CHAPTER I

INTRODUCTION

1.1 Background

Tuberculosis (TB) is a bacterial disease caused by the bacillus *Mycobacterium tuberculosis*. After TB infection occurs, most individuals carry the tubercle bacilli inside the body, but bacteria are in small numbers and are dormant. These dormant bacteria are kept under control by the body's defenses and do not cause disease. Disease occurs only when the tubercle bacilli in the body have started to multiply and become numerous enough to overcome the body's defenses (World Health Organization [WHO], 2004a). The most important source of infection is the patient with TB of the lung, or pulmonary TB (especially sputum smear positive TB), and who is coughing. Coughing produces tiny infectious droplet nuclei. An individual's risk of infection depends on the extent of exposure to droplet nuclei and his or her susceptibility to infection. The risk of infection in a susceptible individual is high with close, prolonged, indoor contact with a person with sputum smear positive TB. Infected persons can develop TB at any time. The disease can affect most tissues and organs, but especially the lungs.

1.2 TB situation worldwide

TB remains a threat to the health and well-being of people around the world. Among infectious diseases, TB remains the second leading killer of adults in the world. Today, TB is estimated to cause about 1.64 million deaths (1.08 million men and 0.57 million women), and 8.74 million new cases yearly. Of these estimated TB

cases, 3.6 million cases, of which 1.5 million were new sputum smear-positive, were reported to the World Health Organization (WHO) in 2000. The male to female ratio of reported cases in most countries is about 2:1 (WHO, 2002a; WHO, 2002b). The extremely high male to female ratio of TB patients in developing countries has yet to be explained. It is estimated that of the approximately six million women with TB at any given time worldwide, at least one-third die because they are undiagnosed or receive inadequate treatment. This means that more than 2,700 women die from TB each day (World Health Organization [WHO], 1996).

The WHO has identified 22 high-burden countries that account for about 80% of all incident TB cases worldwide, and all of them are low or middle-income countries, with more than half the cases occurring in 5 countries (India, Bangladesh, Cambodia, Indonesia and Thailand) (WHO, 2002a). TB causes more than 26% of avoidable adult (15-59 years of age) deaths in the developing world, which results in tremendous social and economic costs (Murray et al., 1990). TB kills more women than all causes of maternal mortality combined (World Bank, 1993), and has become a leading cause of death among human immunodeficiency virus (HIV) positive people (Lucas et al., 1993). Co-infection with tuberculosis and HIV promotes the development of TB, to the extent that HIV positive individuals face a yearly risk of about 10% of developing TB, compared to the lifetime risk of 10% among HIV negative individuals (Grange, 1999; Hopewell, 2000).

1.3 TB situation in Nepal

In Nepal, TB is one of the major public health problems. About 60% of adults and 45% of the general population have been infected with the disease. Nearly 80,000 people currently have TB, with more than 40,000 new cases arising every year (National Tuberculosis Control Programme [NTP], 2003). About half of these have infectious (or sputum smear-positive TB) and continue the chain of transmission. Reported rates are higher in men (79/100,000) than women (40/100,000) (Ministry of Health [MoH], 2004), possibly because adult men are more frequently exposed to infection than women, possibly because women have less access to health care services than men. About 5,000-7,000 people continue to die from TB every year (MoH, 2004). The reported death rates among new smear positive pulmonary male and female patients from TB are 5.8% and 5.0% respectively (NTP, 2003). It has been estimated that without treatment, nearly 190,000 people would have died from TB in Nepal over the next ten years (MoH, 2004).

The highest risk factor for TB worldwide is HIV infection. HIV infection has not yet played a significant role in Nepal, but it is expected to increase. Both neighboring countries, India and China, already have a large HIV problem. In 1998, estimated HIV prevalence in TB patients was 1.8% (MoH, 2004). The results indicate that the prevalence of HIV is low but increasing. HIV and TB dual infection stands to become a serious problem in the future.

