CHAPTER V

SUMMARY, DISCUSSION AND RECOMMENDATIONS

5.1 Summary

5.1.1 Research setting, aim, and methods

This was an analytical study carried out in the Kathmandu valley among new smear pulmonary sputum smear-positive tuberculosis patients enrolled in 37 randomly selected DOTS centres between January to August 2006. The main aim of the study was to identify the gender differences in help seeking behavior and delays in initiating directly observed treatment short-course. Face to face interview, within a month of TB diagnosis, was carried out among 379 male and 237 female patients using standardized pre-tested structured questionnaires. The main delay intervals were patient delay (interval between onset of symptoms and first visit made to any type of provider), health system diagnosis delay (interval between first contact to any type of providers and diagnosis of TB), total diagnosis delay (sum of patient and diagnosis delay), treatment delay (an interval between diagnosis of TB and start of treatment), health system delay (an interval between first contact to any type of providers and start of treatment), and total delay (an interval between onset of symptoms and start of treatment). Bivariate analysis using Mann-Whitney and Kruskal Wallis non-parametric tests were made and multilevel models were constructed to identify the factors affecting patient, health system diagnosis, total diagnosis, and total delay.

5.1.2 Summary findings: delay intervals by gender

The median patient delay was significantly longer in female patients their male counterparts (60 vs. 45 days). It was also observed that health system diagnosis delay was significantly longer in female than male patients. About 40% of male and 28% of the female patients made their first visit to any type of providers within a month after onset of symptoms, while only 9% of the male and 7% of the female patients started of anti-TB treatment with a month after onset of symptoms.

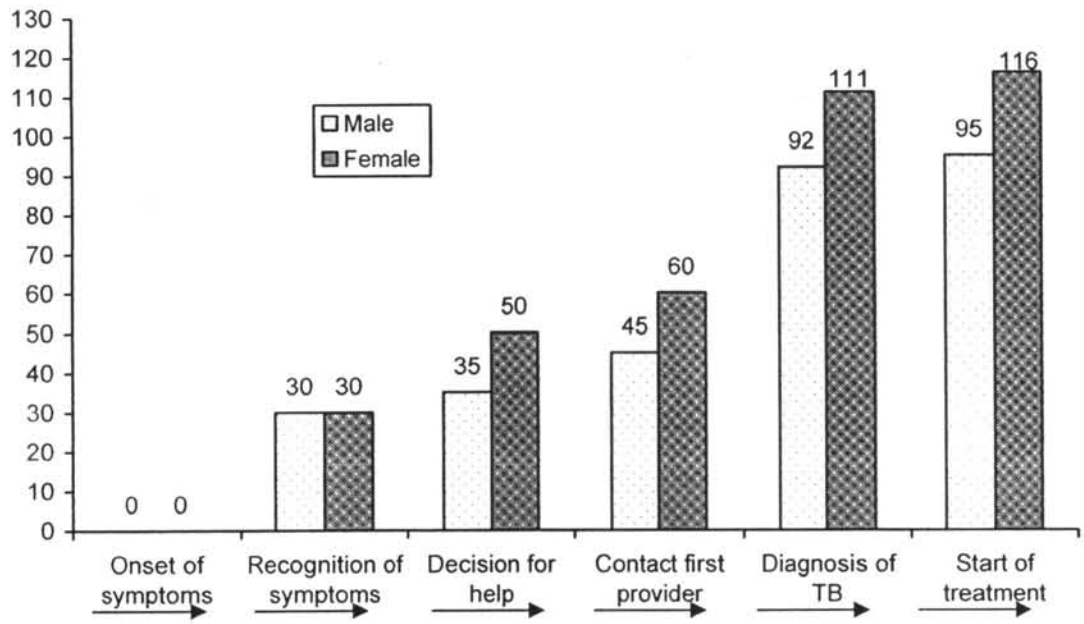

Figure 11: Time interval in days (median) along the pathway to accessing anti-tuberculosis treatment with DOTS, by gender

The DOTS strategy has been successfully implemented in Nepal with the financial and technical support of WHO, IUATLD, LHL, JICA and other donor partners. However, longer delay in diagnosis under-detection of women found in our study highlights a need for a discussion on gender equity aspects of the internationally recommended DOTS strategy. Gender equity should be the guiding principle for the

TB patient-provider encounter, and interventions seem urgently to be needed in order to increase the gender sensitivity of all aspects of the health care seeking journey leading to TB diagnosis and treatment.

Some gender focused studies have been carried out in developed and developing countries to identify the magnitude and determinants of patient delay and health system delay, including a study in Nepal. These studies highlight only the determinants of patient delay and health system delay in general. None of the studies identified the sub-intervals of patients delay. Thus, we succeeded in demonstrating and quantifying the specific sub-intervals and their magnitude where TB diagnosis of men and women delayed along the pathway of help seeking journey, as shown in figure 5 above. We were also able to highlight the major delay interval, i.e. decision making delay for medical help, within the patient delay. This delay interval was found to be a main contributor to total diagnosis delay and therefore self decision making power was found a significant risk factor to patient delay and total diagnosis delay among female patients. This is an area where this thesis supplies new information to the body of knowledge.

The risk factors for patient delay and health system diagnosis delay identified in this study should be the area under discussion of future interventions in order to reduce delay in delivery of DOTS treatment to tuberculosis patients in general and female TB patients in particular, and hence transmission of the disease in the community.

As we observed, patient delay was unacceptably longer particularly among female patients. Factors such as lack of knowledge and awareness about TB symptoms, lack of autonomy in decision making for medical help, fear of social

isolation, and loss of income were found significantly contributing to longer patient delay among female patients, while low education, poor awareness about TB symptoms, and HIV positive status were significantly associated with longer patient delay among male patients. It indicates that NTP should put more emphasis on increasing awareness of the community about tuberculosis symptoms, its diagnosis, and treatment by treating it a gender component.

Health system diagnosis delay was also longer among female patients. It was due to multiple visits to different providers, particularly to traditional healers. They were less likely to get advice for sputum test from the providers whom they sought care first, i.e. traditional healers, public health establishments, and pharmacies. Thus, NTP should have to put more efforts into building effective collaboration between the national tuberculosis control programme and private sectors including traditional healers, often the recipient of the first health seeking action of the community.

Table 46: Summary variables for which $p \leq 0.10$ in final multilevel models for patient delay and diagnosis delay, by gender.

