CHAPTER IV

RESULTS

4.1 Quantitative study results

Background

This analytical study was carried out in an area of the Kathmandu valley of Nepal, which has a population of 1.7 million, between January and August 2006. There are 61 DOTS centres in the study area where TB is treated free of charge. This study was conducted in 37 of these centres, selected randomly. Most people are able to reach to the DOTS centres within 20-30 minutes. In the public medical establishments, only patients with cough for more than 2 weeks are entitled to sputum smear examination for diagnosis of TB. There is no attempt to find individuals with symptoms in the community (no active case detection). Almost all the subjects were interviewed within a month after starting treatment. Face to face interviews were made with the study subjects using a structured questionnaire. There were 674 eligible patients enrolled during the study period; 58 (8.6%) of these declined to take part in the study. Thus, the study included 616 new sputum smear positive pulmonary tuberculosis patients, of whom 379 (61.5%) were males and 237 (38.5%) were females, enrolled in the selected DOTS centres.

4.1.1 Patients' profile

About two thirds (65.2%) of the male and more than half (61.2%) of the female patients were from Kathmandu district, 25.1% of the male and 30% of the female participants were from Lalitpur and 9.8% of the male and 8.9% of the female patients were from Bhaktapur districts. Diagnosis was made in the government medical establishments for 52.0% of male and 44.7% of female patients. About three-quarters of subjects were reported to be the resident of urban areas (75.7% of males and 73.8% of females).

Of the 616 people interviewed, 379 (61.5%) were male (62% of them married), and 237 (38.5%) were female (59% of them married). The mean (SD) age in years was 34.28 (14.90) for males and 30.10 (13.14) for females. Majority of the male (77.1%) and female (83.9%) respondents were between the ages of 13 to 44 years old, which is considered the most productive and reproductive period of the lifetime. More than half of both males (52.0%) and females (58.6%) belonged to the ethnic group Janajati. The median household size was 5 for male respondents and it was 4 for female with the median 2 rooms in the home both for male and female patients.

More than two thirds of male (68.6%) and female (69.2%) were residing temporarily in the study area. Most of them were staying mainly for work. One fifth (19.3%) of the male patients and 40.9% of the female patients had no formal education, while 20.3% of the male and only 12.7% of the female patients had the higher level of education. Regarding occupation, about one third of male patients (32.7%) were laborers, and a very similar proportion of the female patients (33.3%) did house work. Sixty percent of the male and only 19.2% of the female patients identified themselves as the major source of income for their household ($p<0.001$ by

chi-square). The median monthly income was statistically significantly lower in female patients (Rs. 3000 vs. 4850, p<0.001).

Significantly higher proportion of males (62.6%) reported ever smoking, compared to their female (30.7%) counterparts (p <0.001). Similarly, a significantly higher proportion of male (67.6%) patients ever drank alcohol than female (30.5%) patients (p<0.001). More than half of the patients reported they used either kerosene or wood for cooking and heating in both sexes (55.1%). Only 21% of male and 17.4% of female respondents reported they had installed a chimney in the kitchen.

4.1.2 Help seeking behavior by gender

Table 6 shows the majority of the patients had multiple symptoms. The most frequently reported symptom at the outset was cough among 81.5% of the male and 89.5% of the female patients (p=0.008). Similarly it was the main reporting symptom among 89.4% of the male and 93.2% of the female patients.

Table 6: Symptoms at onset of TB, and at any time prior to TB diagnosis

Symptoms	Male, n (%)*	Female, n (%)*	Total, n (%)*	P-value
Symptoms at first				
Cough	309 (81.5)	212 (89.5)	521 (84.6)	0.008
Fever	192 (50.7)	132 (55.7)	324 (52.6)	0.223
Chest pain	147 (38.8)	107 (45.1)	254 (41.2)	0.119
Loss of weight	106 (28.0)	76 (32.1)	182 (29.5)	0.278
Loss of appetite	94 (24.8)	60 (25.3)	154 (25.0)	0.886
Coughing up blood	96 (25.3)	46 (19.4)	142 (23.1)	0.090
Night sweats	48 (12.7)	19 (8.0)	67 (10.9)	0.071
Weakness	9 (2.4)	7 (3.0)	16 (2.6)	0.660
Symptoms at any time				
Cough	339 (89.4)	221 (93.2)	560 (90.9)	0.110
Chest pain	191 (50.4)	132 (55.7)	323 (52.4)	0.200
Coughing up blood	127 (33.5)	64 (27.0)	191 (31.0)	0.089
Fever	269 (71.0)	184 (77.6)	453 (73.5)	0.068
Loss of weight	219 (57.8)	153 (64.6)	372 (60.4)	0.094
Loss of appetite	205 (54.1)	138 (58.2)	343 (55.5)	0.428
Night sweat	127 (33.5)	69 (29.1)	196 (31.8)	0.254
Weakness	9 (2.4)	9 (3.8)	18 (2.9)	0.045
Other symptoms	2 (0.5)	5 (2.1)	7 (1.1)	0.045

*Adds to >100% because subjects were allowed to check more than one symptom. Results are presented in descending order of frequency in females

Table 7 indicates that about two thirds (65.8%) of the female and more than half of the male (54.1%) respondents did not recognize the presenting symptoms as the symptoms of TB disease. The proportion of males who recognized symptoms as TB symptoms was significantly higher than that of females (p=0.004). Of the 81 female patients who recognized symptoms, 34 (42%) reported that former TB patients were the source of suspecting symptoms as TB, while about one third of male patients (31.2%) suspected themselves that the presenting symptoms were of TB. Of the 379 male respondents, more than two thirds (71%) decided to seek medical help where to go by themselves, while this corresponding figure was only 18.1% (43/237) of the female respondents (p<0.001). Cough and fever were found to be the leading symptoms prompting decision to seek medical help.

Table 7: Recognition of symptoms, sources and decision making for help

Variable	Male, n (%)	Female, n (%)	Total, n (%)	P-value
Suspecting symptom as of TB				
Yes	174 (45.9)	81 (34.2)	255 (41.4)	
No	205 (54.1)	156 (65.8)	361 (58.6)	
Source of recognition of symptoms as of TB**				0.001
Former TB patient	43 (24.9)	34 (42.0)	77 (30.3)	
Friend	31 (17.9)	15 (18.5)	46 (18.1)	
Family member	16 (9.2)	13 (16.0)	29 (11.4)	
Self	54 (31.2)	8 (9.9)	62 (24.4)	
Health worker	11 (6.4)	7 (8.6)	18 (7.1)	
Others	3 (1.7)	3 (3.7))	6 (2.4)	
Media	15 (8.7)	1 (1.2)	16 (6.3)	
Decision to seek medical help				<0.001
Self	269 (71.0)	43 (18.1)	312 (50.6)	
Others	110 (29.0)	194 (82.9)	304 (49.4)	
Symptom prompting decision to seek medical help*				
Cough	274 (72.3)	190 (80.2)	464 (75.3)	0.027
Fever	111 (29.3)	90 (38.0)	201 (32.6)	0.025
Chest pain	96 (25.3)	77 (32.5)	173 (28.1)	0.054
Loss of weight	59 (15.6)	47 (19.8)	106 (17.2)	0.173
Coughing up blood	84 (22.2)	46 (19.4)	130 (21.1)	0.415
Loss of appetite	25 (6.6)	21 (8.9)	46 (7.5)	0.298
Weakness	6 (1.6)	5 (2.1)	11 (1.8)	0.631
Night sweat	12 (3.2)	4 (1.7)	16 (2.6)	0.262

*adds to >100% because subjects were allowed to check more than one.** presented based on the frequency of female from higher to lower

Patients were asked to report reasons for delay in making a decision. Forty-three percent of the female patients and 30% of the male patients reported that this was lack of awareness of TB (p=0.002). Of the 237 female patients, 37.6% reported that dependency on the head of the household was one of the reasons for delay in making decision, while this proportion for male patients was only 4% (p <0.001).

Table 8: Reasons for delay seeking medical help by gender

Variable	Male n (%)	Female n (%)	Total n (%)	P-value
Reason for delay*				
Lack of awareness of TB	116 (30.7)	102 (43.0)	218 (35.4)	0.002
Dependent on head of the family	15 (4.0)	89 (37.6)	104 (16.9)	<0.001
Lack of money	45 (11.9)	62 (26.2)	107 (17.4)	<0.001
Lack of family support	9 (2.4)	43 (18.1)	52 (8.4)	<0.001
Busy with work	78 (20.6)	37 (15.6)	115 (18.7)	0.124
Carelessness	106 (28.0)	37 (15.6)	143 (23.3)	<0.001
Maintain secrecy	6 (1.6)	14 (5.9)	20 (3.3)	0.003
Health facility is far	7 (1.8)	12 (5.1)	19 (3.1)	0.025
Fear of isolation	0 (0.0)	7 (3.0)	(1.1)	NA
Others	18 (4.7)	8 (3.4)	26 (4.2)	0.409

*adds to >100% because subjects were allowed to check more than one and presented in descending order of frequency in females.

The health service utilization by patients illustrates patient's pathways in seeking health care. More than 90% of the interviewees visited more than one type of care giver, with median 2 in both sexes. Table 9 shows that 38.4% of the female patients used private pharmacy as entry point into DOTS system while 38.2% of the male patients used public health care facilities as their entry point in the DOTS system. The great majority of male (90.6%) and female (87.9%) patients used a public facility at some point. Of the 54 female patients who visited traditional healers at any point prior to TB diagnosis, 88.8% of them used traditional healers as their entry point into the DOTS system. The mean frequency of encounters to different providers prior to TB diagnosis was significantly higher among female patients than

their male counterparts (7.05 vs. 5.34, $p < 0.001$). The mean frequency of visits to traditional healers was significantly difference between male and female (female 5.19 vs. male 3.0, $p = 0.001$). Only one fifth of the female patients (20.1%) were advised to have a sputum test from the providers whom they visited first, while this proportion was 32.4% for their male counterparts.

Table 9: First treatment seeking and visit to providers at some time prior to diagnosis

Variable	Male, n (%)	Female, n (%)	Total, n (%)	P-value
First treatment seeking*				
Total	379	237	616	
Private pharmacy	122 (33.8)	86 (38.4)	208 (35.6)	0.259
Traditional healers	10 (2.8)	48 (21.4)	58 (9.9)	<0.001
Public facility	138 (38.2)	39 (17.4)	177 (30.3)	<0.001
Private physician	62 (17.2)	30 (13.4)	92 (15.7)	0.222
Nursing Home	27 (7.5)	17 (7.6)	44 (7.5)	0.961
Visit directly to DOTS centre	18 (4.7)	13 (5.5)	31 (5.0)	0.684
Ayurvedic	1 (0.3)	3 (1.3)	4 (0.7)	0.130
Self medication	0 (0.0)	1 (0.4)	1 (0.2)	0.204
Spiritual	1 (0.3)	0 (0.0)	1 (0.2)	0.430
Any time prior to diagnosis*				
Total	379	237	616	
Public facility	327 (90.6)	197 (87.9)	524 (89.6)	0.311
Private pharmacy	141 (39.1)	116 (51.8)	257 (43.9)	0.003
Private physician	92 (25.5)	66 (29.5)	158 (27.0)	0.292
Traditional healers	18 (5.0)	54 (24.1)	72 (12.3)	<0.001
Nursing Home	52 (14.4)	42 (18.8)	94 (16.1)	0.164
Visit directly to DOTS centre	18 (4.7)	13 (5.5)	31 (5.0)	0.684
Ayurvedic	10 (2.8)	8 (3.6)	18 (3.1)	0.585
Self medication	1 (0.3)	2 (0.9)	3 (0.5)	0.311
Spiritual	1 (0.3)	2 (0.9)	3 (0.5)	0.311
Advised for sputum test by first provider				0.001
Total	361	224	585	
Yes	117 (32.4)	45 (20.1)	162 (27.7)	
No	244 (67.6)	179 (79.9)	423 (72.3)	
No. of providers visited				0.002
Total	379	237	616	
One	87 (23.0)	48 (20.3)	135 (21.9)	
Two	192 (50.7)	95 (40.1)	287 (46.6)	
More than two	100 (26.4)	94 (39.7)	194 (31.5)	
Median	2	2	2	

* presented based on the frequency of female from higher to lower

Table 10 shows that more than two thirds of female patients received suggestion for sputum testing from private nursing home where they made their first visit for help seeking, whereas 60% of the male patients received such suggestions from public health care facilities.