1.4 TB control

In 1993, the WHO declared a state of global emergency for TB, due to the steady increase of the disease worldwide and created a framework for effective TB control built upon the pioneering work of Dr Styblo (Enarson, 1991). In 1995 the

DOTS (directly observed treatment, short course) strategy was established as the key intervention to achieve tuberculosis control worldwide. DOTS includes the five major components: i) government commitment to sustained TB control activities; ii) case detection by sputum smear microscopy among symptomatic patients self reporting to health services; iii) a regular, uninterrupted supply of all essential anti-TB drugs; iv) standardized treatment regimen of six to eight months with directly observed therapy (DOT) for at least the initial two months and v) a standardized recording and reporting system that allows assessment of treatment results for each patient and of the TB control programme performance overall (WHO, 2002a). The global targets of this strategy are to achieve 70% case detection and 85% cure rates. In 2003, DOTS programmes successfully treated 84% of all registered new smear-positive patients, but detected only 28% of the estimated tuberculosis cases in the world (WHO, 2003b). Therefore, the target of 70% case detection might not be reached until 2013, unless interventions are made that are able to increase the case detection rate.

In Nepal, DOTS was initiated in 1996 and 100% DOTS coverage reached at the end of 2001 (NTP, 2003). The national case detection rate was achieved at 70% and treatment success rate was at 87% (NTP, 2005).

1.5 Statement of the problem

The goals of TB control are to reduce mortality, morbidity, and transmission of the disease, while preventing drug resistance, until TB no longer poses a threat to public health. It also aims to reduce human suffering and the social and economic burden which families and communities have to bear as a consequence. To achieve this, it is necessary to ensure access to diagnosis, treatment and cure for each TB

patient and to protect vulnerable populations from TB and its drug resistant forms (WHO, 2002c).

Early diagnosis and prompt effective therapy form the key elements of the tuberculosis control programme (Enarson, et al., 1996). Delay in diagnosis results in increased infectivity in the community, and it is estimated that an untreated smear-positive patient can infect, on average, 10 contacts annually, and over 20 during the natural history of the disease until death (Styblo, 1991). Delay in tuberculosis diagnosis may also lead to a more advanced disease state at presentation, which contributes to late sequelae and overall mortality. Smear-positive cases are more likely to infect other individuals. Various studies in the different parts of the world showed that delay in diagnosis may worsen the disease, increase patient expenditure, increase risk of death and enhance TB transmission in the community (Styblo, 1973; Olumuyiwa et al., 2004; Zafran et al., 1994; MacIntyre et al., 1995; Bustamante-Monties et al., 2000). Factors affecting delays in diagnosis identified in studies worldwide include gender, age, education, poverty and access to health care, and low level of knowledge and awareness about the disease (Lawn et al., 1998; Sherman et al., 1999; Wandnalo & Morkve, 2000; Yamasaki et al., 2001).

1.5.1 Gender differences in delays

Long diagnostic delay among women has even more adverse effects, as the health and welfare of children and other family members are closely linked to that of the mothers (Hudelson, 1996). Therefore, reducing delays in TB health seeking and diagnosis is especially important among women.

Published studies report inconsistent findings about differences between men and women in delays. The overall trend shows that delays to TB

diagnosis for women are longer than men. A study conducted in Vietnam and Japan reported that the mean total delay was significantly longer among women than among men (Long et al., 1999b; Niijima et al., 1990; Hooi, 1994) but there was a report of no gender related differences in total delay in Australia (Pirkis et al., 1996).

Studies from Ghana and Japan revealed that doctor's delay was also significantly longer for women than men (Lawn et al., 1998; Sasaki et al., 1995). Several studies have shown that even settings where more women than men present for care; they experience longer provider delays (Long et al., 1999b; Needham et al., 2001, Thorson et al., 2000). Perhaps this is a reflection of different gender roles in different societies and/or differences in TB diagnostic performance of health workers between the study settings.