Conceptual block	**Patient delay**			**Diagnosis delay**		
Gender	Both	Male	Female	Both	Male	Female
Demographic	Sex	-	-	-	-	-
Socio-economic	Occupation Education	Education			Occupation	
Recognition of symptoms and decision making	Self suspecting symptoms Ability of self decision making Chest pain	Self suspecting symptoms	Self suspecting symptoms, ability of self decision making	Self suspecting symptoms Chest pain	-	-
Socio-cultural	Perception of isolation	-	Perception of isolation	Family members find fault frequently	Acquired TB due to sin	Hide TB diagnosis
Perception	Coughing not serious matter	Coughing not serious matter	-	-	-	-
Knowledge	-	-	-	Route of TB transmission	Route TB transmission	-
Behavior	-	-	-	-	-	-
Clinical	HIV status	HIV status	-	-	-	-
Cost	Lost income	Lost income	Lost income	Lost income		Lost income
Access	-	-	-	Waiting hours	Waiting hours	
Health providers	-	-	-	Met providers* Number of health providers visited	No. of health providers visited	Met providers* Number of health providers visited

* Met traditional healers, private physicians, private pharmacy, and local level of public health facilities at any time.

5.2 Methodological considerations

5.2.1 Focus group discussion (FGD) in Nepalese context

Focus group discussions are useful for exploring peoples' experiences, opinions, feelings, and concerns (Berg, 1998). Literatures on the use of FGD in the Nepalese population in scarce, quantitative studies dominate health care research, although there is use of qualitative research methods in Nepal. The exploratory FGDs conducted for this thesis generated data on patients' and health care providers'

perceptions and experiences. These data were useful for questionnaire design and variable definition for the quantitative portion of the research.

The findings from FGDs are assessed according to trustworthiness. Trustworthiness can be achieved by gathering data from participants with various experiences, to shed light on the research questions from a variety of aspects (Graneheim & Lundman, 2004). It is important to consider the relevant voices that might be excluded. In this study, males and females with different socio-economic status were included. Patients were also in different TB care stages with their own specific experiences and perceptions of TB, and access to TB care. Health provider participants represented different sectors and levels of health facilities, including DOT providers at DOTS centre level, private physicians, community volunteers and community residents.

With regard to gender homogeneity of the participants in each FGD, we were unable to organize gender specific FGDs (separate for male and female). We identified a problem in this study which was that there were more male than female health care providers both in public and private sectors. However, from our observations, both male and female provider participants were active in the discussion to provide their own experiences or general perceptions on TB and TB care. In the FGD with patients, all participants seemed to feel at ease, and entered into lively discussions on the topics introduced by the moderator. Based on the information on the tapes and notes from FGDs with TB patient participants, more than 50% of the contributions were made by female patient participants.

5.2.2 Precision of quantitative studies

Precision, or reliability, refers to reproducibility of results. Precision can be improved in two ways; by increasing the size of the study, and by modifying the design of the study to increase the efficiency with which information is obtained (Rothmen & Greenland, 1998). Multistage sampling was used in this study, beginning with purposive selection of the study area. DOTS centres were selected by stratified random sampling within the administrative setting (districts). All eligible new smear positive tuberculosis patients during the period of January to August 2006 were recruited for the study.

Study power was considered before sampling. An extensive literature search was done to understand the prevalence of delay and pattern of delay in TB care seeking. For this study estimating risk (50%) in exposed (female) and about 38% risk in unexposed group (male) of delay for more than 30 days to reach a study power of 80% at 95% confidence, the required sample size was about 636. To increase overall efficiency and to sharpen interpretation of results, multivariable analysis, including linear regression and multilevel analysis, were used for effect estimation.

5.2.3 Internal validity

Internal validity means minimizing systematic error. Internal validity implies validity of inference for the immediate source population of the study subjects Rothmen & Greenland, 1998). Three main types of biases can distort the estimation of an epidemiological measure, i.e. selection bias, information bias, and confounding. In this study, a high validity is anticipated through the cohort study design, which is less liable to selection bias than the case-control and cross-sectional designs. The recruitment of all new smear positive TB patients registered during January to August

2006 rendered the effect estimation quite representative to the new TB patients in the whole population. We included only new sputum smear positive pulmonary TB cases for which diagnostic criteria are standardized, and routinely applied by trained staff. Therefore, the probability of misclassification was minimal.

It is unlikely that recall bias posed a substantial problem for interpretation of results. To minimize the recall bias, different strategies were employed, including training the researchers, reading medical records, asking especial events like wedding, festivals, harvesting time, birth day, religious and national days to estimate the date of onset of symptoms. In addition, Nepalese lunar terms were used to facilitate accurate recall. Moreover, patients were interviewed within a month of diagnosis of TB. Due to the low level of patients' income, each payment represented a considerable sum in relation to the TB patients' resources, so patients usually remembered how much they had paid for their previous health care seeking, although they could not always distinguish the expenditure on diagnosis or on treatment. Confounding was largely controlled by employment of multivariable statistical analysis.

As mentioned in the chapter 3, an important goal was to control for large number of independent variables systematically. In all analytical models, standard errors were quite small, indicating that co-linearity was not a major issue in interpreting results.

5.2.4 Gene ralizability (external validity)

Generalizability is the validity of the inferences as they pertain to people outside the source population. This study was based on observations from only three of Nepal's 75 districts, but the annual rate of TB infection of these districts is

four times higher than that of hill and mountain districts and two times higher than plain districts. The valley accounts for about 20% of the burden of TB in the country. A large proportion of the Kathmandu valley was covered by the study, and we believe that the study population well represents new smear-positive pulmonary TB patients managed by the TB control programme (31% of the Kathmandu valley and 5% of the national coverage). We also observed a similar ratio of male to female (1.5:1) tuberculosis cases to that reported for the TB control programme (1.8:1, NTP, 2005). The age distribution was also similar to that of the national TB statistics in Nepal (NTP, 2005) as well as in other developing countries. The literacy rate in our study (male 80%, female 60%) was also similar to that of the general population in Nepal (70% of male and 45% of female, CBS, 2001). However, the TB control programme routinely recruits only people who voluntarily present themselves to the DOTS centres (passive case finding). Therefore, we have no information about people with TB who did not seek health care, or people who received treatment at other health care providers (the private sector) and not the DOTS centres. However, with the high coverage of the TB control programme (95% of Nepalese population), high DOTS coverage (almost all of the detected cases) and high case detection rate at about 70% of estimated cases (MOH, 2004), the majority of smear-positive pulmonary TB cases are expected to be managed by the TB control programme. However, given the context of the socio-economic status, the health care and TB care systems and the NTP strategy, these findings are important for the whole populations of the Kathmandy valley.. Nevertheless, generalization should be undertaken with caution.

Our findings clarify important aspects of patient, health system and total diagnosis delay for TB in the Nepal and relevant issues that require attention for

improved TB control. It is believed that these insights will be useful and that they will inform policy in the Nepal and comparable regions.

The success of DOTS relies on prompt access to quality diagnosis and treatment of TB. This research describes the pathways towards help seeking behavior for TB in Nepal, especially focusing on characteristics of the obstacles met by female and male patients on their pathway to TB diagnosis and accessing TB treatment.