Table 10: Types of provider advising sputum test at subject's first visit to provider

Provider *	Male		Female	
	Total Number	n (%)	Total Number	n (%)
Private Nursing Home	27	12 (44.4)	17	12 (70.6)
Public facility	138	83 (60.1)	39	18 (46.2)
Private physician	62	16 (25.8)	30	5 (16.7)
Private pharmacy	122	6 (4.9)	86	8 (9.3)
Traditional healers	10	0 (0)	48	2 (4.2)
Ayurvedic	1	0 (0)	3	0 (0)

*presented based on the frequency of female from higher to lower

Table 11 shows that about half of the female patients (47.7%) cited lack of awareness as their reason for not visiting DOTS centre directly for diagnosis and treatment, while more than one third of the male patients (38.5%) cited such reasons. More than a quarter (29.5%) of the female patients also invoked lack of money and not being allowed by their family to visit the DOTS centre alone.

Table 11: Reason for delay not visiting DOTS centre directly by gender

Variable	Male n (%)	Female n (%)	Total n (%)	P-value
Reason				
Lack of awareness	145 (38.5)	113 (47.7)	258 (42.0)	0.024
Lack of money	63 (16.7)	70 (29.5)	133 (21.7)	<0.001
Not allowed to go alone	27 (7.2)	70 (29.5)	97 (15.8)	<0.001
Treatment from private provider	86 (22.8)	53 (22.4)	139 (22.6)	0.897
Busy with work	102 (27.1)	32 (13.5)	134 (21.8)	<0.001
Blockade of road	33 (8.8)	24 (10.1)	57 (9.3)	0.568
Busy with housework	7 (1.9)	19 (8.0)	26 (4.2)	<0.001
Fear of social isolation	11 (2.9)	15 (6.3)	26 (4.2)	0.041
DOTS centre is far	15 (4.)	10 (4.2)	25 (4.1)	0.883
Taking care of children	0 (0.0)	6 (2.5)	6 (1.0)	NA
Unfriendly behavior of health worker	4 (1.1)	3 (1.3)	7 (1.1)	0.816

*adds to >100% because subjects were allowed to check more than one and presented based on the frequency of female from higher to lower

Table 12 shows that former TB patients were an important source of influence in seeking treatment in females (32.9%), whereas the corresponding figure for male counterparts was only 22%; this difference was significant ($p = 0.003$). Only 16% of the female patients acquired information from the system (public health facilities), compared with 31.8% of male patients ($p < 0.001$).

Table 12: Sources influencing to visit DOTS centre for TB treatment

Variable	Male n (%)	Female n (%)	Total n (%)	P-value
Sources*				
Former TB patients	83 (22.0)	78 (32.9)	161 (26.2)	0.003
Friend	95 (25.2)	68 (28.7)	163 (26.5)	0.340
Public health facility	120 (31.8)	38 (16.0)	158 (25.7)	<0.001
Family member	42 (11.1)	37 (15.6)	79 (12.9)	0.107
Private physician	36 (9.5)	30 (12.7)	66 (10.7)	0.226
Private pharmacy	44 (11.7)	27 (11.4)	71 (11.6)	0.916
Other	11 (2.9)	11 (4.6)	22 (3.6)	0.263
TV	15 (4.0)	5 (2.1)	20 (3.3)	0.204
Radio	15 (4.0)	2 (0.8)	17 (2.8)	0.021
Newspaper	3 (0.8)	1 (0.4)	4 (0.7)	0.575
Traditional healer	0 (0,0)	0 (0.0)	(0.0)	NA

*adds to >100% because subjects were allowed to check more than one item. Data are presenteed in descending order for females.

4.1.3 Socio-cultural characteristics and knowledge and perception about TB and its treatment, by gender

More than half (51.9%) of the female patients and only a quarter (28.1%) of the male patients reported they felt ashamed as having TB ($p < 0.001$). The tendency of hiding TB was signficantly stronger in females (38.4%) than males (24.9%, $p<0.001$). About a quarter of (24%) female and only 13.5% of males felt that acquiring TB was due to a sinful act ($p = 0.001$). Among the married males, 11.8% reported they had not had good relationship with their spouse, while 28.6% of married females reported they had not as friendly relationship with their spouse as before contracting TB ($p < 0.001$). Nearly one third of both male and female patients perceived themselves to be isolated.

Only 41.4% of the females and 43.5% of the males knew that the most important symptom of TB disease is cough for 2 weeks or more. Fewer than 20% of the respondents in both sexes knew that bacteria caused TB. Significantly more males (53.1%) than females (43.0%) knew that TB is transmitted through droplets ($p=0.016$). Females were less likely to know that TB is a curable disease (90.7% male

vs. 83.5% female, p = 0.008). A significantly higher proportion of males (67.6%) than females (54.9%) knew that DOTS could completely cure TB (p=0.001). More males (83.5%) than females (74.7%) perceived that everybody is at risk of acquiring TB (p = 0.028). About 12% of males and 15% of females perceived that coughing for 2 weeks or more is not serious matter.

4.1.4 Summary of characteristics related to accessibility, by gender

Riding the bus was the predominant mode of travel for both male (59.2%) and female (64.1%) patients. Significantly longer median distances were computed (p = 0.002) for female patients (7 km), compared to male (5 km). More female patients (43.5%) spent more than 30 minutes in traveling to diagnosis centre, compared to 30.8% male. More than half (51.1%) of the female patients reported they had to wait more than 2 hours in the diagnostic centre in every visit, this proportion was 44% for male patients. The median travel cost was Rs. 60 for both sexes (1US$ = NR. 70). It of interest that more than half of the male patients (60.5%) received health education for producing a good quality of sputum in their first visit to diagnosis centre, while this figure for female patients was only 40.1% (p <0.001).

The mean distance from patient's current residence to DOTS centre (where patient receives daily treatment) was 1.69 kilometers for males and 2.05 kilometers for females. The mean traveling time to reach DOTS centre was 10-15 minutes. Thus, the majority of the patients walked to receive daily treatment (male 84.4% and female 90.7%).

4.1.5 Clinical characteristics, by gender

Of the 379 male and 237 female patients, 19 (5%) and 12 (5.1%) were found with HIV positive status respectively. The duration of cough was found to be

longer among female patients than males. More than a quarter (27.8%) of female patients demonstrated acid-fast bacilli with only 1+ in their sputum-smear samples, while the corresponding figure was only 5.6% in male patients. It indicates that females' smears were less intensely positive than males' smears. On average, more than two sputum samples were taken in government and NGO establishments, whereas less than 2 were taken in private establishments.

4.1.6 Expenditures incurred prior to start of anti-TB treatment

Direct cost: Table 13 shows that the mean total direct expenditure for consultation, diagnosis and medication of tuberculosis for male and female patients was Nepalese rupees 1,933 and Nepalese rupees 2,306 respectively. The mean direct cost incurred by patients was Nepalese rupees 2,077. These medical costs accounted 34.7% of the mean monthly income for male patients and 57.1% for female patients. Seventy percent of the mean monthly income of the male patients expended to private physician and private nursing home, while this proportion was 92.8% of female patients. Regarding non-medical costs, the mean non-medical cost was Nepalese rupees 321 and 314 for males and females respectively. There was a significant difference between genders ($p=0.021$). It was incurred 5.8% and 7.8% of the mean monthly income of the male and female patients respectively.

Indirect cost: Indirect costs could be calculated only for 169 male and 70 female patients. The mean indirect cost was Nepalese rupees 5,706, (5,555 for mals and NRs. 6,070 for females). The mean lost income due to the illness amounted to 99.8% of the mean monthly income of the male patients, while this loss was 150% of the mean monthly income of the female patients. Of the 169 male and 70 female patients who lost their income, 48.5% and 67.6% were laborers, respectively. The

mean lost income by these patients was NRs 5,074 (male 5,230 and female 4,809). These losses were the equivalent of 98% of their mean monthly income (male 93.9% and female 119.0%).

Total cost: The average total cost was NRs 4,566 (NRs 4,682 in males vs. NRs. 4,381 in females). The average cost of TB to patients was equivalent to 88.2% of patient's mean monthly income. For males, this cost represented to 84.1% of the mean monthly income and it was 108.4% for female patients.

Table 13: Patient tuberculosis cost data

Variable	Male n	Mean	Mean %MMI*	Female n	Mean	Mean %MMI*	All n	Mean	Mean %MMI*
Direct expenditure									
Medical									
Nursing Home	52	2122	38.1	42	2235	55.3	94	2173	42.0
Private physician	92	1790	32.1	66	1515	37.5	158	1676	32.4
Traditional healers	18	1166	20.9	54	1216	30.1	72	1203	23.2
Public facility	327	967	17.4	197	992	24.5	524	977	18.9
Private pharmacy	141	837	15.0	116	752	18.6	257	799	15.4
Ayurvedic	10	229	4.1	8	431	10.7	18	319	6.2
Spiritual	1	10	0.2	2	300	7.4	3	203	3.9
Total medical	379	1933	34.7	237	2306	57.1	616	2077	40.1
Non-medical									
Transportation	280	191	3.4	191	202	5.0	471	196	3.8
Food	128	173	3.1	62	176	4.4	190	174	3.4
Additional food	208	104	1.9	117	95	2.4	325	101	2.0
Lodging	31	190	3.4	13	468	11.6	44	276	5.3
Total non-medical	321	321	5.8	213	314	7.8	534	318	6.1
Indirect costs									
Lost income									
Total	169	5555	99.8	70	6070	150.2	239	5706	110.2
Farmer	11	4331	77.8	2	1675	41.4	13	3923	75.8
Laborer	82	5230	93.9	48	4809	119.0	130	5074	98.0
Housework	0	0	0.0	0	0	0.0	0	0	0.0
Government service	14	4455	80.0	0	0	0.0	14	4455	86.1
Private service	37	6482	116.4	12	13407	331.7	49	8178	158.0
Student	2	4700	84.4	0	0	0.0	2	4700	90.8
Merchant	14	6228	111.8	7	4185	103.5	21	5547	107.2
No work	5	8100	145.5	1	550	13.6	6	6841	132.2
Others	4	5750	103.3	0	0	0.0	4	5750	111.1
Total patient costs	**379**	**4682**	**84.1**	**237**	**4381**	**108.4**	**616**	**4566**	**88.2**

*percentage of patients' mean monthly income

Loss of work days: Of the 616 patients, 390 (63.3%) reported that they lost work days due to their TB. Of these, 230 (58.9%) were male and 160 (41%) were female. Females had significantly more lost days than males ($p = 0.007$) prior to TB

diagnosis. The mean of lost work days was higher among male patients who were unemployed, while for female patients, the number of mean days lost was highest (93 days) for patients reported to be farmers (table 14).

Table 14: Lost work days due to TB prior to TB diagnosis

Variable	Male n (%)	Mean	Female n (%)	Mean	All cases n (%)	Mean
Lost workdays						
Total	230	38.8	160	54.9	390	45.44
Farmer	18 (7.8)	41.0	8 (5.0)	93.1	26 (6.7)	57.08
Private service	39 (17.0)	26.3	12 (7.5)	70.7	51 (13.1)	36.82
Housework	3 (1.3)	34.0	55 (34.4)	57.8	58 (14.9)	56.59
Laborer	82 (35.7)	34.7	51 (31.9)	44.4	133(34.1)	38.50
Student	27 (11.7)	30.3	20 (12.5)	35.2	47 (12.1)	32.38
Merchant	20 (6.5)	34.6	8 (5.0)	21.5	23 (5.9)	30.04
Unemployed	19 (8.3)	99.7	6 (3.8)	14.5	25 (6.4)	110.60
Gov. service	14 (6.1)	26.4	0	0	14 (3.6)	26.43
Others	13 (5.7)	46.8	0	0	13 (3.3)	46.85

4.1.7 Health system related factors

4.1.7.1 Profile of DOTS centres

We conducted this study in the 37 randomly selected DOTS centres of the Kathmandu Valley. Nepal National Tuberculosis Control Programme has initiated to work with NGO, private sector, and with local governments in providing DOTS services through collaborative action. In this context, a total of 3 (8.1%) DOTS centres from private sector, 8 (21.6%) from NGOs sector, 11 (29.7%) from local or municipal sector and remaining 15 (40.5%) from government (ministry) sector were selected in this study. More than two thirds of the centres had two or more staff with mean male 1.1 and female 0.73 staff. A median of 8 tuberculosis patients attended the clinic each day ranging from 4 to 60 patients. Of the 37 DOTS centres, 48.6% had more than 8 patients per day, and only 17 (45.9%) had microscopy facilities. We calculated the mean workload in the laboratory per day was 24.41

patients. However, the workload in the outpatient department (OPD) was 36.24 on average.

