	20.72
Availability of health education		
Available	89	80.18
Not available	22	19.82
Availability of TB drugs		
Available	95	85.59
Not available	16	14.41

4.4 Accessibility of DOTS services

The accessibility of DOTS services was measured in this study as to mode of transportation, distance, traveling time, traveling cost and waiting time per visit in the DOTS treatment center. Table 7 shows that more than half (54.95%) of respondents went to the DOTS center by vehicle and the rest of them (45.05%) went on foot. More than three-fifths of them (63.96%) mentioned that the distance from the DOTS center to their house was less than 2 km. More than one-fifth of them (21.62%) stated that their house is 3-4 km from the DOTS treatment center, and a very negligible proportion of the respondents (3.6%) mentioned that the distance between their house and the clinic is equal to or more than 5 kilometer.

More than half (55.86%) of them took less than or equal to 15 minutes go to the DOTS treatment center from their house. Nearly one-third (30.63%) of the respondents had took 16-30 minutes and the rest (13.51%) of them had took more than 30 minutes for traveling time.

Concerning the traveling cost, more than half (54.05%) of them had no need to pay traveling costs from their house to the DOTS center, whereas nearly one-fourth (25.23%) of the respondents spent less than 10 rupees and the rest (13.51%) of them spent more than 10 rupees on every visit as traveling cost.

Regarding the waiting time for getting TB drugs per visit, the majority (83.78%) of the respondents received TB drugs within 5 minutes, while the rest of them (16.22%) mentioned it took more than five minutes to get TB drugs in the DOTS center.

Table 7 Number and Percentage of the Respondents Classified by Accessibility of DOTS Services

Accessibility factors	Frequency (n=111)	Percentage
Mode of transportation		
On foot	50	45.05
Vehicle	61	54.95
Distance (km)		
0-2	71	63.96
3-4	24	21.62
5	16	14.41
Traveling time (minutes)		
0-15	62	55.86
16-30	34	30.63
>30	15	13.51
Traveling cost (Nepali rupees)		
Money not needed	60	54.05
1-10	28	25.23
>10	23	20.72
Waiting time for getting TB drugs (minutes)		
Up to 5 minutes	93	83.78
>5	18	16.22

4.5 Patients Knowledge about TB and the DOTS programme

Patient's knowledge about TB and the DOTS programme was assessed based on the cause of TB, its main symptoms, mode of transmission, method of diagnosis, duration of treatment, benefits of DOTS, when to stop of the TB treatment, impact of irregular treatment, side effects and prevention. There were ten questions for the knowledge score. The answers from the respondents are summarized in Table 8.

Slightly less than two-thirds of the respondents (63.96%) knew about the cause of TB which occurs due to bacteria. Similarly, more than two-thirds of them (73.87%) knew that a the major symptoms of TB are a cough with fever in the evening continuously for more than two weeks.

Concerning the transmission of TB disease, more than a half of them (66.67%) answered correctly and a majority of them (81.98%) answered correctly about its method of diagnosis, which is sputum examination.

About the duration of treatment, a majority of them (86.49%) answered correctly. Regarding the benefits of DOTS, it was found that majority of the respondents (86.49%) answered correctly that DOTS treatment can completely cure TB.

Concerning stopping TB treatment, a majority of them (82.88%) mentioned that they were committed to stop their treatment after being declared cured by a health worker and the rest (17.12%) of them did not give answer correctly. More than half (57.66%) of the respondents mentioned correctly that TB won't be cured if a patient doesn't take the full course of treatment. Similarly, three-quarters (75.68%) of the respondents gave the correct answer about common side effects of the drugs. As to its prevention, a majority (76.58%) of them gave the correct answer that it could be prevented by covering the mouth and nose when coughing and sneezing.

Table 8 Number and Percentage of the Respondents Related to Knowledge About TB and Practice of DOTS Programme Classified by Items

Correct answer

Knowledge questions		Frequency (n=111)	Percentage
1.	The cause of TB is mycobacterium.	71	63.96
2.	The important symptoms of TB disease are a cough belong more than two weeks and fever.	82	73.87
3.	The transmission of TB is droplets spread through the air.	74	66.67
4.	Sputum examination is the best method for TB diagnosis	91	81.98
5.	TB treatment duration is 8 months.	96	86.89
6.	A benefits of DOTS treatment is the complete cure of TB.	96	86.89
7.	TB treatment can be stop after being declared cured by a health worker.	92	82.88
8.	If you stop taking TB drugs before the full course of treatment, the disease will not be cured.	64	57.66
9.	The common side effects of TB drugs are red urine and itching skin.	84	75.68
10.	Transmission of TB can be prevented by covering the mouth and nose when sneezing and coughing	85	76.58

Regarding the overall knowledge about TB and the DOTS treatment, it was made based on total knowledge scores. It was found that the mean scores of knowledge were 7.523 with SD± 2.044. Table 9 shows that more than half (59.46%) of the respondents had a high level of knowledge and nearly one-fifth of them (19.82%) and (20.72%) had moderate and low levels of knowledge about TB and DOTS treatment respectively.

Table 9 Overall Number and Percentage of the Respondents Classified by Level of Knowledge About TB and the DOTS Programme

Variable	Frequency (n =111)	Percentage
Level of Knowledge		
High	66	59.46
Moderate	22	19.82
Low	23	20.72
Mean ± SD = 7.523 ± 2.044, Min. =2, Max. = 10,		

Scores: Low = (up to 5), Moderate= (6-7), High = (8-10).

4.6 Overall perception level about TB and the DOTS programme

The perception level of respondents about TB and DOTS the programme is categorized into four categories; susceptibility, severity, benefits and barriers. It was assessed through a sequence of 16 questions having 3 levels. The respondents were requested to answer as agree, not sure, and disagree, with the perception expressed in each question. For positive perception statements, questions were graded as agree = 3, not sure = 2 and disagree = 1. For negative perception statements, questions were graded as agree =1, not sure = 2 and disagree = 3, respectively. The perception level of respondents is categorized as the >80 = high, 60 to 80 = moderate, and <60 = low.

Table 10 showed that overall perception of TB and the DOTS programme. It was shown that more than three-fifths (63.06%) of the respondents had high perception levels, where 28.83 % had moderate, and only few 8.11 % of them had low perception level on TB and the DOTS programme.

Table 10 Overall Perception Level About TB and DOTS Treatment

Variable	Frequency	Percentage
Level of Perception		
High	70	63.06
Moderate	32	28.83
Low	9	8.11
Mean ± SD= 37.910± 6.397, Max. =48, Min. =24,		

Scores: Low = (16 - 26), Moderate = (27-36), High = (37- 48)

Table 11 shows that the perceptions of TB patients' toward the disease and the DOTS programme, which was evaluated by using questions related its susceptibility, severity, benefits and barriers.

Regarding the statement concerning the re-infection, the majority (73.87%) of the respondents agreed, about one in five (19.82%) of the respondents disagreed and the remainder (6.3%) were not sure on if close contact with TB patient will re-infect a person with TB after being cure. The majority (81.8%) of the respondents expressed their perception that it one family member is infected with TB; other members will develop TB, while a few respondents disagreed or were not sure. More than three-fifths (61.26%) of them disagreed saying that it was not easy to infected with TB, when sharing a towel with a TB patient, One-third of them (33.33%) agreed and only a few (5.41%) of them were not sure about TB infection. More than three-fourths (62.16%) of the respondents disagreed with the statement that it is not easy to get TB in a crowded environment, nearly one-third (31.53%) agreed and only a few (6.31%) of them were not sure on this aspect.

Concerning the seriousness of TB, a majority (91.89%) of the respondents agreed, 7.21% disagreed and only 0.90 % were not sure about the statement "TB is a serious and will be fatal if untreated". Nearly three-quarters (73.87%) of them agreed,

over one-fifth (22.52%) of them disagreed and the rest of them were not sure that feeling sick with TB, causes the loss of much working time. Nearly one-third (32.43%) of the respondents agreed, less than two-thirds (62.16%) of them disagreed and the rest (5.41%) were not sure if after getting TB, nobody has financial problems. More than two-fifths (43.24%) of the respondents agreed, less than half (49.55%) of them disagreed, and the rest were not sure that TB made jobs loss.