5.3 Case detection

5.3.1 Under-detection of new smear positive TB cases

One of the main objectives of tuberculosis control is to reduce tuberculosis transmission in the community through early detection of smear-positive pulmonary TB cases, and rapid administration of a full course of treatment (Enarson, et al., 1996). There is clear evidence that TB in many countries is under-diagnosed, though the magnitude of under-diagnosis is difficult to estimate (Dye et al., 1999). In the passive case finding approach, early case detection depends on voluntary presentation motivated by symptom recognition, as well as cultural and social influences, adequate health care seeking and appropriate diagnostic performance of the health care providers. In the Kathmandu valley of Nepal, the estimated true prevalence of sputum smear positive pulmonary TB in the population was higher then the reported notification rates in both male and female (NTP, 2005). Nationally, notification rates in Nepal show a similar male to female ratio to that reported in Kathmandu, suggesting that notified sputum smear positive TB is more common among males than among females (NTP, 2004).

5.4 Help seeking behavior of tuberculosis patients

Cough followed by fever were the main symptoms reported by both male (89.4%) and female (93.2%) patients. These findings are consistent with reports from India 98% (Rajeswari et al. 2002), Egypt 96%, Iraq 94%, Pakistan 100%, Somalia 98%, Yemen 98% (World Health Organization. Regional Office for the Eastern Mediterranean [WHO-EMR], 2006) and Vietnam male 94.7% and female 90.7% (Long et al. 2002) where tuberculosis patients presented with cough while 61% of patients in Malawi presented with cough and 16% with fever (Salaniponi, et al. 1991). By contrast, weight loss (82%) was the most frequent symptom reported from the Islamic Republic of Iran followed closely by cough (80%) (WHO-EMR, 2006). It is worth mentioning that sputum smear positive pulmonary tuberculosis is usually initially suspected by the cough symptom. It might be that more missed cases occur among those who have other symptoms.

With the onset of symptoms, patients often initially neglect the symptoms and wait for self-recovery. They often wait a long time before acting to seek treatment of the experienced symptoms. This could be due to different local cultural perceptions and interpretations about the cause of TB and the relations of symptoms to TB. We found that 52.3% of female and 65% of male patients reported recognizing their symptoms as potential TB, and causing threat to their health, within 30 days of symptoms onset. A decision was made to seek help by 35% of the female and 49% of the male within 30 days of symptom onset. An attempt was made to seek help by 28.3% of female and 40.1% of male patients to any type provider (e.g. traditional healers, private pharmacy, private physician, public health care facilities) within 30 days of symptom onset. In the pathway of the help seeking journey, 5.5% of female

and 4.7% of male patients promptly visited a DOTS centre got tested and started TB treatment. However, 21.4% of the female and 2.8% of the male patients entered the DOTS system by first accessing the traditional healers as their entry point followed by private pharmacy (38.4% female vs. 33.8% male), public health care facilities (17.4% female vs. 38.2% male) and private physicians (13.4% female vs. 17.2% male). Most female patients acknowledged accessibility (near, convenient and cheap) of traditional healers and greater opportunity to keep disease secret as the main reasons for seeking initial care from the traditional healers. Reasons for making the initial visit to a private physician, pharmacy or private nursing home were that these were easily accessible (convenient time and proximity) and there was a greater chance to keep disease secret compared to the DOTS centre or public sectors cited by female patients. These findings suggest that the choice of health care provider is not only determined by socio-cultural and economic factors, but also by gender. The health seeking behavior differed significantly between males and females with TB suggestive symptoms. Comparable findings reported in a previous study from Nepal that women were more likely to visit a traditional healers first, invoking easy access to them (<30 minutes) (Yamasaki et al., 2001). Other studies in developing countries reported that women in particular reach DOTS treatment through a more circuitous route than men, preferring to seek help first from traditional healers or private practitioners (Ogden, et al. 1999; Thorson, et al. 2000; WHO-EMR, 2006).

Patients visited on average 2.3 (male 2.2 and female 2.5), range 1-6, health care providers before being finally diagnosed, mainly by government establishments (male 52%, female 44%), followed by NGO's (male 34%, female 30%) and private sector establishments (male 13% and female 26%). The mean frequency of visits to

different health care providers was substantially higher in female than male patients (7.5 vs. 5.3). Studies in Pakistan, Egypt, Iran, Yemen, Iraq, Somalia, and Syria reported that the mean number of health care providers visited before TB diagnosis was 1.2-1.8, until finally, the majority of the patients were diagnosed by the TB control programme (WHO-EMR, 2006). It is now urgent to build collaboration with private sector including traditional healers in order to reduce enrolment delays in the DOTS system. The fact that DOTS services are free-of-charge and that their quality is high should be made more widely known to the community through a gender lens.

Stigma proved to be a major obstacle to prompt health seeking behavior. A considerable proportion of female patients felt ashamed that they had developed TB, had tried to hide the disease, felt that it affected family and marital status, and work performance, perceived fear of social isolation. More females than males said that the chance of getting married was reduced due to TB. The association between stigma associated with TB and the health care seeking behavior of the people is in agreement with other reports (WHO-EMR, 2006; Salaniponi et al.,1991).

Only 14.8% of the female and 17.5% of the male patients correctly knew that TB is a contagious disease and caused by bacteria. About 43% of females and 54% of males knew that TB is transmitted through droplets. A better finding was reported in the study of Pakistan where 38.2% of the patients knew that TB is contagious disease and much better findings were reported in Egypt, Iran, Yemen, Iraq, Somalia, and Syria where the majority (about 75%) of the patients knew that TB is a contagious disease (WHO-EMR, 2006). This is key information that should be well communicated to the community to cut the chain of transmission of the disease. A significantly lower level of knowledge about TB disease was reported in our study

population that could lead to delay in seeking of health care, compared to other developing countries. This highlights the need for better community health education in Nepal.

A better knowledge proportion (>80% in both sexes) was recorded for curability of the disease, which is very similar to other developing countries (WHO-EMR, 2006). A strong emphasis on health education is therefore recommended to provide basic knowledge about the disease and to reduce the burden of stigma. It could improve the timely help seeking behavior.

5.5 Length and determinants of patient delay by gender

5.5.1 Length of patient delay by gender

Patient delay can occur during the process of recognizing symptoms, determining if one is ill, assessing the need for medical help, and overcoming personal, social, and physical barriers to obtaining care (Eastwood & Hill, 2004). The median duration between onset of symptoms and help seeking behavior significantly varied between male and female patients. The overall median patient delay was 55 days, and it was 45 days for male and 60 days for female patients. Corresponding findings were reported in Vietnam 7.9 weeks for women and 7.6 weeks for men (Long et al., 1999), and in United Kingdom it was 26 days for males and 50 days for females (Paynter et al., 2004). Nevertheless, studies from Teheran (15.5 weeks for male and 10.5 weeks for female) (Masjedi et al., 2002), and Turkey (35.2 days for male and 25.7 days for female) (Guneyliogiu et al., 2004) reported that patient delay tended to be longer in men than women, while in South India (14 days for male and 14 days for female) (Balasubramanian et al., 2004) and Australia (median 27 for male and 30 for female) (Ward et al., 2001) there were no gender differences in patient

delay. It suggests that patient delay is influenced by gender (rather than sex) and gender related roles in different settings and societies. It is also a reflection of how the health system treats the issue of gender equity and equality to health in different county.