1.5.2 Gender differences in help seeking behavior

From a patient perspective, the help seeking process has been described as having various steps. They include symptoms recognition (to recognize a symptoms as a health problem), sick role (to consider yourself as "sick" and ready to take action), lay referral (discussion and guidance by people within your own social network), and treatment action (Ngamvithayapong et al., 2000). In low income settings, women face more barriers to adequate and timely health care since women have less access to financial resources and less decision making power of their own, despite women's work-load being heavier compared to men's. Being responsible for the health of the family, women often have to put their own needs in the background, whereas resources are spent on the husband or children. Access to adequate health care cannot be taken for granted (Rathgeber & Vlassoff, 1993). In India, women are found to under-report morbidity and are said to practice a "culture of silence"

regarding their illness (Rangan & Uplekar, 1999). Several studies have highlighted that women in particular reach DOTS treatment services through a more circuitous route than men, preferring to seek help first from traditional healers or private practitioners and they are also more likely to medicate themselves (Ogden et al., 1999; Thorson et al., 2000; Yamasaki et al., 2001). Such "shopping for treatment" often leads to delay in diagnosis, and start of effective treatment. This is a problem not only for the patients themselves but also for the public at large, because more people are exposed to potentially infectious persons for a longer period of time.

Poverty may compel people with TB to seek care in the private sector instead of at DOTS clinics. Although TB medicines in the public sector are provided without charge, hidden costs (such as the cost of travel) may put these services beyond the reach of many (Johansson et al., 2000). In Nepal, women first sought care from private practitioners, even when they were aware that free treatment was available at the government heath clinics, largely because household responsibilities discouraged them from traveling the longer distances to government clinics (Yamasaki et al., 2001).

1.6 Rationale

In countries like Nepal, both men and women may suffer from social inequality, poverty, and deprivation, but women are even more disadvantaged. In most developing countries, women are disproportional among the poor, have a low social status, and have less access to education as well as health care. In most of the low income countries, notification rates of pulmonary TB for males are nearly always higher than that for females (Borgdorff et al., 2000). The true magnitude of male excess for pulmonary TB is very difficult to quantify, partly because case detection in

most prevalence surveys is by sputum microscopy, which appears to be less sensitive in detecting TB in women than it is in men. Questions and debate persist about whether the male preponderance for TB stems more from biological/genetic gender differences or more from socio-cultural gender differences (Thorson et al., 2000; Borgdorff, Maher, 2001; Thorson, Long, 2001). Several studies suggest that women face more barriers to opportune TB treatment than men do. There may be undiscovered huge reservoir of active TB cases but due to cultural beliefs, women would be less likely to seek TB treatment than men would (Sumartojo, 1995). Very few studies have looked at the gender differences in relevant socio-cultural factors, and little evidence is found on the potential impact on improving TB control programmes by increasing access to health care for underprivileged people (Liefooghe et al., 1999).

TB is one of the most significant health problems facing Nepal, infecting over 60% of the adult population. Every year 40,000 people develop active TB, of whom 20,000 have infectious pulmonary TB, and can spread the disease to others (NTP, 2003). Remarkable achievements have been made by the NTP by sustaining treatment success rate above 85% among those who presented voluntarily to the DOTS centres, and expanding the DOTS throughout the country. However, to our knowledge, there was no attempt to examine the help seeking behavior of the TB patients before getting into the DOTS system. Our study aim was to provide the baseline information about the magnitude and risk factors for delay in the diagnosis. This would be useful in estimating the impact of the DOTS strategy over time, as well as for developing appropriate strategies to reduce patients and health system delays.