Concerning the benefits, more than half (52.25%) of the respondents disagreed with the statements that DOTS can't break the transmission of TB, over one- third (36.94%) of them agreed and a few of them were not sure. The majority (90.09%) of the respondents agreed, 8.11 % disagreed and a very few of them were not sure about a statement that rich and poor TB patients have an equal chance to be treated with DOTS. Nearly four-fifths (79.28%) of the respondents agreed, less than one-fifth (17.12%) of them disagreed and a few (3.60 %) of them were not sure that DOTS can cure the TB disease. More than two-thirds (68.47%) of the respondents disagreed, over one-quarter (27.93%) of them agreed and a few (3.60 %) of them were not sure that TB patients get more financial problem with DOTS treatment.

Regarding the barriers, more than half (56.76%) of the respondents agreed that it is difficult to go for daily DOTS treatment, more than two-fifths (42.34%) of them disagreed and a very few (0.90 %) were not sure of this statement. Similarly, more than half (54.05%) of the respondents disagreed, while 44.14% of them agreed and the rest of them were not sure about the traveling cost for receiving treatment being expensive. The majority (74.77%) of the respondents disagreed, while more than one fifth (21.62%) of them agreed and a very few of them were not sure if health- workers are not friendly in the DOTS center. Regarding the statement after getting the DOTS treatment you can make contact with friends and neighbors as before, more than one-third (36.94%) of the respondents disagreed, while more than three-fifths (61.26%) of them agreed and a very few of them mentioned that they were not sure.

Table 11 Number and Percentage of the Respondents Classified by Items Related to Perception About TB and Practice of the DOTS Programme

Statement/ Items	N =111	Level of Agreement: Agree N, (%)	Not sure N, (%)	Disagree N, (%)
Perceived Susceptibility				
1. Close contact with a TB patient will re-infect a person with TB after cure.		82 (73.87)	7 (6.31)	22(19.82)
2. If one family member is infected with TB, other members will develop TB.		90 (81.8)	2 (1.80)	19 (17.12)
3. It is not easily to be infected with TB, when sharing a towel with a TB patient.		68 (33.33)	6 (5.41)	37 (61.26)
4. It is not easy to get TB infection in a crowded environment		69 (31.53)	7 (6.31)	35 (62.16)
Perceived Severity				
5. TB is serious and will be fatal, if untreated.		102 (91.89)	1 (0.90)	8 (7.21)
6. Feeling sick with TB causes the loss of much working time.		82 (73.87)	4 (3.60)	25 (22.52)
7. After getting TB disease, nobody gets financial problems.		69 (32.43)	6 (5.41)	36 (62.16)
8. TB makes you lose your job.		55 (43.24)	8 (7.21)	48 (49.55)

Table 11 Number and Percentage of the Respondents Classified by Items Related to Perception about TB and Practice of the DOTS Programme (Cont.)

Statement/ Items	N =111	Level of Agreement: Agree N, (%)	Not sure N, (%)	Disagree N, (%)
Perceived Benefits				
9. DOTS cannot break the transmission of TB.		58 (36.94)	12 (10.81)	41(52.25)
10. Rich and poor TB patients have an equal chance to be treated with DOTS.		100 (90.09)	2 (1.80)	9 (8.11)
11. DOTS can cure TB.		88 (79.28)	4 (3.60)	19 (17.12)
12. TB patients have more financial problem with DOTS treatment		76 (27.93)	4 (3.60)	31 (68.47)
Perceived Barriers				
13. It is difficult to go daily to the DOTS center.		63 (56.76)	1(0.90)	47 (42.34)
14. The traveling cost for receiving the DOTS treatment is expensive.		49 (44.14)	2 (1.80)	60 (54.05)
15. Health workers are not friendly in the DOTS center.		83 (21.62)	4 (3.60)	24 (74.77)
16. After treatment, you can make contact with friends and neighbors as before.		41(61.26)	2 (1.80)	68 (36.94)

Perceptions of the patients were measured by scoring. There were sixteen questions for measuring each type of perception level. The distribution of perception scores on their TB and the DOTS programme is presented in Table12.

Concerning the perception of susceptibility, less than two-thirds (63.06%) of the respondents had a high perception level of susceptibility about TB and nearly the same proportion (18.92% and 18.02%) of them had moderate and low levels of perception as to susceptibility to TB, respectively.

As for the perception level as to the severity of the illness, more than two-thirds (66.67%) of the respondents had a high perception level of the severity, more than one- fifth (21.62%) of them ha a moderate level and more than one-tenths (11.71%) of them had a low level.

In considering the perception benefits of DOTS treatment, the majority (70.27%) of the respondents had a high level of perception, more than one-fifth (23.42%) of them had a moderate and a few (6.31%) of them had a low level of perception.

Regarding the perception as to barriers to DOTS treatment, more than one-third (36.94%) of the respondents had a high perception level, more than one third (36.04%) of them had moderate level and more than one-fourths (27.03%) of them had a low level.

Table 12 Number and Percentage of the Respondents Answers Regarding Level of Each Type of Perception Level on TB and DOTS Treatment

Perception level	Frequency (n=111)	Percentage
Susceptibility		
High	70	63.06
Moderate	21	18.92
Low	20	18.02
Mean ± SD=9.766± 2.497	Max. = 12	Min. =4
Severity		
High	74	66.67
Moderate	24	21.62
Low	13	11.71
Mean ± SD=9.721 ± 2.145	Max. = 12	Min. = 4
Benefits		
High	78	70.27
Moderate	26	23.42
Low	7	6.31
Mean ± SD=10.00 ± 1.854	Max = 12	Min. =2
Barriers		
High	41	36.94
Moderate	30	27.03
Low	40	36.04
Mean ± SD=8.333 ± 2.282	Max. = 12	Min. = 4

4.7 Relationship between various factors and Compliance and Non-compliance with TB and DOTS programme

4.7.1 Relationship between Socio-demographic Characteristics and Patient Compliance with DOTS programme

The age the of respondent was classified into three groups. The results show that there was no statistically significant association between age groups and patient compliance (p-value 0.548).

The proportion compliance and non-compliance was in nearly equal proportions. There was no significant association between sex and compliance with DOTS (p-value 0.707).

Regarding marital status, the results show that the highest compliance proportion (81.48%) was in the single group. The results show that there was no statistically significant association with patient compliance (p-value 0.252).

Concerning occupation status, it was categorized into six groups and analyzed. The results indicate that there was no statistically significant association between occupational status and patient compliance with DOTS (p-value >0.05).

Regarding educational status, it was categorized into two groups, such as illiterate and literate. The compliance proportion was higher (79.41%) among the respondents who were literate than among the illiterate. There was no statistically significant association between education level and patient compliance.

Monthly income was divided into three groups. The compliance rate was different among the different levels of monthly income of the respondents. There was no statistically significant association between family income and patient compliance with DOTS (p-value 0.215).

Table 13 The Distribution of Patient Compliance with DOTS by Socio-demographic Characteristics

Socio-demographic Chacteristics	TB Patient Compliance with DOTS			
	Compliance N, (%)	Non-compliance N, (%)	c^2 (df)	P-value
Age groups			1.203 (2)	0.548
15- 34	49 (76.56)	15 (23.44)		
35- 54	17 (65.38)	9 (34.62)		
>54	15 (71.43)	6 (28.57)		
Sex			0.141 (1)	0.707
Male	57 (74.03)	20 (25.97)		
Female	24 (70.59)	10 (29.41)		
Marital status			1.310 (1)	0.252
Married	59 (70.24)	25 (29.76)		
Single	22 (81.48)	5 (18.52)		
Educational level			11.269 (4)	0.055
Illiterate	27 (62.79)	16 (37.21)		
Literate	54 (79.41)	14 (20.59)		

Table 13 The Distribution of Patient Compliance with DOTS by Socio-demographic Characteristics (Cont.)