5.5.2 Determinants of patient delay by gender

A variety of factors have been identified as the leading causes of patient delay in seeking help: including female gender, subject's occupation, education, self suspecting symptoms as of TB, self decision for medical help, chest pain leading to a decision for seeking medical help, perception of being isolated, that coughing is not a serious matter, HIV positive status, and loss of income. We found the factors i.e. self suspecting symptoms as of TB, and self decision to seek medical help, were strongly associated with reduced duration of patient delay, and factors perception of being isolated and loss of income were associated with increased duration of patient delay for females. For males, higher education level and self suspecting symptoms as TB were found to be associated with decreased duration of patient delay, and perception that coughing is not a serious matter, HIV positive status, and loss of income were found to be associated with an increased duration.

5.5.2.1 Gender

The median patient delay was significantly longer among females than among males. This differential is at least partly explained by gender inequalities due to lack of economic and social independence in the family and the community, autonomy in decision making for medical help, access to TB information sources, and educational opportunities. The heightened risk of longer delay in help seeking among females is also exacerbated by increased prevalence of TB associated

stigma (social isolation/rejection) in the community. It could be further explained by lack of health system responsiveness to gender issues. Such differences are particularly unjust because they increase disadvantage in females, who are already at a disadvantage by virtue of their underlying social position. Thus, TB control programmes could reduce the disparities in accessing DOTS services by organizing regular awareness and educational activities at local level using formal media as well as former TB patients as ambassadors, with selective focus on improving conditions of females.

5.5.2.2 Socio-economic status

Less educated patients were more likely to have longer patient delay among both males and females. In females, shorter patient delay was observed among farmers than non-farmers. They were more likely to have less education and most of them were illiterate. Thus, we could predict that low level of education among the TB patients further constrains to their access to health education on TB and its treatment and lack of understanding of the importance of early help seeking in both male and female gender. Similar observations were made in studies from China (Xu et al., 2005), India (Sudha et al., 2003) and Tanzania (Wandwalo, 2000). However, a study in Turkey reported that gender and education level had no significant effect on patient delay (Guneylioglu et al., 2004).

5.5.2.3 Recognition of the symptoms as of TB

Ability of early recognition of symptoms as of TB was strongly associated with reduced duration of patient delay in both sexes, especially with female gender. It could be explained by the fact of heightened literacy (64.2%), and awareness about TB (more than half knew the route of TB transmission) and its

treatment (knew TB is a curable disease- 87%) among female patients those reported to have recognized the symptoms as due to TB by themselves. Although, these figures only represent one third of the female (34.2%) patients, it suggests that improved knowledge and awareness on TB would likely enhance the ability to recognize the symptoms earlier and seek help sooner. Studies in Ethiopia (Demissie et al., 2001), India (Balasubramanian et al., 2004), Mexico (Alvarez et al., 2001), Nigeria (Enwuru et al., 2002), Pakistan (Khan et al., 2000), and Thailand (Ngamvithayapong et al., 2000) demonstrated that patients with higher education levels and with high knowledge about symptoms of TB are more likely to seek care earlier. However, a study in India (Singh et al., 2002) suggested that knowledge was not sufficient to prompt people to seek care, and that motivation was necessary, too. Thus it could be discussed that the majority of the patients, females in particular, were being missed by health promotion programmes and consequently had lower levels of knowledge and awareness of TB symptoms and therefore they could not recognize the symptoms as early as possible. Similar observations were made in a Chinese study (Lath, 2004). One could easily notice that the health system, i.e. NTP, often takes a passive role towards those who are unaware of their services or are not accessing them. The acting National Director of the Zambian National AIDS Council says: "the drugs are available to both men and women – I don't know why women are not accessing them" (Geloo, 2005).

5.5.2.4 Women's autonomy to decision making for medical help

In many countries, men continue to continue to play a dominant role in women's health-related matters. Since men are decision makers and in control of resources, they decide when and where woman should seek health care

(Rani & Bonu, 2003). Women suffering from an illness report help seeking less frequently than do men (Ahmed et al., 2000). The low status of women prevents them from recognizing and voicing their concerns about health needs. Our study showed that a self-decision to seek help was taken by only 35% of the female patients after suffering with TB symptoms for about 30 days, while this percentage was about 50% for male patients. Interestingly self decision was made by only 18.1% of the female patients whereas it was 71% for male patients. About 56% of the female reported their reasons for delaying decision and help seeking was dependency on the head of the family (generally on man) and 26.2% cited it was due to lack of money. A study in Pakistan reported that women and children need to seek the permission of the head of household to go to health services (Alix-Dance, 2003).

It has been hypothesized that women who are empowered have greater ability to make decision for medical help earlier. Thus female's autonomy for decision making for their health needs is crucial. Our study presents strong evidence that female's autonomy in decision making for medical help was highly associated with reduced duration of patient delay than those with lower or no autonomy, however, which was not observed among male patients. In our analysis, when socio-demographic variables (e.g. occupation, level of education) clinical variables (e.g. chest pain, cough up blood), stigma related components (e.g. perceived to be isolated, acquired TB due to sinful act), perception variables (coughing is not a serious matter), smoking behavior and HIV status were included in the models, the significance levels of women's autonomy in decision making for medical help remained highly statistically significant, suggesting that this autonomy explains more of the risk of patient delay than other variables. Characteristics associated with

patients reported to have autonomy for self decision making for medical help were: literacy rate 72%, being married 58.1%, main income earner in the households 41.9%, student 23.3%, government service holder 4.7%, and merchant 11.6%. Their knowledge status: 35% knew coughing for 3 weeks or more is the main symptoms of TB, 26% knew that cause of TB is bacteria, 63% cited the route of transmission is droplets, 93% knew that TB is a curable disease, and 65% knew DOTS makes completely cured. However, the prevalence of dependency 3.4%, lack of money about 11%, ever smoking 11.3% and HIV positive status 0% was found among them. Education of women can bring respect, social liberty, and decision making authority in household chores. Women's autonomy would be enhanced by providing health education and organizing health promotion activities regarding symptoms of TB, its transmission, cause and its treatment among the community, family, and as well as among different types of providers. These activities would be more gender specific targeting men to change their behavior toward at the helpless female TB patients and focusing females to encourage prompt action to seek TB care. If they do this, they will protect their children, family, friends, and community from TB.