A total of 18 centres (48.6%) provided DOTS services (diagnosis or examining suspect cases) free of charge. Nineteen centres charged Nepalese rupees 11.58 on average at the point of first visit of the patients. The median opening time of the DOTS centres was 10.30 am, although the official government opening time is 10.00 am. The median closing time was 15.00 pm, and 70.3% (26) of the centres were closed between 13.00 and 15.00 pm. A quarter of DOTS centres (24.3%) were closed between 15.00 to 17.00 pm and only 2 provided services later then 17.00 pm. We computed the median hours open was 4 (range 2–13 hours). About a quarter of DOTS centres opened less or equal to 3 hours per day. Nineteen (51.4%) centres were opened three to six hours per day. Only 9 centres (24.3%) were open more than 6 hours per day.

We observed the OPDs of the DOTS centres to evaluate the behavior of the DOTS provider in terms of suspect evaluation. The suspect evaluation for TB includes history of symptoms, family history of TB, contact history with TB cases, movement of the patients, and risky behavior of the suspects, e.g. drug abuse, smoking, alcohol drinking, sexual practice). We observed that 48.6% (18) of the DOTS centres did not evaluate the suspect cases correctly. We noted that each suspect was evaluated between 4-7 minutes. Mainly history taking was focused on symptoms experienced by the suspects (e.g. chest pain, cough, and fever) during the evaluation. Only 10.8% (4) of the DOTS centres referred suspected TB patients for sputum test at the first visit. All 17 DOTS centres with microscopy facilities examined two or more sputum specimen per suspect.

Regular drug supply at four month interval, supervision and monitoring are the key components of the NTP DOTS strategy. We found that 10 (27%) centres did not receive drugs as planned. They reported that they had to face shortage of drugs during the study period. Only 14 centres received a supervisory visit from the district and centre level, and only 5 got supportive action during this visit. Almost all centers held quarterly monitoring meetings at the centre level. However, more than half (20, 54.1%) of the centres did not make any type of analysis regarding sex differences in TB case finding and case holding at the meeting, even though they collected the data.

Involvement of the private sector in the DOTS system has been considered one of the prime goals of the TB control programme. It has been documented that involvement of the private medical system in DOTS would help in improving timely case finding, improving compliance to treatment and preventing multi drugs resistant TB. Pertinent to this, we found the majority (31, 83.8%) of the study centres did not have any type of coordination meeting with the private medical system, and 29 had no referral mechanism between private and public medical systems.

We found 27 centres had no primary defaulter tracing system, and 31 centres had no contact tracing mechanism (screening the individuals who are close to smear positive patients). It is one of the NTP policies that every centre has to establish a coordination committee involving community people, volunteers and health workers. The main task of the committee is to facilitate the centre in tracing the patient if s/he is late or defaults from the treatment and refer the suspect TB cases to

DOTS centre. We found 30 centres had this type of committee but it was not functioning.

In 12 centres there was no educational activity. Eight centres held TB advocacy activities once and 17 centres held them two or more times in a year. Twenty-nine centres had no plan to disseminate TB messages through mass media. Eight centres did not receive any type of advocacy and educational publication from the district health office, while 14 centres received once and 15 centres received two or more times. Ten centres did not hold any meetings with the community members.

Seventeen centres did not take complete symprom histories from patients. They did not ask the patients about previous contact with tuberculosis patients, family history of TB, risky behaviour of the patients (e.g. smoking, drinking alcohol, drugs addicts, safer sex). Moreover, we observed a serious deficiency in referring suspected patients for sputum examination. Thirty-one centres were doing well in putting patients into DOTS treatment. When they received the patients with positive sputum results, weight of the patients was taken, diagnosis and treatment information were recorded in TB cards, and the patient was enrolled in the TB register. Anti-TB drugs were swallowed under direct observation. Fourteen centres had no system for screening close contacts of smear positive TB patients. Sixteen centres did not trace defaulters, although they had some defaulter patients. Staff of the 31 centres knew the content of DOT education providing to the patients and staff of the thirty-four centres knew how to complete TB cards, registers and other reporting forms.

4.1.8 Magnitude of delays

Table 15 summarizes the lag time from reported symptom onset to treatment initiation. The delay from onset of symptoms to commencement of treatment, and its components, is subjects of considerable public health attention. Thus we considered patients' delay in three stages; i) awareness of the symptoms as their health threat i.e. recognition delay, ii) awareness of making decision to treat their symptoms once they recognized them as threat to health i.e. decision making delay, and iii) actions acted to see health care providers once they took decision to treat their symptoms i.e. help seeking delay. The sum of these three intervals is considered as patient delay. Health system delay is the sum of the interval from first contact with a health care provider to diagnosis (diagnosis delay) and the interval from diagnosis to start of treatment (treatment delay). Total delay is the sum of patient delay and health system delay. As described below, most types of delay were distinctly, and statistically significantly, longer in females than in males.

4.1.8.1 Gender differences in patient delay

The median patient delay was 60 days in females and 45 days in males. This difference was highly statistically significant ($p < 0.001$). Delay to recognize the symptoms as a threat to their health contributed 30 days (71%) to patient's delay in female and male patients. Decision making delay contributed median 9 days to male patient delay and 10 days to female patient delay.

4.1.8.2 Gender differences in health system delay

Health system delay consists of diagnosis delay and treatment delay. The median health system delay was found significantly longer in female cases, $p=0.028$, (38 vs. 33 days). About 45% of males and 40.5% of female patients began

taking anti-tuberculosis medications within a month after first medical consultation. Delay interval to diagnosis was the major contributor to overall health system delay. This was significantly longer in females than males (p = 0.013). Treatment delay accounted for only a small proportion (10% of male and about 7% of female cases) of health system delay. It was slightly longer in males than females, and did not differ significantly by gender.

4.1.8.3 Gender differences in total delay

The median total delay was 116 days in female and 95 days in males. This difference was highly statistically significant (p<0.001). About half of male (48%) and one third of female (35.9%) patients began taking anti-tuberculosis treatment within 3 months of the onset of symptoms, while 32% of male and 47% of female patients remained untreated 4 months after the onset of symptoms (table 21). Patient delay was the major contributing interval to overall delay in both sexes. The median total diagnosis delay (the sum of patient delay and diagnosis delay) was significantly longer in females than males (111 vs. 92 days, p<0.001).

Table 15: Gender differences in delays (days) between symptom onset and start of DOTS treatment

Type of delay	Male, (n=379)		Female, (n=237)		P-value
	Median	Mean	Median	Mean	
Patient delay	45	65.2	60	90.5	<0.001
Recognition delay	30	46.9	30	64.7	0.001
Decision-making delay	9	12.7	10	14.6	0.163
Help seeking delay	0	5.6	4	11.1	<0.001
Health system delay	33	50.7	38	65.4	0.028
Diagnosis delay	29	45.2	34	61.2	0.013
Treatment delay	3	5.4	3	4.2	0.978
Total Diagnosis delay	92	110.5	111	151.7	<0.001
Total delay	95	115.9	116	155.9	<0.001

4.1.9 Factors affecting patient delay: bivariate analysis by gender

4.1.9.1 By settings

Patient delay did not vary appreciably by type of diagnosis centre (government, NGOs, and private), type of DOTS centre (ministry, municipal, NGOs, and private), or urban/rural status in either males or females.

4.1.9.2 By socio-demographic and economic factors

Female patients aged more than 25 years had longer patient delay than younger patients ($p = 0.005$) but patient delay did not differ with age in males. Patient delay was longer in female TB patients who reported their ethnicity as Chhetri, Janajati and Dalit (median >60 days) than as Brahman (median <35 days), $p = 0.037$. Married male patients had significantly longer delay ($p= 0.025$) than female patients. Patient delay significantly varied by level of education and occupation in both sexes ($p <0.05$). Generally it was found to be longer in patients reported to be illiterate (45 days in male and 90 days in female) than those reported to have more than grade 10 (30 days in male and 33 days in female). Other socio-economic variables such household size, number of children, monthly personal income, yearly household income and main income earner in the household were not associated with patient delay ($p>0.10$), and were not tabulated in table 16.

Table 16: Patient delays in males, females, and all subjects: bivariate analysis by socio-demographic and economic characteristics

	Male		Female		All	
Demographic factors	No.	Median	No.	Median	No.	Median
Age						
≤ 25 years old	144	39	115	56	259	45
> 25 years old	235	45	122	90	357	60
P-value (MWT)		0.183		0.005		0.019
Caste						
Chhetri	73	45	40	90	113	60
Dalit	42	45	14	70	56	46
Janajati	197	45	139	60	336	52
Brahman	67	35	44	35	111	35
P-value (KWT)		0.661		0.037		0.074
Resident						
Temporary	119	45	73	75	192	49
Permanent	260	45	164	50	424	45
P-value (MWT)		0.953		0.039		0.279
Marital status						
Married	142	45	96	80	238	60
Single/separate	237	35	141	58	378	45
P-value (MWT)		0.025		0.286		0.025
Education						
Illiterate	73	45	97	90	170	67
Grade 1-5	116	60	48	90	164	67
Grade 6-10	113	40	62	50	175	45
≥ Grade 10	77	30	30	33	107	30
P-value (KWT)		<0.001		0.001		<0.001
Occupation						
Farmer	27	45	8	130	35	63
Unemployed	31	60	11	95	42	60
Laborer	124	45	62	90	186	60
Pvt. service	68	37	16	90	84	45
Housework	5	75	79	75	84	75
Merchant	34	38	12	40	46	38
Student	55	30	47	35	102	30
Govt. service	19	45	2	18	21	45
Others (for Rx)	16	77	0	-	16	77
P-value (KWT)		0.015		<0.001		<0.001

4.1.9.3 By characteristics related to symptom recognition and decision making

In females, patient delay was significantly shorter in those who suspected themselves that their symptoms were due to TB than in those who did not (45 versus 90 days, $p<0.001$). Such a difference was not observed in males. Interestingly, in both sexes (especially females), patient delay was significantly shorter when the source of recognition of symptoms as TB was a former TB patient than when the source was another person. Patient delay was significantly shorter in patients who decided themselves to seek medical help than in those for whom decision was made by another person. This difference was significant in males (40 versus 60 days, $p = 0.012$), and highly significant in females (30 versus 90 days, $p<0.001$). Chest pain, coughing up blood, and loss of weight were the symptoms which most frequently prompted decision to seek medical help, and were associated with longer patient delay in females but not in males (table 17). Other symptoms prompting decision (i.e. cough, fever and loss of appetite) were not associated with patient delay ($p>0.10$).

Table 17: Patient delays in males, females, and all subjects: bivariate analysis by characteristics related to recognition of symptoms and decision making

	Male		Female		All	
Variables	No.	Median	No.	Median	No.	Median
Recognition of symptoms						
Yes	173	38	81	45	255	40
No	206	45	156	90	361	60
P-value (MWT)		0.064		<0.001		<0.001
Source of recognition of symptoms as TB						
Cured TB patients	43	30	34	35	77	35
Media	15	40	1	45	16	42
Family member	16	61	13	51	29	60
Health worker	14	60	10	53	24	60
Self	54	32	8	60	62	35
Friend	31	45	15	90	46	45
None	206	45	156	90	362	60
P-value (KWT)		0.107		0.005		<0.001
Decision to seek medical help						
Self	110	40	194	30	304	35
Others	269	60	43	90	312	67
P-value (MWT)		0.012		<0.001		<0.001
Symptoms lead to decision						
Chest pain						
No	283	45	160	60	443	45
Yes	96	45	77	90	173	60
P-value (MWT)		0.315		0.014		0.008
Cough up blood						
No	295	40	191	60	486	45
Yes	84	45	46	115	130	60
P-value		0.318		0.007		0.037
Loss of weight						
No	320	45	190	60	510	45
Yes	59	45	47	90	106	60
P-value (MWT)		0.400		0.067		0.045

4.1.9.4 By socio-cultural characteristics

Significantly longer patient delay was detected in patients who thought acquisition of TB due to sinful act and perceived to be isolated than those who did not in both sexes. In addition, female patients who felt ashamed of having TB, who tried hiding of TB diagnosis, who got problems with their spouse because of getting TB, who felt people hesitated to talk with them, who were prevented from using common articles and unmarried females who felt it would be difficult to get

married, had longer patient delay than those who did not ($p<0.05$). These aspects were not associated with patient delay in males (table 18).