Socio-demographic Chacteristics	TB Patient Compliance with DOTS		c^2 (df)	P-value
	Compliance N, (%)	Non-compliance N, (%)		
Occupation			8.156 (5)	0.148
Agriculture	9 (60.00)	6 (40.00)		
Labor	16 (66.67)	8 (33.33)		
Housewife	12 (60.00)	8 (40.00)		
Service	12 (75.00)	4 (25.00)		
Business	14 (87.50)	2 (12.50)		
Others	18 (90.00)	2 (11.30)		
Family income			3.073 (2)	0.215
< 2000	24 (63.16)	14 (36.84)		
2001-5000	35 (76.09)	11 (23.91)		
>5000	22 (81.48)	5 (18.52)		

.

4.7.2. Relationship between availability of DOTS services and patient compliance with DOTS

Availability of DOTS services and TB patient compliance with DOTS was assessed in term of the of health staff, health education and getting at TB drugs at each visit to the DOTS center.

Table 14 shows that the proportion of compliance was higher among those who had visited health staff in the DOTS treatment center than among the others. It can be seen that there was a statistically significance association between availability of health staff and patient compliance with DOTS (p-value <0.001).

The proportion of compliance was higher (87.64%) among those who got health education than those who did not get. There was a statistically significance association between availability of health education and patient compliance with DOTS (p-value < 0.001).

Since an observation frequency in 2x2 Tables is 0, the chi-square test cannot be applied. That is why to manage the problem, fisher's exact test was applied to analyze, and the p-value< 0.001 is significant. This implies that the proportion of compliance is higher if the TB drugs are available early in the DOTS treatment center. The results show that the respondents who got TB drugs regularly from the DOTS center had a higher rate of compliance. There was a statistically significant association between availability of TB drugs and patients' compliance with DOTS (p-value < 0.001).

Table 14 Relationship Between Availability of DOTS Services and Compliance with DOTS

Availability factors	TB Patient Compliance with DOTS		c^2 (df)	P-value
	Compliance N, (%)	Non-compliance N, (%)		
Availability of health staff			26.617 (1)	<0.001*
Available	74 (84.09)	14 (15.91)		
Not available	7 (30.43)	16 (69.57)		
Availability of health education			48.982 (1)	< 0.001*
Available	78 (87.64)	11 (12.36)		
Not available	3 (13.64)	19 (86.36)		
Availability of TB drugs				<0.001**
Available	81(85.26)	14 (14.74)		
Not available	0 (00.00)	16 (100.00)		

* Significant, (p-value<0.05), ** Fisher's exact test.

4.7.3 Relationship between Accessibility of DOTS Services and TB patient Compliance with DOTS programme

It was found that there was no statistically significant association between mode of transportation and patient compliance with DOTS (p-value > 0.05).

Regarding the distance, patients, who lived access within 2 km of the DOTS center, had a higher proportion (78.87%) of compliance than those who had more than 3 km to travel. But the results show that there was no statistically significant association between distance and patient compliance with DOTS (p-value > 0.05).

Almost equal proportions of compliance were found when comparing the various traveling times. There was no statistically significant association between traveling time and TB patient compliance with DOTS (p-value >0.05).

Regarding traveling cost, TB patients who had no need to pay money for traveling had a higher proportion of compliance than those who needed to pay money. It was found that there was no statistically significant association between traveling cost and TB patient compliance with DOTS (p-value > 0.378).

There is no statistically significant association between waiting time and patient compliance with DOTS (p-value > 0.216). More details are shown in Table 15.

Table 15 Relationship Between Accessibility of DOTS Services and TB Patient Compliance with DOTS

Accessibility factors	TB Patient Compliance with DOTS			
	Compliance N, (%)	Non-compliance N, (%)	c^2 (df)	P-value
Mode of transportation			3.759 (2)	0.053
On foot	41 (82.00%)	9 (18.00%)		
Vehicle	40 (65.57%)	21 (34.43%)		
Distance DOTS center			4.006 (2)	0.135
Up to 2	56 (78.87)	15 (21.13)		
3-4	14 (58.33)	10 (41.67)		
5	11 (68.75)	5 (31.25)		
Traveling Time to DOTS center (minute)			0.653 (2)	0.721
Up to 15	47 (75.81)	15 (24.19)		
16-30	24 (70.59)	10 (29.41)		
>30	10 (66.67)	5 (33.33)		
Traveling cost			1.947(2)	0.378
No need money	47 (78.33)	13 (21.67)		
1-10	19(6786)	9(32.14)		
>10	15 (65.22)	8 (34.78)		
Waiting time (minutes)			1.533 (1)	0.216
Up to 5	70(75.27)	23 (24.73		
>5	11 (61.11)	7 (38.89)		

4.7.4 Knowledge about TB and DOTS programme

As shown in Table 16, TB patients who had a high level of knowledge had higher compliance as compared to those who had moderate and low levels of knowledge about TB and DOTS treatment. The results show that a majority (93.94%) of the respondents had a high level of knowledge about TB and the DOTS programme. There was also a statistically significant association between levels of knowledge and patient compliance with DOTS (p-value <0.001).

Table 16 The Distribution of TB Patient Compliance with DOTS by Knowledge of TB and DOTS Programme

Variable	TB Patient Compliance with DOTS			
	Compliance N, (%)	Non-compliance N, (%)	c^2 (df)	P-value
Knowledge level			50.994 (2)	<0.001*
High	62 (93.94)	4 (6.06)		
Moderate	15 (68.18)	7 (31.82)		
Low	4 (17.39)	19 (82.61)		

Scores: Low = (Up to 5), Moderate = (6 to 7), High = (8-10)

* Significant, p-value <0.05.

4.7.5 Overall Perception about TB disease and DOTS programme

Table 17 shows that TB patients who had high levels of overall perception had a higher proportion of compliance compared to those with moderate and low levels of perception. The results show that a majority (82.86%) of the respondents had a high level of perception about TB and the DOTS programme. It was found that there was a statistically significance association between levels of perception and patient compliance with DOTS (p-value 0.006).

Table 17 Overall Number and Percentage of the Respondents Classified by Level of Perception with DOTS Programme

Variable	TB Patient Compliance with DOTS			
	Compliance N, (%)	Non-compliance N, (%)	c^2 (df)	P-value
Level of perception			10.182, (2)	0.006*
High	58 (82.86%)	12 (17.14 %)		
Moderate	19 (59.38%)	13 (40.62%)		
Low	4 (44.44%)	5 (55.56%)		

Scores: Low = (16-26), Moderate = (27-37), High = (38 - 48).

* Significant, p-value <0.05

Regarding perceived susceptibility, it can be seen that those respondents who had a high (82.86%) perception of susceptibility towards TB had a higher level of compliance than those who had moderate and low level of perception to susceptibility. There was statistically significant association between perception about susceptibility to disease and patient compliance with DOTS (p-value 0.003).

With regards to perceived severity, the results show that those respondents who had a high (81.08%) perception about the severity of the had a higher level of

compliance than those who had moderate and levels of perception as the severity. There a was statistically significant association between perceptions about severity and patient compliance with DOTS (p-value 0.002).

About the perceived benefits, the results show that those respondents, who had a high level (80.87%) of perception towards the benefits of DOTS, had a higher level of compliance. There was a statistically significant association between perceptions about benefits and patient compliance with DOTS (p-value 0.017).

However, there was no statistically significant association between perception about barriers and patient compliance with DOTS (p-value 0.663). More details are shown below Table 18.

Table 18 The Distribution of TB Patient Compliance with DOTS by Perception twowards TB and the Programme

Level of Perception	TB Patient Compliance with DOTS				
	Compliance N, (%)	Non-compliance N, (30)	c^2	(df)	P-value
Susceptibility			11.597,	(2)	0.003 *
High	58 (82.86)	12 (17.14)			
Moderate	15 (65.22)	8 (34.78)			
Low	8 (44.44)	10 (55.56)			
Severity			12.341	(2)	0.002*
High	60 (81.08)	14 (18.92)			
Moderate	17(68.88)	8 (32.00)			
Low	4 (33.33)	8 (66.67)			
Benefit			8.116	(2)	0.017*
High	63(80.77)	15(19.23)			
Moderate	14(53.85)	12(46.15)			
Low	4(57.14)	3 (42.87)			
Barriers			0.822	(2)	0.663
High	31(75.61)	10 (24.39)			
Moderate	25(75.76)	8(24.24)			
Low	25(67.57)	12(32.43)			

Scores: Low = (Up to 7), Moderate = (8 to 9), High = (10 - 12).