5.5.2.5 Socio-cultural beliefs

Socio-cultural beliefs play an important role in determining the help seeking behavior of female patients suspected of tuberculosis as has been demonstrated in our study. The fear of social isolation is associated with an increased likelihood of hindering patients from seeking early health care (patient delay). From the findings in focus group discussion, DOT providers noted that fear of isolation and feeling ashamed of having TB can lead to rejection or a potential diagnosis and delayed voluntary presentation in female patients. Focus group discussion among

community people revealed that shame and embarrassment can lead to reluctance on the part of women to share disease condition with family and health providers and this prevent them from reporting to health services for the diagnosis and treatment of TB. In the focus group discussion among TB patients, women participants expressed fear of losing the opportunity for unmarried sons and daughters to get married and themselves losing their husbands. This negative perception about TB and TB associated stigma would prevent them from seeking early diagnosis and treatment of TB. Some authors noted that besides contributing to a worsening of the quality of life for people with TB (Hudelson, 1996; Jaramillo, 1999), stigma plays a role in most stages of the disease – from acknowledging symptoms and seeking care to being labeled as cured (Rangan & Uplekar, 1999). In societies in which women occupy a lower status, the social consequences of a TB diagnosis may result in under-treatment and increased mortality (Holmes et al., 1998; Hudelson, 1996). Similar observations were documented in other developing countries. In studies in Vietnam (Long et al., 1999b), Pakistan (Agboatwalla et al., 2003), Tanzania (Wandwalo et al., 2000), and Mexico (Rubel & Garro, 1992) documented that fear of social isolation from family and community is a key factor contributing to longer delay among women. Studies in India have shown that married women delay seeking treatment or do not disclose their diagnosis to their husbands out of fear of being deserted (Connolly & Nunn, 1996; Nair et al., 1997; Rajeswari et al., 1999). In India and Pakistan, single women with a history of TB face fewer opportunities for marriage (Barnhoom & Adriaanse, 1992; Jaramillo, 1998; Liefooghe et al., 1995; Rangan & Uplekar, 1999). Thus, we could conclude that women more often than men, face very situations regarding TB-stigma. Fear and stigma can promote denial, undermine self-esteem and prevent timely help

seeking, diagnosis and treatment of TB. Lack of knowledge about TB and its treatment characteristics could thus be related to experiences of stigma and lead to disempowerment regarding the perceived available choices for help seeking. This type of behavior would be more prevalent, where limited access to information sources, knowledge and messages promoting behavioral change that would help dispel stigma are not effectively disseminated and where female literacy and education levels are low.

5.5.2.6 Knowledge and perception about TB

The prevalent perception about coughing as not a serious matter, most of the time it is self recovered was significantly associated with an increased duration of patient delay both in male and female patients in the bivariate analysis and it remained significant with male and not with female gender in multilevel analysis. More than 85% of the female and more than 80% of the male patients attributed TB to causes such as smoking and consumption of alcohol (more common in males), cold, indoor fuel smoke, heredity or poor diet (more common in female) which often resulted in delayed care-seeking. It could be lack of knowledge and awareness about TB and its treatment, may lead patients to dismiss symptoms as unimportant or to attribute them to other conditions, as mentioned above. If such perceptions are prevalent among the suspected TB patients, they could contribute further to lack of awareness of the importance of early detection and treatment of TB, despite the fact that TB treatment is widely available and often provided free of charge.

This has important implications for TB control. Studies from other countries examining how a local culture interprets TB causes and symptoms help providers understand why people delay seeking treatment. In Thailand, research indicates that some people, associating their TB symptoms with HIV/AIDS (Ngamvithayapong et al., 2000). In Kenya (Liefooghe et al., 1997), Philippines (Auer et al., 2000), Pakistan (Liegooghe et al., 1995), patients attributed TB to causes such as smoking, alcohol drinking, hard work, family disease rather than one affecting the individual, and, thus, delayed seeking treatment for their harmless symptoms.

5.5.2.7 HIV

"We cannot win the battle against AIDS if we do not also fight TB. TB is too often a death sentence for people with AIDS", (Nelson Mandela, XV International AIDS conference, Bangkok, July 2004). It informs us that there is an urgent need to find the TB cases and put them on treatment as early as possible among the HIV positive community and find the HIV cases among the TB community and treat them at the earliest point at which they have need. However, the story would be different with a patient with a triple burden, i.e. HIV, TB, and stigma. Individuals can be discriminated against and ostracized by families and communities, as well as institutionally, politically, and legally. They would be prevented from accessing TB/HIV services in time. In this scenario, we have also observed significantly longer median patient delay among patients whose HIV status was positive than those whose HIV status was unknown (male; 110 vs. 40 days, female; 162 vs. 60 days). It also remained one of the significant risk factors associated with an increased duration of patient delay in the multilevel analysis. It could be due to the high prevalence of TB

and HIV related stigma in the community, poor socio-economic status, and lack of awareness about TB and its treatment. Our findings are consistent with the studies of Ngamvithayapong et al. (2000), Rubel & Garro (1992), Alonzo & Reynolds (1995) and Johansson et al. (2000).

5.6 Magnitude and determinants of health system delay by gender

Health system delay was mainly attributed to delayed diagnosis rather than delayed treatment as the latter did not exceed 3 days in either male or female gender. The median duration between the first help seeking behavior and receiving diagnosis was 34 days for female and 29 days for male patients. A previous study in a rural district in Nepal reported similar results i.e. 1.3 months for female and 0.8 month for male (Yamasaki et al., 2001). Studies in other developing countries reported similar findings to ours. Turkey 19.1 days (mean) for male and 26.6 days for female (Guneyliogiu et al., 2004), South India 30 days (median) for male and 37 days for female patients (Balasubramanian et al., 2004) and United Kingdom 26.5 days (median) for male and 41.5 days for female patients (Paynter et al., 2004). However, longer health system delay was reported in Teheran,74 days for male and 112 days for female (Masjedi et al., 2002), while in Australia there were no gender differences in health system diagnosis delay (22 vs. 23 days) (Ward et al., 2001).

We observed that diagnosis delay was the main contributor to the health system delay in our setting. Treatment delay was considerably shorter than health system diagnosis delay. Thus the analysis of diagnosis delay was our prime concern. Female gender was not found significantly influencing health system diagnosis delay. Even so, total diagnosis delay was longer in female patients. This study showed that visiting several health care providers was significantly associated with longer

diagnosis delay in both sexes. More than two thirds (72.3%) of male and more than half (58.0%) of female patients consulted at least two health care providers before being diagnosed with TB and a median of 2 health care providers were consulted by each patient, some patients even consulting 6 health care providers. In spite of frequent consultation with the different health care providers, the final diagnosis of tuberculosis was made by the NTP (government medical establishments and NGOs) coverage institutions in 86.3% of male and 74.7% of female cases after the long journey of help seeking. The factors contributing to this included frequent consultations with less qualified individuals, i.e. traditional healers and pharmacists, and local government medical organizations, and lack of advice to obtain sputum testing, and it was particularly seen in female cases. It is NTP policy that all patients who present at health care providers with a prolonged cough (i.e. of more than two weeks duration) should be tested for pulmonary TB through direct microscopy examination (NTP, 2005). It appears that this policy is not communicated well, and that health care providers may not be adhering to it conscientiously. Previous research in rural area of Nepal reported that longer patient delay in women was contributed to by consultation with traditional healers (Yamasaki et al., 2001). Our results are also in agreement with reports from other countries. In Pakistan (WHO-EMR, 2006), Tanzania (Wandwalo et al., 2000), and Gambia (Liam & Tang, 1997), a longer health care provider delay was seen, when patients consulted traditional healers or drug sellers or alternative health care providers. Visits made to multiple providers contributed to longer diagnosis delay was also documented in the Indian (Rajeswari & Chandraskaran, 2002) and Pakistani study (WHO-EMR, 2006).