Table 18: Patient delays by socio-culture factors: bivariate analysis

	Male		Female		All	
Variables	No.	Median	No.	Median	No.	Median
Feel ashamed for having TB						
Yes	106	45	123	90	229	64
No	271	45	114	47	385	45
P-value (MWT)		0.414		<0.001		<0.001
Hiding TB diagnosis						
Yes	94	45	91	90	185	60
No	283	45	146	60	429	45
P-value (MWT)		0.820		0.001		0.009
Acquired TB due to sinful act						
Yes	51	60	57	90	108	75
No	326	40	180	60	506	45
P-value (MWT)		0.014		0.037		<0.001
Prefer to live isolated						
Yes	122	60	72	107	194	65
No	251	35	163	50	414	45
P-value (MWT)		0.004		<0.001		<0.001
Problem with the spouse						
Yes	28	45	42	120	70	90
No	210	45	105	60	315	45
P-value (MWT)		0.886		<0.001		0.001
Problem to get married						
Yes	45	49	39	60	84	60
No	91	30	47	35	138	33
P-value (MWT)		0.039		0.004		<0.001
People wanted to talk with you						
Yes	274	42	167	60	441	45
No	102	40	69	90	171	60
P-value (MWT)		0.343		0.029		0.045
Family members hesitate in mixing you						
Yes	72	45	45	120	117	60
No	303	40	192	60	495	45
P-value (MWT)		0.116		0.076		0.031
Prevented to use common articles						
Yes	73	45	48	100	121	65
No	303	45	189	60	492	45
P-value (MWT)		0.331		0.002		0.010
Sleep in the same place as before						
Yes	266	45	151	90	417	45
No	110	40	86	60	196	60
P-value (MWT)		0.030		0.023		<0.001

Note: Variables such as TB is a heredity disease, family members find fault, and hesitate to participate in community events as before did not affect patients delay in either sex.

4.1.9.5 By characteristics related to knowledge

The patient delay was shorter in male patients who knew that bacteria are the cause of TB than those who did not, and patients who knew DOTS results in complete cure than those who did not. However, these factors were not associated with patient delay in females.

Table 19: Patient delays by knowledge in males, females, and all subjects: bivariate analysis

	Male		Female		All	
	No.	Median	No.	Median	No.	Median
Most important symptoms						
Cough for 2 weeks or more	164	45	98	60	262	45
Others	213	45	139	70	352	52
P-value (MWT)		0.041		0.807		0.065
Cause of TB						
Bacteria	66	30	35	50	101	35
Others	311	45	201	70	512	58
P-value (MWT)		0.002		0.066		<0.001
TB transmission						
Droplet	200	45	102	60	302	45
Others	177	40	135	89	312	48
P-value (MWT)		0.546		0.069		0.272
Benefit of DOTS						
Complete cure TB	255	35	130	60	385	45
Others	122	60	107	80	229	63
P-value (MWT)		0.001		0.283		<0.001

4.1.9.6 By characteristics related to perception

Patient delay was much longer among those who perceived that coughing for weeks is not a serious matter and usually self-recovers, than those who did not in both male (p=0.001) and female (p=0.030) patients. Likewise, for male and female patients who perceived TB makes them jobless had a longer patient delay than those who did not (males p=0.002, and females p=0.041) (table 20). Perception that TB is caused by sinful act did not affect the patient delay in either males or females.

Table 20: Patient delays by perception in males, females, and all subjects: bivariate analysis

Variables	Male		Female		All	
	No.	Median	No.	Median	No.	Median
Coughing for weeks is not serious matter. It is most of the time self recovered						
Agree	44	64	35	95	79	90
Disagree	331	40	202	60	533	45
P-value (MWT)		0.001		0.030		<0.001
Everybody is at risk of acquiring TB						
Agree	314	42	177	60	491	45
Disagree	62	54	60	90	122	72
P-value (MWT)		0.086		0.111		0.005
TB is a dangerous disease						
Agree	201	40	128	60	329	45
Disagree	174	45	109	65	283	60
P-value (t-test)		0.919		0.064		0.162
Other households members may be vulnerable to get TB, if one member get it						
Agree	314	45	188	60	502	45
Disagree	62	60	49	90	111	63
P-value (t-test)		0.238		0.078		0.024
TB makes jobless						
Agree	206	48	133	75	339	60
Disagree	170	35	104	60	274	40
P-value (MWT)		0.002		0.041		<0.001
TB is a fatal disease if untreated						
Agree	345	45	223	60	568	45
Disagree	31	70	14	112	45	75
P-value (MWT)		0.072		0.052		0.020

4.1.9.7 By characteristics related to access

Females who walked to the diagnosis centre had a shorter delay than those who did not (p=0.024). Among females, the patient delay did not differ by distance, traveling time, travel cost, or waiting hours at diagnosis centre per visit, while among males, patient delay was different by traveling time (≤30 minutes vs. >30 minutes, p=0.046) and waiting hours (≤2hours vs. >2hours, p=0.043) (table 21). Other variables such as traveling cost and availability of health staff on patient's first visit to diagnosis centre were not appreciably associated with patient delay.

Table 21: Patient delays by access factors in males, females, and all subjects: bivariate analysis

Variables	Male		Female		All	
	No.	Median	No.	Median	No.	Median
Mode of transport						
On foot	74	42	35	45	109	45
Bus	223	45	152	90	375	50
Others	80	45	50	58	130	45
P-value (KWT)		0.938		0.024		0.310
Distance to diagnostic centre (km)						
≤ 6 km	232	40	112	60	344	45
> 6 km	143	45	125	65	268	58
P-value (MWT)		0.156		0.591		0.045
Traveling time (diagnosis centre -min.)						
≤ 30 minutes	261	35	134	60	395	45
> 30 minutes	116	60	103	65	219	60
P-value		0.046		0.689		0.029
Waiting time at diagnosis centre (hours)						
≤ 2 hours	211	45	116	62	327	50
> 2 hours	166	35	121	60	287	45
P-value		0.043		0.496		0.122

4.1.9.8 By characteristics related to behavior

Patients with a history of smoking (current or ex-smoker) had a significantly longer patient delay in both sexes compared to those who did not (p=0.001). Patients who used wood or kerosene for cooking or heating had longer patient delay than those who used gas or electricity (p=0.008) (p=0.034). Patient delay was significantly shorter for those who had a chimney in the kitchen in female patients than those who did not, (p=0.006) but it was not different in male patients (table 22). History of current or previous alcohol consumption was not associated with patient delay in either sex.

Table 22: Patient delays by behavioral factors in males, females, and all subjects: bivariate analysis

Variable	Male		Female		All	
	No.	Median	No.	Median	No.	Median
Smoking status (current or ex-smoker)						
No	140	34	160	53	300	45
Yes	234	45	71	95	305	60
P-value (MWT)		0.003		0.001		0.007
Age of start smoking in smokers (years)						
≤ 16	134	60	48	95	182	75
> 16	99	45	23	95	122	45
P-value		0.002		0.897		0.001
Main fuel used for cooking and heating						
Wood/kerosene	208	45	130	75	338	60
Gas/electricity	169	35	106	58	275	45
P-value (MWT)		0.008		0.034		0.001
Installed chimney in the kitchen						
No	298	45	195	75	493	60
Yes	79	33	41	32	120	32
P-value (MWT)		0.167		0.006		0.003

4.1.9.9 By characteristics related to expenditure

Patient delay was significantly longer for those who had lost income more than 5,706 Nepali rupees (1US$ = NR. 70) in male patient compared to those who had lost income <5,706 Nepali rupees in both sexes. Patient delay was also different according to total patient costs (patient incurred <4566 vs. >4566 Nepali rupees, $p<0.05$) in both sexes, (table 23). Direct medical and non-medical costs (not shown in the table) were not associated with patient delay in either sex.

Table 23: Patient delays by costs in males, females, and all subjects: bivariate analysis

Variables	Male		Female		All	
	No.	Median	No.	Median	No.	Median
Lost income (NR) until diagnosis						
None	210	40	167	60	377	47
≤ 5706	116	30	48	55	164	36
> 5706	53	90	22	110	75	90
P-value (KWT)		<0.001		0.016		<0.001
Total patient' cost (NR)						
≤ 4566	261	35	162	60	423	45
> 4566	118	60	75	90	193	60
P-value (MWT)		0.004		0.043		<0.001

4.1.9.10 By clinical characteristics

Both male and female patients with HIV positive status had significantly longer patient delay than those whose HIV status was unknown ($p<0.05$). The duration of cough was positively associated with longer patient delay in both male and female patients (table 24). Other variables such as presence of cough, and grading of sputum results (1+, 2+, 3+) were not found significantly different in relation to patient delay in either sex.

Table 24: Patient delays by clinical factors in males, females, and all subjects: bivariate analysis

Variables	Male		Female		All	
	No.	Median	No.	Median	No.	Median
HIV status						
Positive	19	110	12	162	31	130
Unknown	360	40	225	60	585	45
P-value (MWT)		<0.001		0.002		<0.001
Duration- cough						
<30 days	98	22	48	25	146	24
31 – 60 days	72	32	49	45	121	35
61 – 90 days	54	52	25	60	79	60
> 90 days	115	105	99	120	214	120
P-value (KWT)		<0.001		<0.001		<0.001

4.1.9.11 By characteristics related to help seeking

For female patients, patient delay did not differ in relation to visits to traditional healers, private physicians, private pharmacy, nursing home, public facilities and other providers ($p>0.05$), while for male patients, patient delay was longer for those who visited traditional healers anytime prior to TB diagnosis ($p=0.039$) as compared with those who did not (table 25). Patient delay was calculated in relation to visit anytime to the providers such as private physicians, private pharmacy, and public facilities prior to TB diagnosis, but found not significantly associated with patient delay between males and females.

Table 25: Patient delays by help seeking in males, females, and all subjects: bivariate analysis

Variables	Male		Female		All	
	No.	Median	No.	Median	No.	Median
Visit first						
Private physician	62	35	30	48	92	42
Private pharmacy	122	40	86	60	208	45
Public facilities	140	47	43	60	183	60
DOTS centre	18	51	13	64	31	53
Traditional Healers	10	82	48	90	58	90
Nursing home	27	40	17	90	44	45
P-value (KWT)		0.102		0.254		0.005
Visit at any time						
Traditional Healers						
No	361	45	183	60	544	45
Yes	18	70	54	90	72	90
P-value (KWT)		0.039		0.069		<0.001
Nursing home						
No	327	45	195	60	522	45
Yes	52	45	42	90	94	60
P-value (KWT)		0.538		0.076		0.062
First provider advised for sputum testing						
Advised	135	45	58	55	193	45
Not advised	244	45	179	75	423	45
P-value (MWT)		0.835		0.081		0.192

4.1.10 Multilevel analysis of patient delay

4.1.10.1 Males and females combined

In GLM models for males and females combined, 21 independent variables in all were associated with patient delay at $p \leq 0.10$. These variables and gender were included as fixed effects in the first-step multilevel model. As mentioned above, DOTS center was treated as a random factor in this and all other multilevel models. Model results are presented in table 26a. In this model, sex ($p=0.047$) was significantly associated with patient delay, together with subject's occupation ($p=0.020$), self suspecting symptoms as of TB ($p=0.001$), self decision making for medical help ($p=0.016$), perception of isolation ($p=0.029$), perception of coughing as not a serious matter ($p=0.005$), HIV positive status ($p=0.002$), and loss of income ($p<0.001$). Other individual independent variables i.e. education ($p=0.081$),

and chest pain led to decision making (p=0.063) were marginally significantly associated with patient delay. These variables were entered into the second-step multilevel model.