Rates of TB are generally high across the countries of south-east Asia, where TB accounts for between 4.3% and 7.2% of total deaths (WHO, 2003a). Demographic questions here are especially concerned with a disproportionately high female mortality from TB relative to other world regions (Sen, 2003). Persisting patterns of social discrimination against women and unfulfilled social responsibilities of men underscore diverse and complex relationships between cultural values, social practices, and gender related health and social policy. Widespread stigma targeting people with TB, especially women, further complicates the interactions between this disease and normative gender roles in this part of the world (Hudelson, 1996; Balasubramanian et al., 2004). Almost everywhere, however, dealings between society, culture and TB control raise important questions about the role of gender and discrimination in all aspects of the disease, from case finding to diagnosis, treatment and ultimate outcome. Public health professionals concerned with TB have long emphasized the role of poverty, living conditions and non-specific determinants of health. In 1921, Allen Krause, director of the TB laboratories at Johns Hopkins, noted: "The solution of the TB problem is partly dependent on the removal of other evils and inequalities which constitute, no doubt, a more fundamental problem than does TB itself." (quoted in WHO, 2004). Various extraordinary social stressors, such as war, conflict, insurgency, migration, imprisonment, and forced labour may also potentiate the spread of TB in affected countries and communities, with gender-specific effects on both men and women.

Nepal has a high TB case-notification rate, with an estimated annual incidence of TB patients of 211 per 100,000 populations (Dye et al., 1999). This is on a par with countries known to have a high burden of TB (Dye et al., 1999), and indicates that the

TB burden in Nepal is very serious, as is the case in many other developing countries. According to WHO, the male to female ratio of registered TB patients in Nepal is higher for men, at 2.3:1 (WHO, 2004b). However, one study reported that a higher proportion of women with TB detected at a temporary outreach TB diagnostic camp than at the existing government health facilities (Harper et al., 1996), while another study in Nepal reported a higher proportion of female cases found by active case finding than by self referral, with a male female ratio of only 1.2:1 (Cassels et al., 1982).

These findings suggest that women might encounter difficulties in the case detection process in developing countries, and that a substantial percentage of women with TB might consequently be missed by the existing health care systems. It can also be hypothesized that the pattern of women's utilization of health care providers differs from that of men.

Addressing the challenges of TB control, WHO has recommended the member countries to set the goals of NTP to reduce the morbidity, mortality and break the chain of transmission of TB, while preventing drug resistance, until TB no longer poses a threat to public health. Early case detection in the community is of the highest priority for WHO (WHO, 2003b). Following the WHO and International Union Against Tuberculosis and Lung Disease (IUATLD) guidelines, National Tuberculosis Control Programme of Nepal has developed 10 Year Development Plan (2002-2012) for the control and prevention of TB in the country. Several challenges have been highlighted including gender differences in case detection in the plan (MOH, 2004).

In Nepal, at least twice as many men as women are registered for TB treatment (NTP, 2003). This could be because women are less frequently infected

than men, possibly because men are more often in situations where TB infection commonly occurs-frequently because of migration in search of work. It also could be because women also have more difficulty getting treatment. They may have less access to modern health care facilities, and use traditional healers more than men do. Access to modern medical care for women in Nepal is limited by many factors. The key factors would be poor education, distance, poverty, inferior social status, stigma, dependency, and discrimination, gender of health workers, and lack of decision making power, health beliefs, illness behavior and social roles.

The private sector is active and growing, and perhaps 25-50% of patients with active TB are treated by the private sector, and not registered by the NTP (MOH, 2004). Very little information is available about these numbers of patients (Dye et al., 2002). Several studies have revealed that in order to address the concern of poorly regulated private sector in TB control, their effective involvement in NTP is highly required and desired (MOH, 2004.; Rangan et al., 2003.; Hurtig et al., 2002.; Murthy et al., 2001.; Lonnroth et al., 2001a) and should be treated as a gender issue. Gender issue is highlighted as one of the priority research areas of NTP Nepal (MOH, 2004).

Various studies have highlighted the pattern of delay with respect to gender differences. They have looked at patient delay and health system delay (figure 1). Patient delay was defined as the interval between onset of symptoms and first contact to any type of health care providers and health system delay was defined as the time interval between first visit to any type of health care provider and initiating of TB treatment. Figure 1 shows how people with TB symptoms progress through the various stages of access to TB care. This pathway is rarely linear, with people seeking

a range of remedies from a variety of health providers as all stages of their illness (Lonnroth et al. 2001b; Lonnroth et al. 1999; Long et al. 1999a; Nair et al. 1997).