Visiting private sector medical establishments e.g., private physician or private nursing home or private pharmacy at any time prior to TB diagnosis was significantly associated with reduced duration of diagnosis delay among female patients. The great majority of the female patients (59.4%) made their first contact, evidently because of easy access, convenient time and ability to keep the disease secret, compared to 17.4% in the public sector health institutions, while 38.2% of the male made their visit to public sector first. It is worth noting that the median frequency of visiting private practitioners was 2 compared to traditional healers 5 and public health facilities 3 among female patients. These differential figures are largely explained by the gender inequalities in the utilization of public health facilities.

However, the encouraging news is that TB diagnosis was made more quickly among those who visited in the private medical system in females. It could be explained by heightened awareness of NTP diagnosis and treatment policy among the private practitioners through the public private partnership programme of the NTP. The provision of regular training and orientation to the private practitioners, private pharmacists, and drug sellers in the NTP (NTP, 2005) is further attributed to the fact that private health care providers have a high index of suspicion for tuberculosis. and adhere to the NTP DOTS based guidelines in diagnosis of suspected TB cases and diagnosis could be made quicker than government sector (median 3 vs. 4 days in female patients), and referral duration to DOTS centre for treatment was similar with government sector. Factors contributing to this also included welcoming patient with respect, and more convenient and accessible working hours. In this environment, patients are more likely to provide the detailed and candid history of suffering. This

could contribute a great deal to help physicians to apply proper diagnosis method, i.e. sputum test.

In contrast, longer health care provider delays have been seen in Gambia (Eastwood & Hill, 2004), Bostwana (Steen & Mazonde, 1998) and Ghana (Lawn et al., 1998), and have been attributed to poor access to health services, and prior visits to private health care providers. Studies carried out by WHO-EMRO in Pakistan, Iran, Iraq, Egypt, Yemen, Somalia and Syria also reported that health care system delay was longer when patients visited the private health system (WHO-EMR, 2006).

In our study, longer health system diagnosis delay was observed in female patients who visited public health facilities, or traditional healers, at any time prior to TB diagnosis. It suggests that TB diagnosis can be delayed due to referral procedures. TB diagnosis is only available in the hospital or primary health care centre, but patients often start their health care seeking from the general health system. Moreover, a visit to the hospital is not an easy trip for the poor potential TB patients, considering the travel expenses, time and expenses for accompanying persons. Furthermore, more than two trips are required for patients with a smear-negative result or smear result with 1+ to have repeated smear tests. We observed that the first smear-result was either negative or only minimally positive (1+) in approximately 60% of the female patients. The median number of visits to government medical establishments' diagnosis centre was 4 for female patients, while it was only 2 for male patients. This suggests that the rigid procedures of the TB control programme may lead to delay in TB diagnosis. It would be minimized only if a patient suspected of TB is counseled about the importance of sputum test, production of quality sputum and presentation with sputum specimen in the diagnosis centre when they visit.

Government primary health care centres or hospitals are open only during limited working hours, and their usefulness may be limited even if they are geographically accessible. Waiting time more than 2 hours in the diagnostic facilities was associated significantly with an increased duration of diagnosis delay. About half of the male patients reported to work in the private sector and most of them were laborers. Males were also considered bread winner or pillar in the households, as pointed out in our qualitative study. Thus it could be explained by the fear of losing jobs and income if they away long time from work. The inaccessibility and unfriendliness of public health sector services can also contribute to delaying diagnosis and treatment of TB patients.

The weak linkage between traditional healers and the public health system also contributes to longer diagnosis delay. Patients who visited traditional healers either at first or at any time prior to TB diagnosis were more likely to have longer diagnosis delay in our study. This was more prevalent in female patients. The average cumulative frequency visiting traditional healers was 5 for female and 3 for male. About half of the female patients sought care at first from the traditional healers. It is very striking here that none of them were referred to DOTS centre for further investigation and treatment by the traditional healers. It shows the non-existence of TB control programme among the traditional healers where majority of female TB suspects sought care first for their TB related symptoms. A previous study in Nepal (Yamasaki et al., 2001), and studies of other countries such as Tanzania (Wandwalo et al., 2000) and Malawi (Salaniponi et al., 2000), reported that traditional healers were the first contact, as well as representing a risk factor for longer diagnosis delay.

The cost of time spent accessing treatment services can also act as a barrier to access. This includes both time lost due to illness and the time spent at the health care providers and the time required for travel, which is time not spent in productive or reproductive labor. Our study showed that female patients who were more likely to have less education, lack of information and knowledge about TB and its treatment, and highly associated with TB related stigma, consulted traditional healers, pharmacists, local public health system, where diagnosis facilities are rarely available. Due to poor information about TB and its treatment, and stigma, they could be prevented from going directly to the DOTS centre. As a result, they not only lost income due to spending uncompensated time seeking care from poorly qualified health care providers, but also further delayed diagnosis and treatment, and thereby remained a source of TB transmission in the community.

A significant risk factor for long health system diagnosis delay in our study was stigma i.e. feeling of hiding TB diagnosis among female and acquired TB due to sinful act among male patients. Similar observations were made in studies carried out by WHO-EMRO in Pakistan, Iran, Iraq, Egypt, Yemen, Somalia and Syria (WHO-EMR, 2006). Knowledge on TB and its treatment could enhance the ability of reduction of diagnosis delay. Awareness about the route of transmission of TB i.e. droplets contributed to reduced duration of diagnosis delay in male patients.

5.7 Magnitude and determinants of total diagnosis delay

The TB programme of Nepal recommends that a person with a cough of more than two weeks' duration should have a sputum test for early diagnosis and treatment of tuberculosis under directly observed treatment therapy. In our study, we observed that the median duration between the onset of symptoms and diagnosis was 111 days

for females and 92 days for males. This is unacceptably long, particularly in females but also in males. This is longer than that reported from other countries: in studies from Vietnam (Long et al., 1999a), Malaysia (Hooi, 1994), Korea (Mori et al., 1992), South Africa (Beyers et al., 1994), Australia (Pirkis et al., 1996), total diagnosis delay from first symptoms to diagnosis was between 8 and 12 weeks.