Table 26b and 26c present second-step model results. Being a female was a significant risk factor associated with an increase of patient delay (regression coefficient = 13.2 days, p = 0.042). Other gender related factors i.e. subject's occupation, education, self suspecting the symptoms as of TB, self decision making for medical help, perception of isolation, perception of coughing as not a serious matter, HIV status, and loss of income were also found to be significant risk factors for patient delay. For subject's occupation, i.e. student (p = 0.010), housework (p = 0.018), and government service (p = 0.045) were found significantly associated with a reduction of patient delay, as compared to other occupations. The level of subject's education was significantly associated with a decreased likelihood of patient delay (p = 0.005). Self suspecting symptom as of TB was significantly associated with a reduction of patient delay (p<0.001). And self decision for medical help was significantly associated with decreased likelihood of patient delay (p = 0.005). The presence of chest pain in decision making process for medical help was found with an increased likelihood of patient delay (p = 0.028). Perception of isolation (p = 0.028) and perception of coughing as not a serious matter (p = 0.001) were found with an increased likelihood of patient delay. HIV positive status was found a significant risk factor associated with an increase of patient delay (p<0.001). Lesser (<5706 Nrs.) loss of income was significantly associated with reduced likelihood of patient delay (p<0.001).

Table 26a: Multilevel analysis for all cases: type III tests of effect

Patient delay (days)	
Variables	P-value
Sex-female	.047
Caste	.280
Occupation	.020
Age	.904
Education	.081
Self suspecting symptoms as TB	.001
Self decision for medical help	.016
Chest pain lead to decision	.063
Cough up blood lead to decision	.285
Felt ashamed	.135
Acquired TB due to sinful act	.314
Prefer to live isolated	.029
Sleep same place as before	.914
Coughing not serious matter	.005
TB makes jobless	.152
Fatal disease if untreated	.121
Bacteria is the cause of TB	.731
Ever smoked	.842
Gas/electricity used for cooking	.379
Installed chimney in the kitchen	.627
HIV positive status	.002
Loss of income	<.001

Table 26b: Final multilevel analysis for all cases: type III tests of effect

Patient delay (days)	
Variables	P-value
Sex-female	.042
Occupation	.019
Education	.005
Self suspecting symptoms as TB	<.001
Self decision for medical help	.005
Chest pain lead to decision	.028
Perceived to be isolated	.007
Coughing not serious matter	.001
HIV positive status	<.001
Loss of income	<.001

Table 26c: Final multilevel analysis for all cases: regression coefficients, 95% confidence intervals (CI) and p-values

Patient Delay (days)				
Variable	Coefficient	95% CI		P-value
		Lower	Upper	
Intercept	142.7	105.6	179.9	<.001
Sex				
Female (reference = male)	13.2	.5	25.9	.042
Occupation (reference = others)				
Farmer	-32.1	-68.9	4.8	.088
Laborer	-21.7	-54.4	11.0	.194
Housework	-42.4	-77.6	-7.2	.018
Government service	-42.1	-83.2	-.9	.045
Private service	-23.0	-56.5	10.5	.177
Student	-44.5	-78.3	-10.6	.010
Merchant	-33.2	-68.8	2.4	.068
No work	-7.7	-43.4	28.0	.674
Education	-9.1	-15.5	-2.7	.005
Self suspecting symptoms as TB	-18.6	-28.7	-8.6	<.001
Self decision for medical help	-16.7	-28.3	-5.2	.005
Chest pain lead to decision	12.4	1.3	23.5	.028
Perceived to be isolated	14.9	4.2	25.6	.007
Coughing not serious matter	24.8	9.9	39.7	.001
HIV positive status	46.3	23.5	69.1	<.001
Loss of income (reference , >5,706 rupees)				
None	-24.9	-41.7	-8.1	.004
≤5,706 rupees	-51.7	-68.6	-34.8	<.001
Random effect, DOTS Centre				
Estimate of covariance parameters	(89.9)	18.7	430.7	.211

4.1.10.2 Males only

A separate multilevel model was run for male patients. Criteria for selecting the variables were the same as mentioned above. Perception of coughing as not a serious matter (p=0.002), HIV positive status (p=0.003) and loss of income due to illness (p<0.001) were found highly associated variables, and education (p=0.066) and self suspecting symptoms as of TB (p=0.082) were found marginally significant variables associated with patient delay in male patients. These variables were carried forward to construct the final multilevel model for males. DOTS centre was entered as random factor in the model (table 27a)

The model shows that level of education ($p<0.001$), ability of suspecting symptoms as of TB ($p=0.029$), lesser loss of income i.e. ≤5,706 NRs ($p<0.001$) were significantly associated with reduced likelihood of patient delay in male patients. Factors i.e. perceived coughing is not a serious matter ($p=0.001$) and HIV positive status ($p<0.001$) were significantly associated risk factors with an increase in likelihood of patient delay (table 27b, 27c). The random variable did not have a significant effect ($p=0.785$).

Table 27a: Multilevel analysis for male cases only: type III tests of effect

Male - Patient delay (days)	
Variables	P-value
Married	.609
Education	.066
Self suspecting symptoms as TB	.082
Self decision for medical help	.593
Acquired TB due to sinful act	.154
Perceived to be isolated	.301
Sleep same place as before	.132
Bacteria is the cause of TB	.312
DOTS makes complete cure	.458
Coughing not serious matter	.002
TB makes jobless	.141
Traveling time to diagnosis centre (>30 minutes)	.165
Waiting hours at diagnosis centre (>2 hours)	.265
Ever smoked	.478
Gas/electricity used for cooking	.558
HIV positive status	.003
Meet traditional healer at any time	.589
Loss of income	<.001

Table 27b: Final Multilevel analysis for male cases only type III tests of effect

Male - Patient delay (days)	
Variables	P-value
Education	<.001
Self suspecting symptoms as TB	.029
Coughing not serious matter	.001
HIV positive status	<.001
Loss of income	<.001

Table 27c: Final multilevel analysis for males: regression coefficient, 95% CI and p-value

Male - Patient Delay (days)				
Variable	Coefficient	95% CI		P-value
		Lower	Upper	
Intercept	107.9	90.0	125.8	<.001
Education	-10.8	-16.4	-5.1	<.001
Self suspecting symptoms as TB	-12.6	-24.0	-1.3	.029
Perceived coughing is not serious matter	29.8	12.3	47.4	.001
HIV positive status	54.5	29.1	80.0	<.001
Lost of income (reference , >5,706 NRs.)				
None	-20.4	-37.4	-3.3	.019
≤5,706 rupees	-48.8	-67.0	-30.6	<.001
Random effect DOTS Centre				
Estimate of covariance parameters	(25.9)	.1	7271.3	.728

4.1.10.3 Females only

A separate multilevel model was run for female patients. Criteria for selecting the variables were same as mentioned above. Self suspecting symptoms as of TB (p=0.036), self decision to seek medical help (p=0.001), perception of isolation (p=0.033), and loss of income due to illness (p=0.005) were significantly associated with longer patient delay in females. These factors were carried forward to construct the final multilevel model (table 28a).

We identified that self suspecting symptoms as of TB (p=0.003), self decision to seek medical help (coefficient = - 58.2 days, p<0.001), loss of income i.e. ≤5,706 NRs (p<0.001) were found to be significantly associated with reduced likelihood of patient delay in female patients. Factors i.e. perception of isolation (coefficient = 38.3 days, p=0.001) was a significant risk factor with an increase in likelihood of patient delay (table 28b, 28c). The effect of the random factor was marginally significant (p=.084).

Table 28a: Multilevel analysis for female cases only: type III tests of effect

Female - Patient delay (days)	
Variables	P-value
Occupation	.195
Permanent residence	.660
Education	.312
Self suspecting symptoms as TB	.036
Self decision for medical help	.001
Chest pain lead to decision	.121
Cough up blood lead to decision	.282
Loss of weight lead to decision	.118
Acquired TB due to sinful act	.862
Perceived to be isolated	.033
Prevent to use common article	.386
Coughing not serious matter	.606
TB makes jobless	.928
Fatal disease if untreated	.461
Mode of transportation to diagnosis centre	.557
Ever smoked	.494
HIV positive status	.301
Advised for sputum test from first provider at first visit	.849
Loss of income	.005

Table 28b: Final multilevel analysis for female cases only: type III tests of effect

Female - Patient delay (days)	
Variables	P-value
Self suspecting symptoms as TB	.003
Self decision for medical help	.000
Perceived to be isolated	.000
Loss of income	.000

Table 28c: Final multilevel analysis for female cases: regression coefficient, 95% CI and p-value

Female - Patient Delay (days)				
Variable	Coefficient	95% CI		P-value
		Lower	Upper	
Intercept	156.4	124.7	188.0	<.001
Self suspecting symptoms as TB	-30.2	-49.6	-10.7	.003
Self decision for medical help	-58.2	-81.0	-35.4	<.001
Perceived to be isolated	38.3	18.4	58.2	<.001
Loss of income (reference, >5,706 Rs.)				
None	-61.9	-93.1	-30.6	<.001
≤5,706 Rs.	-64.8	-100.2	-29.4	<.001
Random effect DOTS Centre				
Estimate of covariance parameters	(522.6)	167.8	1627.6	.084

4.1.11 Fac tors affecting diagnosis delay: bivariate analysis by gender

4.1.11.1 By setting

Table 29 shows that the median diagnosis delay found to be significantly different in female patients (p=0.016) by type of diagnosis centre. Median diagnosis delay also varied by district in both sexes (p<0.05).

Table 29: Health system diagnosis delay by venue in males, females, and all subjects: bivariate analysis

Variables	Male		Female		All	
	No.	Median	No.	Median	No.	Median
Type of diagnosis centre						
NGO	130	35	71	27	201	30
Private	52	37	60	28	112	31
Government	197	23	106	46	303	31
P-value		0.286		0.016		0.932
Type of DOTS centre						
NGO	108	23	74	25	182	23
Ministry	129	31	73	35	202	33
Municipal	122	30	75	38	197	34
Private	20	50	15	41	35	46
P-value		0.142		0.139		0.023
District						
Kathmandu	247	23	145	29	392	25
Lalitpur	95	46	71	42	166	46
Bhaktapur	37	18	21	75	58	28
P-value		<0.001		0.013		<0.001

4.1.11.2 By socio-economic characteristics

Among females, the median diagnosis delay was longer in patients reporting their age in years to be >25 as compare with those <25 years old (p=0.002), while this figure was not different in male patients. The diagnosis delay did not differ by caste, status of residence, marital status, household and children size both in male and female patients.

The median diagnosis delay varied with the subject's educational status. The shortest delay was reported by the patients with >grade 10 education as compared with those who were illiterate (41 days) for female patients, while it was not different for male patients. The median diagnosis delay differed also

with the subject's occupation both in male (p=0.032) and female (p=0.004) patients. The median diagnosis delay was found significantly different according to who was the main earner in the households (p=0.005) in male patients.

Table 30: Health system diagnosis delay in males, females, and all subjects: bivariate analysis by characteristics related to demographic

Variables	Male		Female		All	
	No.	Median	No.	Median	No.	Median
Age						
≤ 25 years old	144	28	115	27	259	27
> 25 years old	235	29	122	42	357	35
P-value (MWT)		0.445		0.002		0.018
Caste						
Chhetri	73	38	40	54	113	45
Dalit	42	38	14	39	56	38
Janajati	197	26	139	31	336	28
Brahman	67	20	44	30	111	25
P-value (KWT)		0.217		0.069		0.060
Education						
Illiterate	73	30	97	41	170	35
Grade 1-5	116	27	48	52	164	31
Grade 6-10	113	28	62	28	175	28
≥ Grade 10	77	29	30	21	107	24
P-value (KWT)		0.993		0.002		0.080
Occupation						
Unemployed	31	39	11	66	42	43
Pvt. service	68	26	16	56	84	32
Farmer	27	16	8	51	35	31
Laborer	124	28	62	40	186	32
Housework	5	45	79	33	84	36
Govt. service	19	14	2	33	21	14
Student	55	37	47	16	102	28
Merchant	34	41	12	12	46	32
Others (for Rx)	16	13	0	0	16	13
P-value (KWT)		0.032		0.004		0.034
Main income earner in the household						
Self	229	23	45	42	274	27
Others	149	28	189	33	338	35
P-value (MWT)		0.005		0.317		0.009

4.1.11.3 By characteristics related symptoms recognition and decision making for medical help

Table 31 presents the factors related to recognition of symptoms and decision making influencing diagnosis delay in male and female patients. The median diagnosis delay was found to be shorter in patients who

suspected themselves that their symptoms were due to TB than in those who did not both in males (p=0.004) and females (p=0.045). Chest pain, coughing up blood, fever, and loss of weight were the symptoms which most frequently prompted decision to seek medical help, and were associated with longer health system diagnosis delay in females but not in males .. Other symptoms prompting decision (i.e. cough, and loss of appetite) were not associated with health system diagnosis delay.