* Significant, p-value<0.05

CHAPTER 5
DISCUSSION

The primary concern of this study was to determine the socio-demographic characteristics, availability and accessibility of DOTS services, knowledge and perceptions about TB and the DOTS programme during the DOTS treatment. A cross-sectional study was conducted to identify the association between these variables and compliance with DOTS.

5.1 Socio-demographic characteristics

5.1.1 Age

In this study the respondents were sputum positive TB patients who were 15 years old. The lowest age was 15 and the highest was 79 years. The majority (81.89%) of the respondents were in the economically productive age group, 15-54 years, which has direct impact on the family, community and the national economy. The younger age (15-35) group had higher compliance (76.56%) compared to the other age groups. It was also found that there was no significant association between age groups and TB patient compliance with DOTS. The study was similar to Shrestha KB (40) and Doveren RFC (41). They found that the level of compliance was good among the young age group. But the results were different in the study of Kandel Shyam Lal (42) who mentioned that the higher age group had higher compliance than younger age group.

5.1.2 Sex

In this study more than two-thirds (69.36%) of the respondents were male. It is similar to studies conducted by Kandel Shyam Lal (42) and Nguyen Duc Hong, (31). Males had higher compliance (74.03%) compared to females, but there was no significant association between sex status and patient compliance with DOTS. This might be due to females always being involved in their home and also mostly working in the kitchen and garden. But males are involved in outdoor activities; therefore males

are still at higher risk of tuberculosis infection. Another reason might be that females have problems and are not able to free themselves from home responsibilities to go to the hospital for treatment. This study was comparable to the study done by Boyles SJ. (15).

5.1.3 Marital status

More than two-thirds (75.68%) of the respondents were married. It was found that compliance proportion was higher in the single group (81.48%) compared to the married group. But there was no significant association between marital status and compliance with DOTS. The results of the study are similar to those of the studies done by Kandel Shyam Lal (42) and Nguyen Duc Hong (31). It was demonstrated that the compliance rate was higher in the single group than in the married group. The reason may be the higher level of knowledge in the single group. It was shown that there is a significant association between marital status and knowledge level (Appendix B3).

5.1.4 Educational level

Concerning the level of education, this study indicates that the respondents who had a higher level of education had a higher proportion of compliance than those who had a lower level of education. It might be that their lack of knowledge about TB and DOTS became a main cause of non-compliant behavior. The respondents who had a high level of knowledge strictly followed the treatment regularly. It might indicate that the respondents, who had a high level of education, have considerably a higher level of knowledge about TB and its treatment. It was also shown that there was a significant association between education level and knowledge level (Appendix B5). However, there was no significant association between educational level and patient compliance with DOTS. The results are similar to the study done by Lee Chiou (33). They mention that compliance behavior among TB patients is related to educational level.

5.1.5 Occupation

The results of this study show that 21.62% of the respondents were laborers, working in some industries, 13.51% of them were farmers (agriculture) and 14.41%

were business-man. It was found that there was no significant association between occupation and compliance with DOTS. Similar results were found in the study of Shrestha KB (40). It can be concluded that these mentioned groups moved frequently and had contact with people, who were likely to be a source of infection to spread tuberculosis among the family and community.

5.1.6 Monthly income

The results of the study show that 34.23% of the respondents had less than 2,000 Nepali Rupees in monthly income and 24.32% of the respondents had >5000 Nepali Rupees. The results also show that those patients who had a higher family income had a higher proportion of compliance than other groups. This could be explained by the facts that the higher income group often prefers to visit private clinics and hospitals with tuberculosis diagnostic facilities and treatment where they can get faster service as they like. The report of Castillo in 1990 mentioned that “tuberculosis was a disease of poverty and was a useful indicator of development”. Poverty leads to bad and over-crowded housing or poor work conditions and hard life. These may lower defense mechanisms of the body as well as making infection more likely (42). However, no significant association was found between family income and patient compliance with DOTS. These results are similar to the result of shrestha KB; who mentioned that the higher income group had a higher proportion of compliance (40).

5.2 Availability and accessibility of DOTS services

5.2.1 Availability of DOTS services

In considering the availability of health staff, those respondents who visited health staff at the DOTS center at every visit had a higher proportion of compliance than the others. It was found that there was a statistically significant association between availability of health staff and patient compliance with DOTS. Patients might be compliant if health staff encourage and support them regular treatment at every visit. The results are different from the study done by Tara Bam (16), who mentioned that committed and well-trained health staff reinforced the training.

Concerning availability of health education, a majority (80.18%) of the respondents received the health education from the health staff in the DOTS centers. The compliance proportion was high (87.64%) among respondents who got health education in the DOTS centers compared with those who did not get it. The results also show that there is a statistically significant association between availability of health education and patient compliance with DOTS. The results are consistent with the study results of the conducted by Nguyen Duc Hong (31). It might be that patients can get more important information regarding the disease and its treatment from health worker and also increase their knowledge about it. This might support to the patient for getting regular treatment. Therefore it can be concluded that health workers are the key motivator to getting high compliance with TB treatment. It was also shown that there is also a significant association between availability of health education and level of knowledge on TB and DOTS programme (Appendix B7).

As to about the availability of TB drugs, all the non-compliant patients answered negatively about the regular of TB drugs at every visit to the DOTS center. This study showed that there was availability significant association between availability of TB drugs and patient compliance with DOTS. The results are similar to those of studies done by Tara Bam (16) and by Uplekar M (35). The reason might be that interrupted drug supply is one of the main causes of noncompliant behavior because patients may be irregular if they couldn't get medicine during their visit.

5.2.2 Accessibility of DOTS services

With regards to mode of transportation, more than half (54.95%) of the respondents used a vehicle. The findings of this study show that the proportion of compliance was higher among respondents who went to the DOTS center on foot. However, the results showed that there is no statistical significant association between mode of transportation and patient compliance with DOTS. This results is similar to that of the study of Kandel Shyam Lal (42).

Nearly two-thirds (63.96%) of the respondents said that the distance was less than 2 km from their home to the DOTS center. The compliance proportion was higher

among those who had less than two km to travel compared with those who had a longer distance. However, there was no significant association between distance and patient compliance with DOTS. The results are similar to those of the study conducted by Sudhakar Morankar (17). He demonstrated that the completion rate was poor if the patient has a greater distance from their home to the DOTS center. It can be concluded that patients might have problem traveling if their houses are far from the DOTS center.

Regarding travel time, more than half (55.86%) of respondents spent less than or equal to 15 minutes traveling to the DOTS center. The compliance rate was higher (78.87%) among the respondents who spent less than and equal to 15 minutes compared to greater than 15 minutes. There was no significance association between traveling time and compliance with DOTS treatment. Similar results were found in study conducted by Kandel Shyam Lal (42). It might be that the government has given priority to expanding DOTS center near the patient home.

Regarding the traveling cost, more than half (54.05%) of the respondents had no need to pay money for travel costs. 25.23% of them spent less than ten rupees and only 20.72% of them spent more than twenty rupees per visit. The results show that who had no need to pay money for travel costs had a higher proportion of compliance (78.33%) than those who spent money for traveling. It was show that there is no statistically significant association between traveling cost and patient compliance with DOTS. The results are similar to those of study conducted by Tara Bam (16), but the results are different from those of the study done by Boyles SJ. (12). He mentioned that cost of transport was the reason most frequently given for non-compliance.

Concerning waiting time, a majority (83.78%) of the respondents waited the less than or equal to 5 minutes to get the TB drugs. The rate of compliance was higher (75.27%) among those who waited less than or equal to 5 minutes than among those who waited more than 5 minutes to get the TB drugs. There was no significance different between the two groups, however. This might be due to the trained health

staff; their commitment and motivation reinforce providing qualitative services. The results are similar to those of the study conducted by Tara Bam (16).