The total diagnosis delay of tuberculosis was longer for females than males. This difference was explained by a difference in delay on the patient as well as provider sides. The delay in contacting health care providers (patient delay), as well as the delay to diagnosis from the first contact with any health care provider (diagnosis delay), were statistically significantly longer for females. In our multilevel analysis gender related factors such as chest pain leading to decision making for medical help, perception of coughing as not a serious matter, HIV positive status, and seeking care from more than one provider before diagnosis were invariably significant risk factors for total diagnosis delay. We also observed that both male and female patients rarely sought health care from DOTS centres as their first choice. We obtained information from our qualitative study, that this could be due to fear of the social isolation and stigma attached to TB and HIV as well as other factors such as poor understanding and under-evaluation of the symptoms, or poor accessibility and availability to the DOTS centres. This could also be explained by the fact that about half of the female patients (47.7%) cited that they delayed visiting the diagnosis centre because of lack of awareness about TB diagnosis and treatment; about 30% of the female patients said they were not allowed to go alone to the centre where they finally got TB diagnosis. Lack of money was invoked by 30% of the females and only 16% of the males.

Education was significantly associated with reduced duration of total diagnosis delay, promoting patients to seek timely health care. Factors such as ability of self suspecting symptoms as of TB, and self decision making for medical help were significantly associated with reduced duration of total diagnosis delay. In our qualitative study, we found that some people explained that help seeking behavior was strongly influenced by family structure and gender roles in the family. We observed that female patients with higher education, who had a autonomy in making decision for medical help, and who had awareness about symptoms of TB were more likely to contact health care providers earlier than those who did not.

The median total diagnosis delay was about 3 weeks longer in females than in males. 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. Longer diagnosis delay among women has even more adverse effects as the health and welfare of children and other household members (Hudelson, 1996). One untreated smear-positive patients can infect 10-14 persons over a 12 month period (Murray et al., 1990). This is one of the threats to the primary objective of the NTP, to reduce TB prevalence among the community. The observed difference in this study is due to poor TB awareness and educational activities force the patients to delay attempt for help seeking, and also indicates a difference in referral to sputum microscopy and diagnosis process among the health care providers where women sought care first.

While a number of studies have addressed delay in general, only a few have studied gender differences in delay. Studies in Vietnam (Long et al., 1999a), and Japan (Sasaki et al., 1995) reported that provider's and doctors' delay was longer in

female than in male patients. However, studies from Malaysia (Hooi, 1994) and another study in Japan (Niijima et al., 1990) reported that total diagnosis delay tended to be longer in men than women, while in Australia there were no gender differences in total diagnosis delay (Pirkis et al., 1996). Hence, our findings regarding gender and delay are consistent with some, but not all, previous studies. This could be a reflection of different gender roles in different settings and communities as well as difference in addressing gender issue by health system in the particular country.

In summary, total diagnosis delay was unacceptably long for both females and males, particularly females, and particularly patient delay.

5.8 Magnitude and determinants of total delay

The median duration between onset of symptoms and treatment was significantly longer in female than male patients (116 vs. 95 days). It was found much longer than in the previous study in Nepal (99 vs. 69 days) (Yamasaki et al., 2001). It was reported longer total delay among female than male (93 vs. 77.5 days) in the study carried out in United Kingdom (Paynter et al., 2004), while significantly shorter total delay was mentioned among female than male (90 vs. 120 days) in the study from Brazil (Martinho et al., 2005). Various mean delay durations were reported from different countries: 60 days from India (Rajeswari et al., 2002), 87.5 days from Malaysia (Sherman et al., 1999), 100 days from Pakistan (WHO-EMR, 2006), 79.5 days from Somalia (WHO-EMR, 2006), and 127 days from Iran (WHO-EMR, 2006).

We observed that patient delay was the major contributing interval to the total delay in females. Patient delay constituted about 67% of the total delay among female patients while it was only 42% among male patients. Median treatment delay was quite short both in males and females. Even so, there was considerable variation in

treatment delay; mean treatment delay ranged 2.38 to 11.35 days by DOTS centre. Thus is an area for further consideration. Only less than 10% of the patients (female 6.8%, male 8.7%) initiated treatment within 30 days after onset of TB symptoms. One third of female patients (35.9%) initiated DOTS treatment within 3 months after onset of TB symptoms, while the corresponding figure for their male counterparts was 48%. It could be due to the other gender related factors such as lack of knowledge and awareness about TB symptoms that leads delaying recognition of symptoms and help seeking, lack of decision making power in the households for medical help, HIV positive status, visit to several providers and stigma associated with TB were significantly associated underlying predictors of total delay. Socio-economic factors such as education was found a protective factor, promoting patients to seek early health care. Some of the underlying predictors to total delay of our study were consistent with the studies from Syria, Iran, Iraq, Pakistan, and Yemen; explained that TB associated stigma, inadequate knowledge the disease and poor satisfaction with care were significant predictors of total delay (WHO-EMR, 2006).

Assessment of the delay in initiating treatment after onset of symptoms brings forth the important point that female patients who consult traditional healers and general health services at first tend to be delayed diagnosis and treatment. The underlying causes are discussed above. Lack of continuing TB education especially among traditional healers and private pharmacies contributes to poor knowledge and therefore poor ability to immediately refer a suspect of tuberculosis to DOTS centre. Patients' repeated visit to diagnosis centre, and long waiting time at the centre could contribute to be back private medical system. It is worthwhile to note here that private physicians were found a protective factor, offering TB diagnosis sooner than in the

public sector among female patients. Thus there is a dire need to integrate the private health care sector including traditional healers with the mainstream public health intervention: DOTS. There is also need to strengthen the laboratory established in Primary Health Care Centre so as to have more treatment and diagnostic facilities in the peripheral centres to offer easy access for the patients. Moreover, there is also need to decentralize the TB control activities to the peripheral health units and therefore they will be responsible to make public awareness about TB and its treatment.

5.9 Economic burden

TB is a major public health problem especially in developing countries. It affects mainly productive and reproductive segment of the population (mostly age between 15 and 59). They are also the parents on whom the survival and development of children and, to an increasing extent the elderly, depend. The present study also documented that 84% of the female and 77% of the male patients were between the age of 15 to 44 years old with mean 34 for male and 30 for female. The corresponding proportion was very similar with the report of Nepal NTP (NTP, 2005). Moreover, 61% of the male and 20% of the female patients reported to be a main income earner for the household. It is a great concern how an ill mother suffering with TB make her children healthy. Thus tuberculosis has the potential to obstruct the development of both individuals and the society (Connolly & Nunn, 1996).