Table 31: Health system diagnosis delay in males, females, and all subjects: bivariate analysis by factors related to recognition of symptoms and decision making

Variables	Male		Female		All	
	No.	Median	No.	Median	No.	Median
Recognition of symptoms						
Yes	173	22	81	25	255	24
No	206	35	156	39	361	37
P-value (MWT)		0.004		0.045		<0.001
Decision for medical help						
Self	269	28	43	28	312	28
Others	110	34	194	35	304	35
P-value (MWT)		0.467		0.067		0.008
Symptoms lead to decision						
Chest pain						
Yes	96	36	77	51	173	42
No	283	28	160	27	443	28
P-value (MWT)		0.066		<0.001		<0.001
Cough up blood						
Yes	84	28	46	29	130	28
No	295	29	191	35	486	31
P-value (MWT)		0.379		0.009		0.018
Fever						
Yes	111	37	90	46	201	40
No	268	23	147	29	415	27
P-value (MWT)		0.056		0.018		0.001
Loss of weight						
Yes	59	35	47	67	106	49
No	320	27	190	28	510	28
P-value (MWT)		0.314		0.002		0.004

4.1.11.4 By socio-cultural characteristics

Table 32 shows the relationship between socio-cultural factors and diagnosis delay in male and female patients. Significantly longer diagnosis delay was found in patients reported to feel ashamed of having TB compared to those who did not in females (p=0.009) but not in males. Similarly, longer diagnosis delay

was reported in patients who reported that they were hiding the TB diagnosis as compared to those who did not in females (p=0.012). Other socio-cultural components such as TB is a heredity disease, perceived to be isolated, problem to get married were not associated with health system diagnosis delay in both sexes.

Table 32: Health system diagnosis delay in males, females, and all subjects: bivariate analysis by socio-cultural characteristics

Variables	Male		Female		All	
	No.	Median	No.	Median	No.	Median
Feel ashamed for having TB						
Yes	106	30	123	42	229	37
No	271	28	114	26	385	27
P-value (MWT)		0.302		0.009		0.003
Hiding TB diagnosis						
Yes	94	29	91	43	185	35
No	283	28	146	28	429	28
P-value (MWT)		0.823		0.012		0.037
Acquired TB due to sinful act						
Yes	51	37	57	41	108	40
No	326	27	180	31	506	28
P-value (MWT)		0.099		0.088		0.006
Family members find fault frequently						
Yes	52	20	32	38	84	23
No	324	29	205	34	529	31
P-value (MWT)		0.078		0.585		0.088
Sleep in the same place as before						
Yes	266	27	151	31	417	28
No	110	31	86	40	196	35
P-value (MWT)		0.187		0.153		0.035

4.1.11.5 By characteristics related to knowledge about TB

The median diagnosis delay was shorter in patients who believed droplets to be the source of TB transmission for both males (p=0.003) and females (p<0.001) patients compared to those who did not. The median diagnosis delay was also shorter in patients reported to know that TB is a curable disease for both males (p=0.046) and females (p=0.033) compared in those who did not. For females, the median diagnosis delay was found to be shorter for those who reported understanding coughing for 2 weeks or more to be an important symptom of TB and as compared with those who did not (p=0.047), significantly shorter diagnosis delay

was detected in patients those reported bacteria as the cause of TB compared to those who did not ($p<0.001$), while none of them were significantly different in male patients ($p>0.05$) (table 33).

Table 33: Health system diagnosis delay in males, females, and all subjects: bivariate analysis by characteristics related to knowledge

Variables	Male		Female		All	
	No.	Median	No.	Median	No.	Median
Most important symptoms						
2 weeks cough or more	164	28	98	27	262	28
Others	213	29	139	38	352	33
P-value (MWT)		0.800		0.047		0.273
Cause of TB						
Bacteria	66	18	35	9	101	13
Others	311	30	201	37	512	33
P-value (MWT)		0.102		<0.001		<0.001
TB transmission						
Droplet	200	21	102	23	302	21
Others	177	35	135	47	312	39
P-value (MWT)		0.003		<0.001		<0.001
TB a curable disease						
Curable	342	28	198	31	540	28
Others	35	40	39	47	74	42
P-value (MWT)		0.046		0.033		0.001

4.1.11.6 By characteristics related to perception about TB

Table 34 shows the relationship of perception factors with diagnosis delay among males and females. For females, the median diagnosis delay was shorter in patients who agreed that everybody is at risk of acquiring TB compared with those who disagreed with this statement ($p=0.033$), and patients agreed that other members of the household may be vulnerable to get TB, if one member gets it, as compared with those disagreed with this statement ($p=0.023$). The median diagnosis delay was much longer in patients agreed that TB is caused by the will of God compared with those who disagreed with the statement ($p=0.013$) in females. None of these factors were significantly different in male patients ($p>0.05$).

Table 34: Health system diagnosis delay in males, females, and all subjects: bivariate analysis by characteristics related to perception

Variables	Male		Female		All	
	No.	Median	No.	Median	No.	Median
Everybody is at risk of acquiring TB						
Agree	314	28	177	32	491	29
Disagree	62	30	60	44	122	37
P-value (MWT)		0.761		0.033		0.041
Other households members may be vulnerable to get TB, if one member get it						
Agree	314	28	188	31	502	29
Disagree	62	30	49	55	111	42
P-value		0.588		0.023		0.037
TB is caused by wish of God						
Agree	54	25	37	67	91	35
Disagree	322	29	200	32	522	30
P-value (MWT)		0.287		0.013		0.404

4.1.11.7 By characteristics related to access

Table 35 indicates the diagnosis delay varied by mode of transport between male and female patients. The median diagnosis delay was significantly longer in patients reported to have waited >2 hours on each visit to the diagnosis centre compared to those reporting waiting < 2 hours for both males (p=0.005) and females (p=0.044). The median diagnosis delay was significantly different in females (<6 km vs. >6 km), p=0.009 and but not in males. Traveling time to diagnosis centre and health education received on sputum examination at first visit to diagnosis centre did not affect the diagnosis delay significantly.

Table 35: Health system diagnosis delay in males, females, and all subjects: bivariate analysis by characteristics related to access

Variables	Male		Female		All	
	No.	Median	No.	Median	No.	Median
Mode of transport						
On foot	74	14	35	18	109	16
Bus	223	32	152	39	375	35
Others	80	29	50	30	130	29
P-value (KWT)		0.005		0.049		<0.001
Distance to diagnostic centre (km)						
≤ 6 km	232	31	112	27	344	29
> 6 km	143	25	125	38	268	31
P-value (MWT)		0.693		0.009		0.104
Traveling cost (rupees)						
None	99	18	46	22	145	18
≤ 60 rupees	151	37	102	32	253	35
> 60 rupees	129	28	89	39	218	33
P-value		0.008		0.190		0.001
Waiting time at diagnosis centre (hours)						
≤ 2 hours	211	22	116	28	327	24
> 2 hours	166	37	121	35	287	37
P-value (t-test)		0.005		0.044		0.001
Meet health staff at first visit						
Yes	344	30	226	35	570	32
No	33	10	11	11	44	10
P-value (MWT)		0.057		0.146		0.010

4.1.11.8 By characteristics related to behavior

Significantly longer median diagnosis delay was observed in patients reported to be smokers (current or ex) compared to those who were not (p=0.009) for female patients, whereas it was not different for male patients. Interestingly, the median diagnosis delay was significantly shorter in patients who had reported having installed a chimney in the kitchen than for those who did not, in both males (p<0.001) and females (p=<0.001). However, alcohol drinking was not associated with diagnosis delay in either sex.

Table 36: Health system diagnosis delay in males, females, and all subjects: bivariate analysis by characteristics related to behavior

Variables	Male		Female		All	
	No.	Median	No.	Median	No.	Median
Smoking status (current or ex-smoker)						
Yes	234	28	71	51	305	33
No	140	29	160	30	300	29
P-value (MWT)		0.439		0.009		0.151
Main fuel used for cooking and heating						
Wood/kerosene	208	31	130	39	338	35
Gas/electricity	169	23	106	26	275	24
P-value (MWT)		0.171		0.067		0.027
Installed chimney in the kitchen						
Yes	79	12	41	10	120	12
No	298	36	195	38	493	37
P-value (MWT)		<0.001		<0.001		<0.001

4.1.11.9 By characteristics related to expenditure

The median delay was longer in patients reported to have lost income >5,706 Nepalese rupees compared to those who had not lost any income (p=0.005) for female patients, but not for males.

Table 37: health system diagnosis delay in males, females, and all subjects: bivariate analysis by characteristics related to cost

Variables	Male		Female		All	
	No.	Median	No.	Median	No.	Median
Direct medical cost (NR)						
None	20	1	13	1	33	1
≤ 2077 (mean)	258	32	143	38	401	35
> 2077	101	28	81	34	182	29
P-value (KWT)		<0.00 1		<0.00 1		<0.00 1
Direct non-medical cost (NR)						
None	58	13	24	26	82	17
≤ 318 (mean)	226	36	151	35	377	35
> 318	95	23	62	35	157	30
P-value (KWT)		0.001		0.632		0.002
Lost income (NR)						
None	210	28	167	30	377	29
≤ 5706 (mean)	116	25	48	39	164	28
> 5706	53	42	22	80	75	39
P-value (KWT)		0.139		0.005		0.011

4.1.11.10 By characteristics related to help seeking behavior

Table 38 shows the relationship between care seeking factors and diagnosis delay for male and female patients. The median diagnosis delay varied by the choice of first health care providers between male ($p<0.001$) and female ($p<0.001$) patients. For females, the shortest median diagnosis delay was reported by patients who first visited DOTS centres or private nursing home and the longest median diagnosis delay was reported by patients who first visited traditional healers or private physicians. For males, the shortest median diagnosis delay was reported by patients who first visited DOTS centres or public facilities and the longest median diagnosis delay was reported by the patients who first visited private pharmacies or private physicians.

The median diagnosis delay was longer in patients who visited traditional healers at any point prior to TB diagnosis both for males ($p=0.015$) and females ($p=<0.001$) patients. Likewise, the median diagnosis delay was found longer for patients who visited a private physician at anytime prior to TB diagnosis than for those who did not in both sexes. The median diagnosis delay was also longer among patients who visited public facilities at anytime prior to TB diagnosis than those who did not for both sexes. The median diagnosis delay was found to vary according to the number of providers (not taking account the number of visits made to the same health provider) visited prior to TB diagnosis in both sexes ($p<0.001$). It is worthy of note that in both sexes, the median diagnosis delay was significantly shorter when the first provider advised a sputum test than when it did not ($p<0.001$).