I----------Patient delay----------I I----------Health system delay---------I

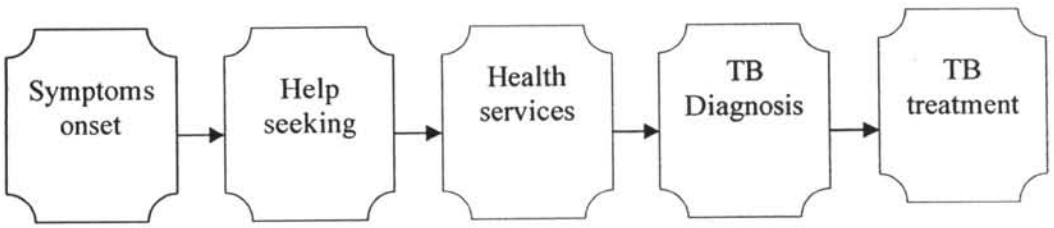

Figure 1: The pathway to TB care

These studies have identified a variety of potential barriers to timely diagnosis and start of treatment among men and women. These barriers might be socio-demographic, socio-cultural, psychosocial, socio-economic, access to health services etc. What is lacking in the literature, however, are investigations into how some women/men are able to overcome these barriers, what social networks and support structure exist or are tapped by those women/men who are able to do so.

Policymakers need to know which barriers to address first, and where interventions would be best targeted. For example, control programmes are often uncertain about where to target health education messages – at individual level, at families or in large communities. In order to move understanding of barriers to DOTS service utilization to a higher level, this research taps into the enabling and supporting factors within communities that provide the context in which individuals must face and deal with access issues, and ultimately act out their health seeking behavior. Thus, this research moves from an individual view of health care seeking, to an understanding of how communities deal with health system, and how individuals draw on their communities to address health problems.

Therefore, this study is aiming to add some steps in the pathway to TB care and explaining gender influences at each stage. The pathway is shown below:

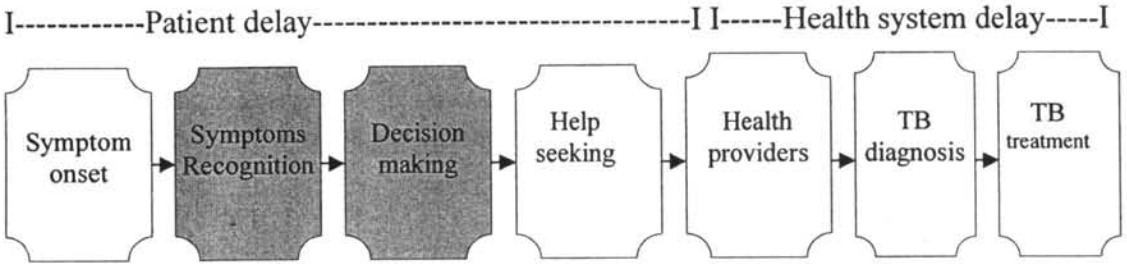

Figure 2: The study pathway to TB care

At each stage of this pathway we investigated the gender influences and how people understand and interpret their symptoms, how they recognize their health status, their decision making about help seeking and access to health services, how they obtain a TB diagnosis and treatment. At each stage there are barriers to progressing to the next stage. These barriers result in not all people progressing to the next stage. Consequently there was a loss or drop out from the total number of people with symptoms, to those who make it successfully through treatment. Barriers were identified at each stage and time intervals were calculated and compared among the stages.