The mean direct cost attributed to consultation, diagnosis and medication of for TB related symptoms was Rs. 2, 077. Direct costs were highest by 20% among female (Rs. 2,306) than male (Rs. 1,933) patients. Direct costs were lower among patients attending public health care facilities, and were 6 times higher among patients

attending the private sector (sum of costs paid to private physician, private nursing home, traditional healers, and private pharmacy) in both male and female patients. A significant number of patients (female about 75% and male about 87%), although ultimately diagnosed in DOTS centres, incurred heavy expenditure while seeking a diagnosis in the private sectors including traditional healers. It could be due to the fact that a considerable proportion of female patients (81%) made their first visit to private sectors (includes traditional healers) in seeking remedies for their symptoms. Female patients often had several encounters with different providers in the traditional healers, private and public sectors (on average 7.05). Thus reducing the number of health encounters before diagnosis could be one strategy to reduce patient direct cost. These observations hint that although diagnosis and treatment of tuberculosis is offered free of charge to patients attending DOTS centres, a substantial financial loss is incurred prior to attending a DOTS centre. Our findings are consistent with studies from India (Rajeswari et al., 1999, Needham et al., 2001, Lonnroth et al., 2001b).

Our study presents strong evidence for the need to integrate private practitioners, including traditional healers and private pharmacies, into the DOTS system of the National Tuberculosis Control Programme. The costs incurred due to the poor follow up of standard diagnosis and treatment procedures among the private practitioners, and delayed referral behavior among traditional healers, could be minimized only if they were convinced to follow the standard policy of TB suspects, diagnosis and treatment with respect their contributions by the NTP.

Non-medical expenditure (costs incurred in travel, food, and special food) also entails a disproportionate burden on the TB patients, especially on poor female patients, as this is also expenditures for out-of-pocket patients. The average non-

medical cost was about US$ 5 (Rs. 314) for both male and female patient. This cost is lower than that incurred by Zambian (Needham et al. 1996) and Indian (Rajeswari et al., 1999) patients. It could be explained by the fact that our study is mainly on urban setting where a TB diagnosis service is available with median distance of 6 kilometers and about two thirds of them reported, it was accessed within 30 minutes of traveling time by bus. However, the cost would have a grate impact on poor female patients.

With tuberculosis, there is loss of productivity and loss of income. The average indirect cost observed for employed patients was Rs. 5706 (US$ 81.5). This cost was higher by 10% among female (Rs. 6070) than male (Rs. 5555). The mean lost income due to TB prior to start of TB treatment was 150% of the mean monthly income of the female patients, and more than two thirds of them were daily paid laborer. The mean work days lost was 55 among female and 38 among male patients prior to start of TB treatment, and it was 45 days for all patients. This is an indirect indicator of the delay in establishing a diagnosis in these patients as reported by Rajeswari et al. (1999). Similar but general, not gender specific, observations were made by the study from Indian (Rajeswari et al., 1999), and Uganda (Saunderson, 1995), while the very lower days lost (12.5 to 20) was reported from the study of Zambia (Needham et al., 1996). We found loss of work days was highest among female farmer patients (93 days). These observations underscore the need for effective educational and advocacy activities, with especial focus on early diagnosis for the female in Nepal.

In the present study, the average total cost was Rs. 4566 (US$ 65.2) prior to start of TB treatment with DOTS. It was Rs. 4381 (US$ 63) for female and Rs. 4682 (US$ 67) for male patients. Interestingly, the cost represents 109% of the mean

monthly income of female patients, and the corresponding figure for males was 84.1%. Although aggregate costs for females tend to be lower in real terms than costs for males, costs relative to monthly income are much higher for females than males. NTP Nepal receives about 35,000 TB cases every year (NTP, 2005). The national loss per year due to expenditure prior to receiving TB treatment (not included caregiver cost, and providers cost) calculates at Rs. 160 millions (US$ 2.3 millions). Furthermore the indirect costs for unemployed persons have not been analyzed and not included in the estimations. It is a great implication for TB control programme. It would be a huge barrier for poor TB patients, especially poor female TB patients, to make advances in early help seeking and early TB diagnosis. DOTS has been reported a cost effective strategy in TB control comparing the cost effectiveness of different primary health care interventions (World Bank, 1993). It has been estimated that now the cost for a basic course of treatment is about US $10 compared with US $40-60 in the early 1990s (Stop TB Initiative, 1999). One could say it is a cost-effective strategy, producing significant savings for governments and achieving higher cure rates if only patient enrolls voluntarily into the system. But it apparently does not take into consideration the costs incurred by patients before enrolling in the system. The willingness to prompt seeking help could be pressed by the potential expenditures occur during the help seeking journey, particularly poor females who always resource scare. The free supplies of anti-tuberculosis drugs alone may not be sufficient to improve the early case detection and early treatment. Our findings disclose an urgent need to NTP for collaborative actions with community people including former TB patients, private sector and other community based organizations to promote health educational activities, expansion of DOTS with microscopy facilities (it reduces the

travel cost, loss of work days, unnecessary diagnosis and treatment cost), and active information and communication for the maximum and timely use of the DOTS facilities at the local level.

5.10 Recommendations and policy implications

- To address gender inequalities in access to DOTS centres and to increase case detection among women, NTP should have to put more efforts by integrating DOTS services with other existing health services at all levels.
- Efforts should be made to increase public awareness about the symptoms of tuberculosis and about the importance of early care seeking behavior, by including development of behavior change communication audio, visual, and print materials, especially targeting women.
- Efforts should be made to increase public awareness about the availability and location of free TB diagnosis and treatment services.
- Efforts should be made to educate both public and private physicians, and other paramedics, about the need to maintain a high index of suspicion of tuberculosis and rapidly performing appropriate tests or immediately referring to DOTS centres. Sputum must be examined in all patients with persistent cough, and negative investigations should be repeated.
- Patients must be counseled on the importance of sputum tests and production of quality sputum.
- Effective collaboration should be developed between private and NTP providers to ensure an effective public private partnership.
- Training and retraining of both private and public health care providers about tuberculosis at regular intervals should be instituted.

- Efforts should be made to involve private medical establishments in DOTS monitoring and evaluation process at regular intervals.
- Efforts should be made to develop a network of former cured TB patients at all DOTS centres, and to utilize them as DOTS advocators/ambassadors at the community level.
- The various delay durations identified in the present study should be incorporated into routine surveillance reports. Date of symptoms onset and date of first contact to any type of providers would be recommended to incorporate in the TB treatment card as well as TB register. This would allow monitoring of the effectiveness of the interventions and control measures in reducing the duration of delay, hence reducing the transmission and burden of tuberculosis in the community.
- Improve quality of care at public health facilities, focusing on reducing waiting times and better inter-personal quality of care, in order to attract patients from the private to public sector and reduce direct costs. Building community and patient trust in lower level public facilities is a key challenge.
- Invest in health services that are closer to clients (WHO, 2001), to reduce excessive transport and time costs, and also to reduce the direct medical costs incurred at private providers including traditional healers.
- Decentralization of DOTS services may reduce patient costs substantially, but range of service delivery capacities need to be in place before decentralization can be implemented effectively.