5.3 Knowledge about TB and DOTS program

Regarding the knowledge about TB and the DOTS programme, ten questions were asked and focused on patient knowledge concerning TB and the DOTS programme. On analysis, it was found that about 60% of the respondents had a high level of knowledge regarding TB and the DOTS programme. The results show that they were relatively less aware about the cause of TB disease, route of transmission, and full course of treatment.

Nearly two-thirds (63.96%) of them knew the cause of TB. The results are different the study done by Kandel SL (42). It might be that whatever enormous advances from those of sciences, in mass media in communication have reached the old traditional and superstitions about tuberculosis itself are still rooted in society.

Regarding the main important symptoms of the disease, 73.87% of them answered correctly. Exactly two-thirds (66.67%) of them knew about route of transmission and the rest of them didn't know about it. The results are different from those of the study done by Nguyen Duc Hong (31).

A majority (81.98%) of the respondents knew about the diagnosis of TB; it might be due to the focus on sputum microscopy by the National Tuberculosis Programme. The health staff focuses on sputum microscopy at the end of the intensive phase at five months and in the last months for to confirm of disease has been cured.

A majority (86.49%) of the respondents knew the duration of TB treatment. This can be a reflection of good motivation by the health staff. Regarding the benefits of DOTS, majority (86.49%) of them knew DOTS can completely cure the disease. It might be due to the focused on DOTS programme by the government. The results are similar to those obtained by Tara Bam (16).

A majority (82.88%) of the respondents knew that treatment could be stopped only being after declared cured by the health staff, but the rest didn't know about this aspect. Regarding the full course of treatment, more than half (57.66%) of the respondents knew about the full course of treatment and less than half (42.34%) of the respondents didn't know about this aspect.

Concerning the side effects, more than two-thirds (75.68%) of them knew about the common side effects of TB drugs. Regarding the prevention of transmission more than three-fourths (76.58%) of them knew and the rest of them didn't know about this aspect.

The overall level of knowledge scores of the respondents show that those respondents who had high level of knowledge had high compliance proportion than who had a moderate and low levels of knowledge about TB and the DOTS program. The results also showed that there is a statistically significant association between knowledge level and patient compliance with DOTS. The results are consistent with the study done by Nguyen Duc Hong (31). It was also shown that there is a significant association between education level and knowledge level, which was mentioned earlier (Appendix B5). But the results contrast with those of the study by WHO, TB notes No. 2, 2002, where it was mentioned that the researcher found no linkage between level of knowledge and compliance with TB treatment (39). However, DOTS has had a positive impact on the TB control programme. During treatment with DOTS programme, there is constant close contact between health staff and patients. Patients benefits from receiving health education, motivation, and direct communication from the health staff. Regarding the non-compliant patients, the knowledge score was lower. Non-compliance patients are more likely to think they are cured when their symptoms have ceased, even though the full course of the treatment has not been completed. It was shown that compliance is enhanced if patients receive an adequate educational programme (44).

5.4 Perception about TB disease and DOTS programme

Regarding the perceptions, They were assessed by using questions related to susceptibility to TB, severity of illness, benefits of DOTS and barriers to treatment.

5.4.1 Perceived susceptibility

Regarding perceived susceptibility, 63.06% of the respondents had a high perception of a level of susceptibility toward TB. The results show that respondents' who had high levels of perception to susceptibility had a higher proportion of compliance than who had its moderate and low level. There was a significant association between perception to susceptibility and patient compliance with DOTS. The results was similar with the theory described in the Health Belief Model (29). Those individuals at the high extreme perception of susceptibility feel there is a real danger and that they have experienced an adverse condition or contacted a grave disease.

5.4.2 Perceived severity

Exactly two-thirds (66.67%) of the respondents had a high level of perception about severity of TB. 21.62% of them had a moderate perception and the rest of them had a low level of perception. The results show that respondents' who had a high level of perception as to the severity had a higher proportion of compliance than the others. There was a significant association between perceptions about severity and patient compliance with DOTS. The study is similar to the study conducted by Morankar S. (17). It may be that they perceived TB is a serious disease before, but after getting treatment they take it easy.

5.4.3 Perceived benefits

Concerning benefits of the DOTS programme, more than two-thirds (70.27%) of the respondents had a high level of perceptions about the benefits of the DOTS programme. Those respondents who had a high level of perception towards the benefits of DOTS, had a higher compliance rate than those who had moderate and low levels of perception to benefits of DOTS programme. The results of the study also

show that there is a statistically significant association between perceptions about benefits and patient compliance with DOTS. The results are similar to the theory explained in the Health Belief Model (29). Regarding non-compliant patients, they might have financial problems or lack of motivation for the treatment and the DOTS programme. Compliance with treatment can be improved, if the government (NTP) promotes the DOTS strategy to cover all patients in close coordination with the peripheral levels of communities and near the patients' homes.

5.4.4 Perceived barriers

Concerning the perception of barriers, it was found that nearly the same proportion had high and low levels of perceptions about barriers. And the compliance proportion was similar among those who had high and moderate level of perception about barriers. However, the results show that there is no significant association between perception to barriers and patient compliance with DOTS. A similar result was found by Tara Bam (16), but a different result was found in the study done by R. Liefooghe (18). It can be concluded that barriers have been perceived normally during the treatment period.

About overall perceptions, the compliance rate was higher among those who had a high level of perception about TB and the DOTS program than among those who had moderate and low levels of perception. It was also found that there was a significant association between the overall perception level and patient compliance with DOTS. The results are similar to those of the study conducted by Tara Bam (16). But, the results are different from those of the study done by Ru-ping et al (33). It can be said that the non-compliant patient might have a low level of knowledge and a low level of perception about TB and the DOTS program. It was also shown that there was a significant association between knowledge level and perception level (Appendix B15).

CHAPTER 6
CONCLUSION AND RECOMMENDATION

6.1 Conclusion

The cross sectional study was conducted in Pokhara urban Kaski, Nepal, which may not be truely representative of the situation for compliance of TB patients and treatment with DOTS programme. A structural questionnaire was used to determine socio-demographic characteristics, availability and accessibility factors, patient knowledge and perception about TB disease and the DOTS programme.

In conclusion, concerning the main objective, the results showed that 72.97% of the respondents were compliant and 27.03% of them were non-compliant. They were 67.37% male, 81.08% from the economically productive age group (15-54), and 75.68% of them were married. The largest group of respondents were illiterate (38.74%) and 21.62% of them were daily wage laborers. Concerning the income of the respondents, it was found that 41.44% of them had a family income ranging from 2000 to 5000 Nepali Rupees.

Concerning availability, the majority of the respondents (79.28%) answered positively about the availability of health staff in DOTS treatment centers. Similarly, a majority of them (80.18%) mentioned that they got adequate health education from the health staff and also a majority of them (85.59%) agreed that TB drugs were available in the DOTS treatment centers.

With regards to accessibility of DOTS services, it was found that more than half of them (54.95%) went to the DOTS centers by vehicle, more than three-fifth of them (63.96%) mentioned that the distance between the DOTS center and their house was less than 2 km., more than half (55.86%) of them took 15 minutes or less to go from their houses to the DOTS center more than half of them (54.05%) had no need to pay

traveling cost from their house to the DOTS center, and a majority of them (83.78%) received TB drugs within 5 minutes in the DOTS center.

Regarding knowledge more than half (59.46%) of them had a high level of knowledge and nearly one-fifth of them (19.82%) and (20.72%) had moderate and low levels of knowledge about TB and the DOTS treatment respectively.

About overall perceptions about TB and the DOTS programme, more than three-fifths (63.06%) of the respondents had a high perception level, while 28.83 % had a moderate level and only a few (8.11 % of them) had a low level of perception. Furthermore, for each type of perception, less than two-thirds (63.06%) of the respondents had high perception level about susceptibility to TB, more than two-thirds (66.67%) of them had a high perception level about the severity, a majority (70.27%) of the respondents had a high level perception about the benefits and more than one-third (36.94%) of the respondents had a high perception level toward the barriers.

With regards to socio-demographic characteristics, none of the characteristics as (age group, sex, marital status, occupation status, educational level and monthly income) had a significant association with patient compliance with DOTS.