Published articles have shown that local surveys on knowledge and attitudes towards TB greatly benefit the planning, health education and implementation of TB control programmes. Several health interventions have failed because they were designed without ascertaining any knowledge of the health behavior of the target population (Godin & Shephard, 1983). A serious concern has been pointed out that a great deal of attention is being given to case finding in TB services, because programmes are not yet attaining targets for case-finding in the overall strategy of TB control. Clearly, if we do not find and treat a substantial proportion of existing cases,

the strategy of TB control will fail (Enarson, 2003). Therefore findings from this study are useful as evidence to develop specific strategic planning to narrow down the interval between onset of symptoms and start of TB treatment under DOTS strategy. Based on study findings, recommendations are made for countermeasures to improve early case detection and treatment, as a result and these to serve the goal of NTP to reduce morbidity, mortality and transmission of TB.

1.7 Research questions

- What are the magnitudes of delay intervals, and do these intervals differ between male and female?
- What are the factors contributing to these delays, and do these factors differs between male and female?

1.8 Objectives

1.8.1 General objective

To investigate the gender differences for delay in initiating directly observed treatment, short-course (DOTS), among new sputum smear-positive pulmonary tuberculosis patients.

1.8.2 Specific objectives

- To describe the gender differences in the journey of help seeking among sputum smear-positive tuberculosis patients.
- To investigate the gender differences for patient delay in reaching to first health provider and health system delay in receiving TB diagnosis.
- To identify the factors contributing to patient delay and health system delay, and compare them between males and females.

- To elicit, in qualitative research, whether males and females with tuberculosis have different levels of opportunity to obtain diagnosis and DOTS treatment.
- To develop recommendations for shortening patient delay and provider delay, and for achieving gender equality in DOTS treatment.

1.9 Research null hypothesis

- There is no gender differences for delay in initiating DOTS treatment

1.10 Operational definition

Gender; It refers to those distinguishing features that are socially constructed. Gender influences the control men and women have over the determinants of their health, for example, their economic position and social status, and their access to resources. Gender configures both the material and symbolic positions that men and women occupy in the social hierarchy, and shapes the experiences that condition their lives (WHO, 2004).

Delay in initiating directly observed treatment; It is an interval between onset of symptoms and start of treatment with combination of anti-TB drugs (HRZE) under the direct supervision of trained personnel at the DOTS centre.

DOTS; It is a package which includes government commitment, direct sputum microscopy, uninterrupted drugs supply, directly observed treatment, and recording and reporting.

New sputum smear-positive pulmonary TB case; It refers to a patient who has never had treatment of TB, or who have taken TB treatment for less than one month. And, at least two initial sputum smear examinations (direct smear microscopy) demonstrate acid-fast bacilli (AFB+), or one sputum examination AFB+ and

radiographic abnormalities consistent with active pulmonary TB, or one sputum smear specimen AFB+ and culture positive for mycobacterium TB.

Onset of symptoms; It refers mainly to the commencement of coughing as the onset of TB symptom. Other symptoms such as chest pain, blood in sputum, fever, night sweat, loss of appetite, loss of weight are also considered as TB symptoms.

Recognition of symptoms; It refers to recognition of the symptoms as a threat to health and suspecting them as of TB

Decision making; It is a decision that has been taken to find out the remedies to treat the symptoms. It has been taken either by the patients themselves or by others.

Help seeking; It refers to help seeking practices among either government medical establishments or private medical system including traditional healers to treat symptoms.

Diagnosis of TB; It refers to the process of diagnosis of TB using direct microscopy.

Patient delay; It is an interval between onset of symptoms and first contact with any type of health provider.

Symptom recognition delay; It refers to the time interval between onset of symptom and recognition of symptoms as a threat for health.

Decision making delay; It refers to the time interval between recognition of symptoms as a threat and decision making for help

Help seeking delay; It refers to the time interval between decision making and first contact to any type of health provider

Health system diagnosis delay; It is an interval between first contact with any type of health providers and diagnosis of TB.

Health system treatment delay; It is the interval between diagnosis of TB and start of anti-TB treatment under DOTS system.

Health system delay (Diagnosis + Treatment); It is an interval between first presentations to health care provider until the start of anti-TB treatment with DOTS.

Total diagnosis delay; It is the interval between onset of symptoms and diagnosis of TB by direct microscopy.