Table 38: Health system diagnosis delay in males, females, and all subjects: bivariate analysis by characteristics related to help seeking

	Male		Female		All	
Variables	No.	Median	No.	Median	No.	Median
Visit first						
Traditional Healers	10	38	48	64	58	50
Private physician	62	38	30	36	92	38
Private pharmacy	122	41	86	34	208	39
Public facilities	140	15	43	24	183	17
Nursing home	27	33	17	18	44	23
DOTS centre	18	1	13	1	31	1
P-value (KWT)		<0.001		<0.001		<0.001
Visit at any time						
Traditional Healers						
Yes	18	45	54	56	72	51
No	361	28	183	28	544	28
P-value (KWT)		0.015		<0.001		<0.001
Private physician						
Yes	92	38	66	48	158	41
No	287	23	171	28	458	25
P-value (KWT)		0.004		0.010		<0.001
Private pharmacy						
Yes	141	41	116	42	257	41
No	238	19	121	27	359	22
P-value (KWT)		<0.001		0.010		<0.001
Nursing home						
Yes	52	46	42	47	94	47
No	327	25	195	32	522	28
P-value (KWT)		0.001		0.038		<0.001
Public facilities						
Yes	327	30	197	39	524	35
No	52	13	40	10	92	11
P-value (KWT)		0.001		<0.001		<0.001
Others						
Yes	12	62	11	57	23	62
No	367	28	226	33	593	29
P-value (KWT)		0.001		0.082		<0.001
Number of provider visited						
One provider	87	3	48	5	135	4
Two providers	192	29	95	28	287	28
> two providers	100	60	94	70	194	62
P-value (KWT)		<0.001		<0.001		<0.001
First provider advised for sputum test						
Advised	135	9	58	9	193	9
Not advised	244	39	179	43	423	41
P-value (MWT)		<0.001		<0.001		<0.001

4.1.12 Multilevel analysis of health system diagnosis delay

4.1.12.1 Males and females combined

In GLM models for males and females combined, 17 independent variables in all were associated with health system diagnosis delay at $p \leq 0.10$. These variables and gender were included as fixed effects in the first-step multilevel model. DOTS center was treated as a random factor in this and all other multilevel models.

Female sex was no longer a risk factor for health system diagnosis delay (p=0.340). Other factors i.e. self suspecting symptoms as due to TB (p=0.023), chest pain leading to a decision to seek medical help (p= 0.034), belief that TB is transmitted through droplets (p= 0.018), having visited a private physician (p=0.003), private pharmacy (p=0.005), nursing home (p=0.034), or public health facility (p=0.029) at any time prior to TB diagnosis, number of health providers visited prior to TB diagnosis (p<0.001), and finally loss of income to get a TB diagnosis (p<0.001) were found to be significantly associated with health system diagnosis delay. Waiting hours at diagnosis centre for each visit was found marginally significant with health system diagnosis delay (p=0.058), table 39a.

Table 40b and 40c show that female sex was not a significant risk factor associated with an increase of health system diagnosis delay. Symptom i.e. chest pain leading to a decision to seek medical help (p=0.018), waiting more than 2 hours in the diagnosis centre at each visit (p=0.048), and visits made to several providers (p=<0.001) were found to be significantly associated with an increased likelihood of diagnosis delay. However, knowledge of TB transmission through droplets (p=0.034), visits made to a private physician at any point prior to TB

diagnosis (p=0.040) and a lower level of loss of income was associated with a reduction in likelihood of diagnosis delay (p<0.001). The effect of the random factor, DOTS center, was not significant (p=0.383).

Table 39a: Multilevel analysis for all cases: type III tests of effect

Health system diagnosis delay (days)	
Variables	P-value
Sex-female	.345
District	.451
Self suspecting symptoms as TB	.023
Chest pain lead to decision	.034
Family member find faults frequently	.147
TB is transmitted through droplets	.018
Waiting hours at diagnosis centre in each visit	.058
Met health staff in first visit to diagnosis centre	.180
Installed chimney in the kitchen	.469
Visit first to help	.125
Met private physician at sometime prior to TB diagnosis	.003
Met private pharmacy at sometime prior to TB diagnosis	.005
Met nursing home at sometime prior to TB diagnosis	.034
Met public health care facilities at sometime prior to TB diagnosis	.029
No. of health provider visited prior to diagnosis TB (ascending order)	<.001
Direct medical cost occurred to receive TB diagnosis	.925
Lost income	<.001

Table 39b: Final multilevel analysis for all cases: type III tests of effect

Health system diagnosis delay (days)	
Variables	P-value
Sex-female	.239
Self suspecting symptoms as TB	.063
Chest pain lead to decision	.018
TB is transmitted through droplets	.034
Waiting hours at diagnosis centre in each visit	.048
Met private physician at sometime prior to TB diagnosis	.040
Met private pharmacy at sometime prior to TB diagnosis	.356
Met nursing home at sometime prior to TB diagnosis	.079
Met public health care facilities at sometime prior to TB diagnosis	.262
No. of health provider visited prior to diagnosis TB (ascending order)	<.001
Lost income	<.001

Table 39c: Final multilevel analysis for all cases: regression coefficient, 95% confidence intervals, and p-value

Health system diagnosis delay (days)				
Variable	Coefficient	95% CI		P-value
		Lower	Upper	
Intercept	38.6	13.0	64.3	.003
Female (reference = male)	7.2	-4.8	19.2	.239
Self suspecting symptoms as TB	-11.1	-22.9	.6	.063
Chest pain lead to decision	15.5	2.6	28.4	.018
TB is transmitted through droplets	-12.8	-24.6	-1.0	.034
> 2 hours waiting at diagnosis centre per visit (reference, <2 hours)	12.0	.1	23.8	.048
Met private physician anytime prior to TB diagnosis	-15.8	-30.9	-.7	.040
Met private pharmacy anytime prior to TB diagnosis	-6.3	-19.6	7.0	.356
Met nursing home anytime prior to TB diagnosis	-16.1	-34.1	1.9	.079
Met public health care facilities anytime prior to TB diagnosis	-10.7	-29.5	8.0	.262
No. of health provider visited prior to diagnosis TB (ascending order)	26.8	19.2	34.5	<.001
Lost of income (reference, >5,706 rupees)				
None	-32.0	-49.7	-14.2	<.001
≤5,706 rupees	-46.1	-65.9	-26.4	<.001
Random effect DOTS centre				
Estimate of covariance parameters	(68.3)	7.2	644.8	.383

4.1.12.2 Males only

A separate multilevel model was run for male patients. Criteria for selecting the variables were the same as mentioned above. Table 40a presents factors included in the model. It was found that the perception that TB was acquired due to a sinful act (p=0.024), waiting hours at the diagnosis centre (p=0.025), and number of health providers visited prior to TB diagnosis were significantly associated with diagnosis delay. Subject's occupation (p=0.076) and knowledge of TB transmission through droplets were found to be marginally significant in association with diagnosis delay. These factors were carried forward to construct the final multilevel model for male patients only. DOTS centre was entered as random factor in the model.

The model in table 40c shows that of the perception that TB was acquired due to a sinful act (p=0.018), waiting more than 2 hours at the diagnosis centre at each visit (p=0.024), and visit to multiple providers for care seeking (p<0.001) were the factors strongly associated with an increased likelihood of diagnosis delay. Knowledge of TB transmission through droplets was found significantly associated with reduced likelihood of diagnosis delay (p=0.049). The probability of increased diagnosis delay varied with subjects' occupation as shown in the model. However, the effect of the occupation itself did not reach statistical significance for diagnosis delay (p=0.076) as presented in table 40.b. The random effect did not reach statistical significance (p=0.254).

Table 40a: Multilevel analysis for male cases: type III tests of effect

Male - Health system diagnosis delay (days)	
Variables	P-value
District	.187
Occupation	.076
Self suspecting symptoms as TB	.451
Acquired TB due to sinful act	.024
Family member find faults frequently	.274
TB is transmitted through droplets	.075
Waiting hours at diagnosis centre in each visit	.025
Met health staff in first visit to diagnosis centre	.206
Installed chimney in the kitchen	.262
Direct medical cost incurred to receive TB diagnosis	.514
No. of health provider visited prior to diagnosis TB (ascending order)	<.001

Table 40b: Final multilevel analysis for male cases: type III tests of effect

Male - Health system diagnosis delay (days)	
Variables	P-value
Occupation	.066
Acquired TB due to sinful act	.018
TB is transmitted through droplets	.049
Waiting hours at diagnosis centre in each visit	.024
No. of health providers visited prior to diagnosis TB (ascending order)	<.001

Table 40c: Final Multilevel analysis for male cases: regression coefficients, 95% confidence intervals, and p-values

Male - health system diagnosis delay (days)				
Variable	Coefficient	95% CI		P-value
		Lower	Upper	
Intercept	-5.3	-38.1	27.5	.752
Occupation (reference = others)				
Farmer	34.2	-2.3	70.8	.067
Laborer	7.6	-23.5	38.6	.631
Housework	72.3	12.0	132.6	.019
Government service	16.6	-23.7	56.9	.418
Private service	13.5	-18.6	45.6	.409
Student	22.1	-10.8	54.9	.187
Merchant	34.3	-1.3	69.9	.059
No work	20.3	-15.2	55.8	.262
Acquired TB due to sinful act	21.8	3.8	39.9	.018
TB is transmitted through droplets	-12.6	-25.1	.0	.049
> 2 hours waiting at diagnosis centre per visit	14.4	1.9	26.9	.024
No. of health provider visited prior to diagnosis TB (ascending order)	14.6	8.7	20.5	<.001
Random effect DOTS Centre				
Estimate of covariance parameters	(124.0)	22.2	691.6	.254

4.1.12.3 Females only

A separate multilevel model was also run for female patients. Criteria for selecting the variables were the same as mentioned above. Table 41a presents factors included in the model. It was found that loss of income ($p<0.001$), visits made to a private physician ($p=<0.001$), private pharmacy ($p=0.011$), nursing home ($p=0.001$), or public facility ($p=0.015$) at anytime, and number of health providers visited for care seeking ($p=<0.001$) were significant factors associated with diagnosis delay. Preference to hide the TB diagnosis ($p=0.065$), and visits made to traditional healers at any time ($p=0.064$) were marginally significantly associated with diagnosis delay. All these factors were included to construct our final multilevel model for female patients. DOTS centre was remained as random factor in the model.

The model in table 41c shows that a visit made to a private physician at any time (coefficient = - 54.5, p<0.001), visit to a pharmacy at any time (p=0.016), visit to a nursing home at any time (coefficient = -52, p=0.004), and lesser levels of lost income i.e. <5,706 Nepalese rupees (p<0.001) were significantly associated with reduced likelihood of diagnosis delay. Visit to several providers for care seeking (p<0.001) was the factor strongly associated with an increased likelihood of diagnosis delay. Preference to hide a TB diagnosis was marginally significantly associated with an increased diagnosis delay (p=0.066). The random effect was not significant (0.471).

Table 41a: Multilevel analysis for female cases: type III tests of effect

Female - health system diagnosis delay (days)	
Variables	P-value
Type of diagnosis centre	.448
Chest pain lead to decision	.135
Cough up blood lead to decision	.220
Hide of TB diagnosis	.065
Other households may be vulnerable to get TB, if one member get it	.222
Waiting hours at diagnosis centre in each visit	.873
Installed chimney in the kitchen	.787
Lost income	<.001
Visit first to help	.187
Meet traditional healers	.064
Met private physician anytime prior to TB diagnosis	.000
Met private pharmacy anytime prior to TB diagnosis	.011
Met nursing home anytime prior to TB diagnosis	.001
Met public health care facilities anytime prior to TB diagnosis	.015
Met others providers anytime prior to TB diagnosis	.059
No. of health provider visited prior to diagnosis TB (ascending order)	<.001

Table 41b: Final multilevel analysis for female cases: type III tests of effect

Female - health system diagnosis delay (days)	
Variables	P-value
Hide of TB diagnosis	.066
Lost income	.000
Meet traditional healers	.145
Met private physician anytime prior to TB diagnosis	<.001
Met private pharmacy anytime prior to TB diagnosis	.016
Met nursing home anytime prior to TB diagnosis	.004
Met public health care facilities anytime prior to TB diagnosis	.165
Met others providers anytime prior to TB diagnosis	.158
No. of health providers visited prior to diagnosis TB (ascending order)	<.001

Table 41c: Final multilevel analysis for female cases: regression coefficient, 95% confidence intervals, and p-value

Female - health system diagnosis delay (days)				
Variable	Coefficient	95% CI		P-value
		Lower	Upper	
Intercept	68.5	21.5	115.5	.004
Hide of TB diagnosis	20.9	-1.4	43.2	.066
Loss of income (reference,>5,706 rupees)				
None	-91.5	-128.6	-54.3	<.001
≤5,706 rupees	-102.8	-145.5	-60.0	<.001
Met traditional healers	-23.9	-56.1	8.3	.145
Met private physician anytime	-54.5	-84.8	-24.2	.000
Met private pharmacy	-33.5	-60.6	-6.3	.016
Met nursing home anytime	-52.0	-87.1	-16.9	.004
Met public facilities anytime	-24.9	-60.2	10.3	.165
Met others providers	-42.6	-101.7	16.6	.158
No. of health provider visited	57.2	38.6	75.9	<.001
Random effect DOTS Centre				
Estimate of covariance parameters	(182.1)	11.9	2767.9	.471

4.1.13 Fac tors affecting total diagnosis delay, multilevel analysis

4.1.13.1 Males and females combined

GLM models for males and females combined, independent variables in all were associated with total diagnosis delay at p≤0.10. These variables and gender were included as fixed effects in the first-step multilevel model. As mentioned above, DOTS center was treated as a random factor in this and all other multilevel models.