However, there was a significant association between availability factors (availability of health staff, availability of health education, availability of TB drugs) and patient compliance with DOTS (p-value <0.05).

But the results show that there was no significant association between accessibility factors (mode of transportation, distance, traveling time, traveling cost, waiting time) and patient compliance with DOTS.

The results show that there is a significant association between knowledge level and patient compliance with the DOTS programme (p-value 0.05). Similarly, there is also a significant association between overall perception level and patient compliance with the DOTS program (p-value 0.05). About each type of perception, there was a

significant association between patient compliance and perceptions about susceptibility, severity and benefits towards TB and the DOTS programme (p-value 0.05). However, there is no significant association between patient compliance and perceptions to barriers toward the DOTS programme.

6.2 Recommendations

6.2.1 Policy/Administration

From the findings of this study, it is clear that compliant behavior is affected by various factors. To improve the compliance rate, it is necessary to develop strategic planning and make some administrative changes at the policy level:

1. Involvement of community and the private sector in late patient tracing in the DOTS program. Because most of the late patients might interrupted their treatment and became non-compliant.

2. Policy should be established for home visiting of those patients who miss at least two doses of medicine. This can improve the of compliance.

6.2.2 Implementation

On the basis of the results of this study and findings through observation in the DOTS treatment centers, the following recommendations are suggested for better compliance of TB patients with DOTS;

1. The study showed that more than two-thirds of the respondents had moderate and low levels of perception about barriers towards TB and the DOTS program. It was also found that more than 80% of the respondents perceived health workers were not friendly in the DOTS centers. Therefore it can be suggested that the negative attitudes of health workers or the misperception of patients should be changed by carrying out some orientation and interaction programs involving TB patients and health workers of DOTS centers.

2. It was found that more than one-third of the respondents did not have correct knowledge about the cause of TB, mode of disease transmission, and impact of irregular treatment. It can be said that these are most crucial issues during their treatment. Therefore, health workers should pay further attention to the content of the information during educational talk. It is suggested that health education should provide sufficient, simple and clear information about the above-mentioned issues and also needs to emphasize the importance of regular treatment.

3. In the study, it was found that the compliance rate was higher among those who had accessibility to the services than among the others. Therefore, it is suggested that health staff should pay further attention to patients with disadvantages regarding accessibility because it may hamper their compliance. DOTS service should be expanded near the patients' homes, which can minimize traveling time, cost and can enhance the compliance rate.

6.3 Recommendations for future study

Non-compliance of patients with treatment is the big issue in the tuberculosis Control Program. This study did not cover all the aspects of behavioral information socio-demographic characteristics and availability and accessibility of the DOTS services for a program to get high compliance. Therefore, following items could be further studied.

1. A further study, it should be conducted towards the compliance behavior of patients with treatment in different situations.

2. The appropriateness of knowledge and communication skills of health staff in their dealings with TB patients.

3. Qualitative research focusing only on the non-compliant group to find out the reasons for interruption of DOTS treatment.

4. Further study should be conducted about the performance of health workers at DOTS centers.

REFERENCES

1. WHO Regional office for South East Asia. Department of communicable disease. What is TB. [Online]. 2001. Available from: http.www.whosea.org/tb/default.htm [Accessed 2002 Oct 20].
2. Crofton J. Failure in treatment Tuberculosis: 2001 potential cause and their avoidance. Bull Int Union Tuber Lung Dis 1980; 55: 95-9.
3. Rojanapithayakorn W. Jai P. Narain. TB and HIV: some question and answer. New Delhi: The Organization; 1999. 9-13.
4. World Health Organization. Communicable Diseases. Global Tuberculosis Control WHO Report 2001. Geneva: The Organization; 2002.
5. World Health Organization. Global Tuberculosis Control: WHO Report 2002. Geneva: The Organization; 2002.
6. World Health Organization. Forty-fourth World Health Assembly. Geneva: 1991. WHA 44/1991/REC/11991.
7. World Health Organization. Tuberculosis Program, Frame-work for Effective TB Control. Geneva: The organization; 1994; WHO/TB/94.179.
8. Maher D, Mikulencak M. What is DOTS? A guide to understanding the WHO recommended TB control strategy knows as DOTS. WHO/CDS/CPC/TB/99.270.Geneva :The organization; 1999.
9. Nepal. Ministry of Health. Annual report 2002/2003. Kathmandu: Department of Health Services; 2003.
10. National Tuberculosis Programme. Annual report 2002/2003. Kathmandu: National Tuberculosis Centre; 2003.
11. National Tuberculosis Programme. Five year plan 1998-2003. Kathmandu: National Tuberculosis Centre; 1998.
12. Population monograph of Nepal central Bureau of Statistics Ram Shah Path, Kathmandu: National planning commission of Nepal; 2003
13. Central Bureau of Statistics. National population census. 2001. Kathmandu: National Planning Commission of Nepal; 2001.

14. Tekle B. Defaulting from DOTS and its determinants in three districts of Aris Zone in Ethiopia. Int J. Tuberc Lung Dis 2002 Apr: 6(7): 573-79.
15. Boyles SJ. Factors affecting patient compliance with anti TB chemotherapy using (DOTS). In J Tuberc Lung Dis 2002 Apr: 6(4): 307-12.
16. Tara B. Factors affecting patient compliance in Kathmandu urban area Nepal [M.P.H.M. Thesis in Primary Health Care Management]. Nokhon Pathom: Faculty of Graduate Studies, Mahidol University; 2003.
17. Morankar S. Suryawanshi N. Indian Socio-cultural aspects of tuberculosis among women in western rural Maharashtra India. Pune: Foundation of Research in Community Health; 2000.
18. Liefooghe R, Muynck AD. Dynamics of tuberculosis treatment adherence. Islamabad: VLIR project, Saialkot; 2001.
19. Kani K. Introduction to tuberculosis and mycobacterium. Tokyo: Southeast Asian Medical Information Center, International Medical Foundation of Japan 1990. SEAMIC publication no.60
20. World Health Organization. Treatment tuberculosis guidelines for National Tuberculosis Programme. 2nd ed. Geneva: The Organization; 1997.
21. Jaramillo E. Community contribution to TB care: a Latin American Perspective. Geneva: The Organization; 2002.
22. Park K. A textbook of preventive and social medicine. 17th edition Jabalpur, India: 2002: 138- 152.
23. Toman K. Tuberculosis case finding and chemotherapy: questions and answers Geneva: World Health Organization; 1979.
24. World Health Organization. WHO report on the tuberculosis epidemic 1995. Geneva: The Organization; 2002.
25. World Health Organization. Global Tuberculosis Programme. Global tuberculosis control. The Organization; 1997.
26. Narain JP, editor. Tuberculosis epidemiology and control. New Delhi: WHO Regional office for South-east Asia; 2002.
27. Ministry of Health. Annual report 2000/2001. Kathmandu: Department of Health Services, 2001.

28. National Tuberculosis Programme. Report of HIV surveillance in TB patients Kathmandu: National Tuberculosis Centre; 1999.
29. William CC. Medical sociology. 7th ed. Upper Saddle River, N. J.: Prentice Hall; 1998.
30. Robin DM, Dinicolo DD. Achieving patient compliance School of medicine, University of California. Los Angeles 1982; 7-17,195-321.
31. Nguyen DH. Patient adherence to DOTS in long a province southern, Vietnam [M.P.H.M Thesis in Primary Health Management]. Nakhon Pathom: Faculty of Graduate Studies, Mahidol University; 2000.
32. World Health Organization. Gender and tuberculosis control towards a strategy for research and action 2002. Geneva: The Organization; 2000.
33. Lee RP, Chiou YF. The compliance Behavior of patients with pulmonary? tuberculosis in Hualien, Taiwan. Tzu Chi Med J 1997; 9: 219-27.
34. Wafaa ES. Tuberculosis adherence partnership alliance studies. New York: Harlem Hospital Center; 2000
35. Uplekar M, Rangan S. Tackling TB: the search for solution. Bombay: The Foundation for Research in Community Health; 1996.
36. Srinivasan S. The economics of TB [Online] 2001. Available from:http://www.infochangeindia. Org / features-main 01.jsp [Accessed 2002 Oct 30].
37. Jagota P, Sreenivas TR, Parimala N. Improving treatment compliance by observing differences in treatment irregularity. Indian J. Tub 1996; 43: 75-80.
38. Prapasi S, Buri E. A clinical model for a better tuberculosis treatment outcome and factors influencing compliance. J Med Ass Thailand 1985; 68(7): 256-59.
39. World Health Organization. TB notes. Geneva: The Organization; 2002.
40. Shrestha KB. The association between compliance behavior and the effectiveness of tuberculosis treatment among pulmonary tuberculosis in Bangkok Thailand. [M. Sc. Thesis in Medical Epidemiology] Bangkok: Faculty of Graduate Studies, Mahidol University; 1991.
41. Doveren RFC. Why Tuberculosis control in an unstable country is essential: Despite TB patients embrace DOTS in Angola. Int. J Tuberc Lung Dis 2001; 5 (3): 486-88.