Total delay; It is the interval between onset of symptoms and commencement of anti-TB treatment under DOTS.

Independent variables

Socio-demographic factors; it refers to the patient's age, sex, marital status, households and children size, and migration status.

Socio-economic factors; It includes education, occupation, monthly personal income, and household yearly income in Nepalese Rupees (Rs.), main income earner in the household.

Symptoms recognition and decision making; It refers to recognition of symptoms as of TB, source of recognition of symptoms, decision making for medical help, decision maker, symptoms lead to decision making

Socio-cultural factors; It refers to feeling ashamed, hiding TB diagnosis, perception of acquiring TB due to sinful act, perceiving TB is a hereditary disease, perception of isolation, problem with spouse, problem to get married, hesitate to talk with friends and others, hesitate in mixing with family members, family members find fault frequently, prevent to use common articles, sleeping place, hesitating to participate in community events.

Knowledge about TB; i.e. important symptoms of TB, cause of TB, route of transmission, knowledge on TB as a curable disease, benefit of DOTS.

Perception on TB; It includes perception of coughing, everybody is at risk of acquiring TB, dangerous disease, other households may be vulnerable to get TB, TB makes jobless, fatal disease if untreated, acquired TB due to sinful act.

Access to TB diagnosis and treatment; it refers to mode of transport, distance, traveling time, travel cost, waiting time, and meet health staff at diagnosis centre at first visit, received health education on sputum examination at first visit in diagnosis centre.

Behavioral factors; It refers history of personal smoking (current, former, or never), consumption of alcohol (current, former, or never), types of fuel used for cooking and heating, and presence or absence of chimney in the kitchen.

Clinical factors; It includes HIV positive known and unknown status and grading of sputum smear-positive i.e. 1+, 2+ and 3+.

Care seeking practices; It refers to visit to first provider, providers visited at any time, number of providers visited, advised to have sputum test by first provider).

Private medial system; It refers to the health provider i.e. traditional healers, private pharmacies, private physicians, and nursing homes.

Public medical establishment; it refers to government health institution i.e. hospital, primary health care centres, health post, and sub health posts.

DOTS centre; it is a place where anti-TB treatment is freely available and patients are closely monitored under the DOTS system.

Patient's expenditure; it includes the expenditures for help seeking at the different level of providers, transportation, accommodation, food and additional foods, and lost income due to TB before obtaining the TB diagnosis.

Human resources; it refers to availability of trained health staff at DOTS centre.

NTP diagnosis policy; it refers to test three sputum specimens within two consecutive days, of those who present at the health facility with cough for more than two weeks. It also includes the contact tracing activities in those who are close to sputum smear positive TB cases.

NTP linkage programme; it refers to availability and functioning of public private mix programme at the DOTS centre level.

Advocacy and awareness activity; it refers to activities organized at the DOTS centre level i.e. dissemination of TB message through mass media, advocacy meeting with community people, and patients together with their family members.

Health providers; it refers to traditional healers, private physicians, pharmacists, Ayurvedic centres, public health facilities and DOTS centres.

1.11 Conceptual framework

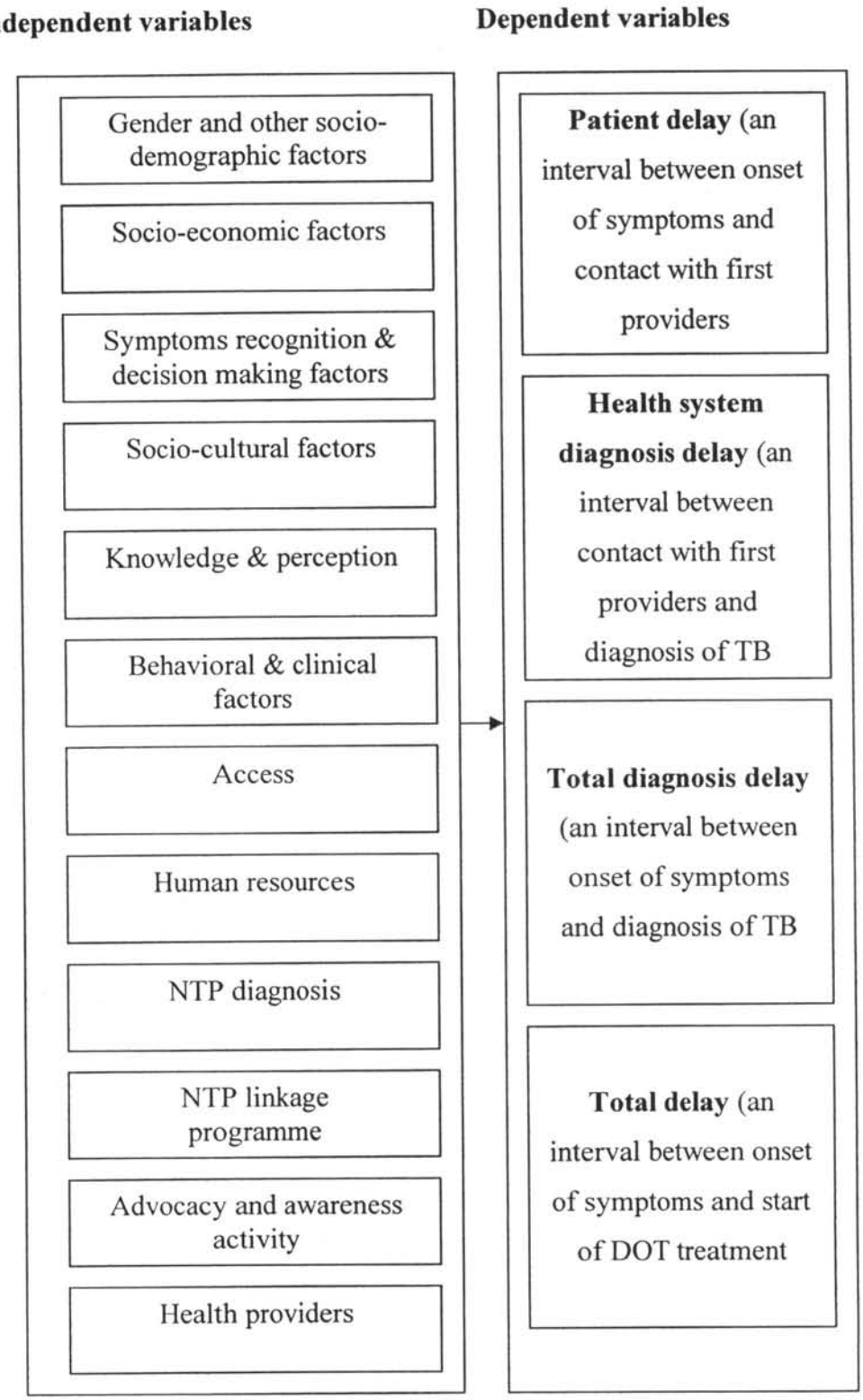

Figure 3: Conceptual framework, showing independent and dependent variables

LEVEL						
Individual		Demographic & Economic factors Knowledge on TB symptoms Perception Behavioural factors Clinical factors	Autonomy for decision Cultural factors	Misperception on cost Preference to non-DOTS provider	Knowledge on diagnosis steps Knowledge on TB services	Knowledge on TB services
Care seeking	Symptom onset	Symptoms recognition	Decision making	Seek help	TB Diagnosis	Anti-TB Treatment
System		Awareness and educational activities Network with former TB patients , other CBOs	Access Burden of TB Gender specific activities	Access (time, cost, waiting time, distance) Knowledge on TB, its diagnosis Referral by non-DOTS providers	Linkages between DOTS and other providers Information about sputum test Type of diagnosis centre	Referral system Human resource Information on DTS treatment Access Type of DOTS centre

Figure 4: Conceptual paths of help seeking behavior in accessing anti-TB treatment and barriers