42. Kandel SL. Compliance of tuberculosis patients with treatment in Bangkok chest clinic, Thailand [M.P.H.M. Thesis in primary Health Management]. Nakhon Pathom: Faculty of Graduate Studies, Mahidol University; 2000.
43. Murray CSL et. al. Tuberculosis in developing countries; burden, intervention and cost bill. IUALT 1999; 65(1).
44. Morisky D, Malotte C, Choi P. A patient education programme to improve adherence rates with anti-tuberculosis drug regimens. Health educ. Q 1990: 27 253-67.

APPENDIX

APPENDIX A

QUESTIONNAIRE

Factors related patient compliance with "Directly Observed Treatment Short course" in Pokhara urban Kaski, Nepal

Clinical information.

Name of the DOTS Treatment Centre / Sub centre:_____.

Name of the patient: _____.

Name of interviewer_____.

Date of interview: / / / / (dd / mm / yy)

There are five parts to this questionnaire including socio-demographic factors, availability of DOTS services, accessibility of DOTS services, knowledge about TB and DOTS programme, perceptions on the disease and its treatment.

Part1. Socio-demographic factors.

Please put a tick mark [ ] in the appropriate box to answer the question.
(Choose one for each question)

1. What is your age? _____years.

2. Sex
   - ❒ 1= Male
   - ❒ 2= Female

3. What is your marital status?
   - ❒ 1= Single
   - ❒ 2= Married
   - ❒ 3= Divorced/separated
   - ❒ 4= Widow
   - ❒ 5= Other (specify_____).

4. What is your occupation?
   - ❒ 1= Agriculture
   - ❒ 2= Labor
   - ❒ 3= Housewife
   - ❒ 4= Service / Government
   - ❒ 5= Business
   - ❒ 6= Other (specify_____).

5. What is your educational level?
   - ❒ 1= Illiterate
   - ❒ 2= Primary School
   - ❒ 3= Junior High School
   - ❒ 4= Higher School
   - ❒ 5= College
   - ❒ 6= Others (specify_____).

6. How much is your monthly income?_____ in (NRs).

Part 2 Availability and accessibility of DOTS services factors

Availability and accessibility of DOTS service factors are crucial for TB compliance; the following questions will be used to measure the availability and accessibility of DOTS services.

Availability of DOTS services:

7. Do you meet the health staff at every visit to the DOTS center?
   - ❒ 1= Yes
   - ❒ 2= No
8. Do you get the health education by the health staff at every visit to DOTS center?
   - ❒ 1= Yes
   - ❒ 2= No

9. Do you get drugs at your daily visits to the DOTS center?

❒ 1= Yes

❒ 2= No

Accessibility of DOTS services

10. How do you travel from your home to the DOTS treatment center?

❒ 1= On foot

❒ 2= In your vehicle

❒ 3= By taxi

❒ 4= By bus

❒ 5= Other (Specify_____).

11. How far is it from your home to the DOTS treatment centre? _____km.

12. How long does it take to travel from your home to the DOTS treatment Center? _____minutes.

13. How much money you pay for traveling costs per visit?_____(NRs.)

14. How long do you wait at every visit to get the drugs DOTS services? ___min.

Part 3 Knowledge about TB disease and DOTS programme

Please put a tick mark [ ] in the appropriate box to mark correct answer the question. **(**Choose only one for each question)

15. Do you know what the main cause of TB is?

❒ 1= Bacteria

❒ 2= Drinking alcohol and smoking

❒ 3= Heredity

❒ 4= Virus

16. Which is the main important symptom of TB?

❒ 1= Headache

❒ 2= Cough more than two weeks and fever in the evening

❒ 3= Vomiting

❒ 4= Back pain

17. What is the main source of transmission of TB?

❒ 1= Droplets through the air

❒ 2= Eating utensils

❒ 3= Sharing towels

❒ 4= Hand-shaking

18. Which is the best method for diagnosing TB?

❒ 1= Sputum examination

❒ 2= Blood and skin examination

❒ 3= Stool and Urine examination

❒ 4= Physical and x-ray examination

19. How long do you need to take TB drugs?

❒ 1 =10 months

❒ 2= 6 months

❒ 3= 8 months

❒ 4= 7 months

20. What is the most important benefit to you of DOTS?

❒ 1= DOTS completely cures TB

❒ 2= DOTS stops bleeding

❒ 3= DOTS prevents cough and chest pain

❒ 4= DOTS creates a good relationship with health workers

21. Do you know when TB treatment can be stopped?

❒ 1= When feeling healthy

❒ 2= After five months

❒ 3= In 8 months / follow up sputum examination by a health worker declares the patient cured.

❒ 4= After symptoms disappear.

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

❒ 1= TB will not be cured

❒ 2= TB will be cured

❒ 3= Nothing will happen

❒ 4= Will re-infection.

23. Which of the following is a common side effect of TB drugs?

❒ 1= Headache

❒ 2= Red urine and itching skin

❒ 3= Yellow urine

❒ 4= Back pain

24. How can you prevent TB to others (choose the best answer)?

❒ 1= Cover the mouth and nose when sneezing or coughing

❒ 2= Do not share towels

❒ 3= Do not eat together from the same plate

❒ 4= Do not sleep together.

Part 4 Perceptions of TB patients about TB & its treatment

Please a tick mark ( ) under the number which expressed your opinion on the following statements (from no. 25 to 40)

	Statement	Agree	N o t sure	Disagree
	Perceived susceptibility			
25	Close contact with a TB patient, will re-infect with TB after being cured.			
26	If one family member is infected with TB, other members will develop TB.			
27	It is not easy to be infected with TB, when sharing towel with TB patient.			
28	It is not easy to be infected with TB in a crowded environment			
	Perceived severity			
29	TB is serious, and will be fatal if untreated.			
30	Feeling sick with TB, causes much loss of working time.			
31	After getting TB, nobody has financial problems.			
32	TB makes you lose your job.			
	Perceived benefits			
33	DOTS cannot break the transmission of TB.			
34	Rich and poor TB patients have an equal chance to be treated with DOTS.			
35	DOTS can cure TB.			
36	TB patients have more financial problems with DOTS treatment			
	Perceived barriers			
37	It is difficult to go for daily DOTS treatment.			
38	Traveling cost for receiving the DOTS treatment is expensive.			
39	Health workers are not friendly in DOTS centers.			
40	After getting DOTS treatment you can have contact with friends and neighbors as before.			

Part 5 Compliance

Please a tick mark ( ) under the number which expresses your opinion on the following statements

41. Are you taking treatment regularly, according to the instructions of health workers?

❒ 1= Yes

❒ 2= No

(If yes, answer questions no.42 and 43, if no. answer questions no. 44 and 45)

Yes,

42. Have you been taking drugs TB drugs 7 or more consecutive days?

❒ 1= Less than 7 days

❒ 2= More than 7 days

43. When will you stop your TB DOTS treatment?

❒ 1= After symptoms disappear

❒ 2= When the health worker declares me cured/ treatment completed

❒ 3= When feeling healthy

❒ 4= When some side effects appear.

❒ 5= Others (specified _____).

No,

44. How many days do you have left in your treatment?

❒ 1= Less than 7 days

❒ 2= 7 or more days

45. How many times have you missed your treatment? _____). times.

46. When did you miss your treatment? Date……

47. What is the exact reason for missing drugs? There is more than one correct answer. Please place tick mark ( ) under the number which expresses your opinion on the following statements.

❒ 1= Travel cost is so expensive

❒ 2= Bad behavior of health staff

❒ 3= Due to the side effects of the TB drugs

❒ 4= Nobody suggested regular treatment for me

❒ 5= Feeling cured

❒ 6= Other (Specify_____).

Thank you for your cooperation in answering this questionnaire.

We hope you soon recover your health.

APPENDIX B

ANALYSIS OF INDEPENDENT VARIABLES

Table B1 Relationship between age group and knowledge level

Socio-demographic characteristics	Knowledge level			
	High	Moderate	Low	
	N, (%)	N, (%)	N, (%)	c^2 (df) p-value
Age group				6.821 (4), 0.146
15-34	42 (63.63)	12 (18.75)	10 (15.63)	
35-54	16 (61.54)	3 (11.54)	7 (26.92)	
>54	8 (38.10)	7 (33.33)	6 (28.57)	

Table B2 Relationship between sex status and knowledge level

Socio-demographic characteristics	Knowledge level			
	High	Moderate	Low	
	N, (%)	N, (%)	N, (%)	c^2 (df) p-value
Sex				0.282 (2), 0.869
Male	45 (58.44)	15 (19.48)	17 (22.08)	
Female	21 (61.76)	7 (20.59)	6 (17.65)	

Table B3 Relationship between marital status and knowledge level

Socio-demographic characteristics	Knowledge level						
	High		Moderate		Low		
	N,	(%)	N,	(%)	N,	(%)	c^2 (df) p-value
Marital status							9.797 (2), 0.007*
Single	23	(85.19)	2	(7.41)	2	(7.41)	
Married	43	(51.19)	20	(23.81)	21	(25.00)	

* Significant, (p value<0.05).

Table B4 Relationship between educational level and knowledge level

Socio-demographic characteristics	Knowledge level						
	High		Moderate		Low		
	N,	(%)	N,	(%)	N,	(%)	c^2 (df) p-value
Educational level							16.230 (2), < 0.001*
Literate	50	(73.53)	11	(16.18)	7	(10.29)	
Illiterate	16	(37.21)	11	(25.58)	16	(37.21)	

* Significant, (p value<0.05).

Table B5 Relationship between occupational status and knowledge level

Socio-demographic characteristics	Knowledge level			
	High	Moderate	Low	
	N, (%)	N, (%)	N, (%)	c^2 (df) p-value
Occupation				14.513 (10), 0.151
Agriculture (farmer)	8 (53.33)	3 (20.00)	4 (26.67)	
Labor	12 (50.00)	4 (16.67)	8 (33.33)	
Housewife	12 (60.00)	3 (15.00)	5 (25.00)	
Service	10 (62.50)	3 (18.75)	3 (18.75)	
Business	7 (43.75)	7 (43.75)	2 (12.50)	
Others	17 (85.00)	2 (10.00)	1 (5.00)	

Table B6 Relationship between family income and knowledge level

Socio-demographic characteristics	Knowledge level			
	High	Moderate	Low	
	N, (%)	N, (%)	N, (%)	c^2 (df) p-value
Family income				7.030 (4), 0.134
< 2000	23 (60.53)	8 (21.05)	7 (18.42)	
2000-5000	28 (60.87)	5 (10.87)	13 (28.26)	
>5000	15 (55.56)	9 (33.33)	3 (11.11)	

Table B7 Relationship between availability of health education and knowledge level

Availability factors	Knowledge level				
	High	Moderate	Low		
	N, (%)	N, (%)	N, (%)	c^2 (df)	p-value
Availability of health education				47.560 (2),	<0.001
Available	64 (71.91)	18 (20.22)	7 (7.87)		
Not available	2 (9.09)	4 (18.18	16 (72.73)		

* Significant, (p value<0.05).

Table B8 Relationship between age group and perception level

Socio-demographic characteristics	Perception level				
	High	Moderate	Low		
	N, (%)	N, (%)	N, (%)	c^2 (df)	p-value
Age group				5.003 (4),	0.287
15-34	25 (39.06)	28 (43.75)	11 (17.19)		
35-54	16 (61.54)	8 (30.77)	2 (7.69)		
>54	12 (57.14)	6 (28.57)	3 (14.29)		

Table B9 Relationship between sex status and perception level

Socio-demographic characteristics	Perception level			
	High	Moderate	Low	
	N, (%)	N, (%)	N, (%)	c^2 (df) p-value
Sex				0.599, (2) 0.741
Male	35 (45.45)	30 (38.96)	12 (15.58)	
Female	18 (52.94)	12 (35.29)	4 (11.76)	

Table B10 Relationship between marital status and perception level

Socio-demographic characteristics	Perception level			
	High	Moderate	Low	
	N, (%)	N, (%)	N, (%)	c^2 (df) p-value
Marital status				5.033, (2) 0.081
Single	10 (37.04)	15 (55.56)	2 (7.41)	
Married	43 (51.19)	27 (32.14)	14 (16.67)	

Table B11 Relationship between educational level and perception level

Socio-demographic characteristics	Perception level			
	High	Moderate	Low	
	N, (%)	N, (%)	N, (%)	c^2 (df) p-value
Educational level				2.955 (2), 0.228
Illiterate	24 (55.81)	12 (27.91)	7 (16.28)	
Literate	29 (42.65)	30 (44.12)	9 (13.24)	

Table B12 Relationship between occupational status and perception level

Socio-demographic factor	Perception level			
	High	Moderate	Low	
	N, (%)	N, (%)	N, (%)	c^2 (df) p-value
Occupation				3.996 (10), 0.948
Agriculture	6 (40.00)	6 (40.00)	3 (20.00)	
Labor	9 (37.50)	11 (45.83)	4 (16.67)	
Housewife	10 (50.00)	7 (35.00)	3 (15.00)	
Service	8 (50.00)	5 (31.25)	3 (18.75)	
Business	10 (62.50)	5 (31.25)	1 (6.25)	
Others	10 (50.00)	8 (40.00)	2 (10.00)	

Table B13 Relationship between family income and perception level

Socio-demographic factor	Perception level			
	High	Moderate	Low	
	N, (%)	N, (%)	N, (%)	c^2 (df) p-value
Family income				0.488 (4), 0.975
< 2000	17 (44.74)	16 (42.11)	5 (13.16)	
2000-5000	23 (50.00)	16 (34.78)	7 (15.22)	
>5000	13 (48.15)	10 (37.04)	4 (14.81)	

Table B14 Relationship between availability of health education and perception level

Availability factors	Perception level			
	High	Moderate	Low	
	N, (%)	N, (%)	N, (%)	c^2 (df) p-value
Availability of health education				47.560 (2), <0.001*
Available	64 (71.91)	18 (20.22)	7 (7.87)	
Not available	2 (9.09)	4 (18.18)	16 (72.73)	

* Significant, p-value < 0.05.

Table B15 Relationship between knowledge level and Perception level

Variable	Perception level			
	High	Moderate	Low	
	N, (%)	N, (%)	N, (%)	c^2 (df) p-value
Knowledge Level				20.196(4) <0.001*
High	33 (50)	28 (42.42)	5 (7.58)	
Moderate	12 (54.55)	9 (40.91)	1 (4.55)	
Low	8 (34.78)	5 (21.74)	10 (43.48)	

* Significant, (p value<0.05).

BIOGRAPHY

NAME	Hari Bahadur Kunwar
DATE OF BIRTH	September 10, 1960
PLACE OF BIRTH	Palpa, Lumbini, Nepal.
INSTITUTE ATTENDED	Tribhuvan University, Kathmandu Shiksha Campus, Kathmandu, Bachelor's Degree in Education, Ramshahpath, Kathmandu Nepal (1995-1999) Mahidol University, Master Degree of Primary Health Care Management, 2004-2005.
FELLOSHIP/ RESEARCH GRANT	Self
PRESENT POSITION	Regional TB coordinator, Western Region National Tuberculosis Center, Nepal