Factors as shown in the table 42a were included in the model. It was found that female sex was not no longer significantly associated with total diagnosis delay (p=0.614). Other factors i.e. education (p=0.007), self suspecting symptoms as due to TB (p=0.009), chest pain leading to a decision to seek medical help (p= 0.024), perceiving that cough is not a serious matter (p<0.001), known HIV status (p=0.023), number of health care providers visited prior to TB diagnosis (p<0.001), and finally loss of income to get a TB diagnosis (p<0.001) were found to be significantly associated with total diagnosis delay. Self decision to seek medical

help was found to be marginally significant in association with total diagnosis delay (p=0.063). Further, a multilevel model was constructed that included gender as well (although it was not found important risk factor) and other independent variables as fixed effect from first models for which p-value ≤ 0.10. DOTS centre was included as a random effect in the model.

Table 42b and 42c show that female sex was not significantly associated with an increase of total diagnosis delay (p = 0.355). Symptoms i.e. chest pain leading to a decision to seek medical help was found to be significantly associated with an increased likelihood of total diagnosis delay (p=0.018). Perceiving coughing for weeks as not a serious matter that will recover without treatment was found to be significantly associated with an increased likelihood of total diagnosis delay (p<0.001). Similarly, known HIV positive status was found to be a significantly associated with an increased probability of total diagnosis delay (p=0.004) and visiting multiple providers was significantly associated with an increased likelihood of total diagnosis delay (p=<0.001). However, level of education (p<0.001), self suspecting that symptoms are due to TB (p=0.003), self decision to seek medical help (p=0.023), and lesser level of lost income (p<0.001) were found to be significantly associated with reduced likelihood of total diagnosis delay. The random effect, DOTS centre, was not significantly associated with total diagnosis delay (p=0.204).

Table 42a: Total diagnosis delay, multilevel analysis for all cases

Total diagnosis delay (days)	
Variables	P-value
Sex-female	.614
Caste	.542
Age	.891
Education	.007
Self suspecting symptoms as TB	.009
Self decision for medical help	.063
Chest pain lead to decision	.024
Felt ashamed having TB	.158
Acquired TB due to sinful act	.288
Bacteria is the cause of TB	.920
Perceived cough is not a serious matter	<.001
Other households member may vulnerable to get TB	.528
Perceived TB makes jobless	.909
Ever smoked	.583
Installed chimney in the kitchen	.380
HIV positive status	.023
Met private physician at sometime prior to TB diagnosis	.150
Met public health care facilities at sometime prior to TB diagnosis	.503
Met other health facilities at sometime prior to TB diagnosis	.829
No. of health provider visited prior to diagnosis TB (ascending order)	<.001
Lost income	<.001

Table 42b: Final Multilevel analysis for all cases: type III tests of effect

Total diagnosis delay (days)	
Variables	P-value
Sex-female	.355
Education	<.001
Self suspecting symptoms as TB	.003
Self decision for medical help	.023
Chest pain lead to decision	.018
Perceived cough is not a serious matter	<.001
HIV positive status	.004
No. of health provider visited prior to diagnosis TB (ascending order)	<.001
Lost income	<.001

Table 42c: Final multilevel analysis for all cases: regression coefficient, 95% confidence intervals, and p-value

Total diagnosis delay (days)				
Variable	Coefficient	95% CI		P-value
		Lower	Upper	
Intercept	159.3	120.6	197.9	<.001
Female (reference = male)	9.6	-10.8	30.0	.355
Education	-16.5	-24.9	-8.0	<.001
Self suspecting symptoms as TB	-26.6	-44.3	-9.0	.003
Self decision for medical help	-23.4	-43.6	-3.3	.023
Chest pain lead to decision	23.3	3.9	42.7	.018
Perceived cough is not a serious matter	53.1	27.3	78.9	<.001
HIV positive status (reference = HIV unknown)	59.1	19.3	98.8	.004
No. of health provider visited prior to TB diagnosis	25.3	17.1	33.5	<.001
Lost income (reference, >5,706 rupees)				
None	-62.3	-89.4	-35.2	<.001
≤5,706 rupees	-98.1	-127.9	-68.3	<.001
Random effect, DOTS Centre				
Estimate of covariance parameters	(243.5)	52.0	1138.5	.204

4.1.13.2 Males only

A separate multilevel model was run for male patients. Criteria for selecting the variables were the same as mentioned above. Table 43a presents factors included in the model. It was found that education (p=0.034), perceiving that TB was acquired due to a sinful act (p=0.019), sleeping in the same place as before (p=0.031), perceiving cough not to be a serious matter that would recover without treatment (p<0.001), number of health care providers visited prior to TB diagnosis, and loss of income were found to be significantly associated with total diagnosis delay. Self suspecting that symptoms are due to TB (p=0.070) and known HIV positive status (p= 0.078) were found be marginally associated to total diagnosis delay. These factors were carried forward to construct the final multilevel model for male patients. DOTS centre was entered as random factor in the model.

The model in table 43c shows that level of education (p=0.002), subject's sleeping place being the same as before (p=0.035), and lesser

amount of income lost ($p<0.001$) were significantly associated with reduced total diagnosis delay. Self suspecting symptoms as being due to TB was found marginally significant in association with reduction of total diagnosis delay ($p=0.056$). Perceived acquisition of TB due to a sinful act ($p=0.014$), perceived cough as not a serious matter that will recover without treatment ($p<0.001$), and visit to multiple providers for care seeking ($p<0.001$) were all factors strongly associated with an increased likelihood of total diagnosis delay. HIV positive status was found marginally associated ($p=0.057$) with an increased total diagnosis delay. The random effect was not significant ($p=0.223$).

Table 43a: Multilevel analysis for male cases: type III tests of effect

Male - Total diagnosis delay (days)	
Variables	P-value
Education	.034
Self suspecting symptoms as TB	.070
Acquired TB due to sinful act	.019
Sleep in the same place as before	.031
Bacteria is the cause of TB	.501
Perceived cough is not a serious matter	<.001
Traveling time to diagnosis centre	.185
Ever smoked	.276
Installed chimney in the kitchen	.471
Grading of sputum results	.585
HIV positive status	.078
No. of health provider visited prior to diagnosis TB (ascending order)	<.001
Lost income	<.001

Table 43b: Final multilevel analysis for male cases: type III tests of effect

Male - Total diagnosis delay (days)	
Variables	P-value
Education	.002
Self suspecting symptoms as TB	.056
Acquired TB due to sinful act	.014
Sleep in the same place as before	.035
Perceived cough is not a serious matter	<.001
HIV positive status	.057
No. of health provider visited prior to diagnosis TB (ascending order)	<.001
Lost income	<.001

Table 43c: Final multilevel analysis for male cases: regression coefficient, 95% confidence intervals, and p-value

Male - Total diagnosis delay (days)				
Variable	Coefficient	95% CI		P-value
		Lower	Upper	
Intercept	133.8	96.9	170.7	<.001
Education	-14.1	-22.9	-5.2	.002
Self suspecting symptoms as TB	-17.4	-35.3	.4	.056
Acquired TB due to sinful act	33.0	6.8	59.2	.014
Sleep in the same place as before	-21.4	-41.2	-1.5	.035
Perceived cough is not a serious matter	53.1	25.4	80.7	<.001
HIV positive status (reference = HIV unknown status)	40.2	-1.2	81.7	.057
No. of health provider visited prior to diagnosis TB	19.0	10.3	27.7	<.001
Lost income (ref., >5,706)				
None	-22.5	-49.2	4.2	.098
≤5,706 rupees	-64.1	-93.0	-35.3	<.001
Random effect, DOTS Centre				
Estimate of covariance parameters	(306.8)	61.3	1534.4	.223

4.1.13.3 Females only

A separate multilevel model was also run for female patients. Criteria for selecting the variables were the same as mentioned above. Table 44a presents factors included in the model. It was found that self decision to seek medical help (p=0.004), number of health providers visited prior to TB diagnosis (p<0.001) and lost income (p<0.001) were significantly associated with total diagnosis delay. Self suspecting that symptoms were due to TB (p=0.055) was found to be marginally associated with total diagnosis delay. These factors were carried forward to construct our final multilevel model for female patients. DOTS centre was remained as random factor in the model.

The model in table 44c shows that self suspecting that symptoms were caused by TB (p=0.015), self decision to seek medical help (p=0.001), and lesser level of income lost (p<0.001) were significantly associated with reduced likelihood of total diagnosis delay. Visit to multiple providers for care

seeking ($p<0.001$) was strongly associated with an increased likelihood of total diagnosis delay. The random effect was not significant ($p=0.441$).

Table 44a: Multilevel analysis for female cases: type III tests of effect

Female - Total diagnosis delay (days)	
Variables	P-value
Self suspecting symptoms as TB	.055
Self decision for medical help	.004
Chest pain lead to decision	.346
Weight loss lead to decision	.858
Hide of TB diagnosis	.145
Other households may vulnerable to get TB	.180
Installed chimney in the kitchen	.566
HIV positive status	.411
Met nursing home anytime prior to TB diagnosis	.292
No. of health provider visited prior to diagnosis TB (ascending order)	<.001
Mode of travel to diagnosis centre	.462
Lost income	<.001

Table 44b: Final multilevel analysis for female cases: type III tests of effect

Female - Total diagnosis delay (days)	
Variables	P-value
Self suspecting symptoms as TB	.015
Self decision for medical help	.001
No. of health provider visited prior to diagnosis TB (ascending order)	<.001
Lost income	<.001

Table 44c: Final multilevel analysis for female cases: regression coefficient, 95% confidence intervals, and p-value

Female - Total diagnosis delay (days)				
Variable	Coefficient	95% CI		P-value
		Lower	Upper	
Intercept	242.5	173.4	311.6	<.001
Self suspecting symptoms as TB	-44.0	-79.3	-8.7	.015
Self decision for medical help	-72.9	-116.3	-29.5	.001
No. of health provider visited prior to diagnosis TB (ascending order)	36.8	21.6	52.1	<.001
Lost income (reference, >5,706 rupees)				
None	-162.6	-220.0	-105.3	<.001
≤5,706 rupees	-186.1	-251.4	-120.9	<.001
Random effect, DOTS Centre				
Estimate of covariance parameters	(451.4)	35.5	5731.6	.441

4.1.14 Fac tors affecting total delay; multilevel analysis

Multilevel analysis was performed for all cases combined. Factors as shown in the table 45a were included in the model. It was found that female sex was not no longer significantly associated with total delay (p=0.755). Other factors i.e. education (p=0.007), self suspecting symptoms as due to TB (p=0.004), chest pain leading to a decision to seek medical help (p= 0.036), perceived cough is not a serious matter (p<0.001), HIV status (p=0.021), number of health care providers visited prior to TB diagnosis (p<0.001), and finally lost income to get a TB diagnosis (p<0.001) were found to be significantly associated with total delay. Self decision to seek medical help was found to be marginally significantly associated with total diagnosis delay (p=0.056). A final multilevel model was constructed that included gender as well (although it was not found to be an important risk factor) and other independent variables as fixed effect from first models for which p-value ≤ 0.10. DOTS center was included as a random effect in the model.

Tables 45b and 45c show that female sex was not a significant risk factor associated with an increase in total delay (p = 0.432). Symptom i.e. chest pain leading to a decision to seek medical help was found to be significantly associated with an increased likelihood of total delay (p=0.020). Perceiving chronic coughing is not a serious matter that would recover without treatment was significantly associated with an increased likelihood of total delay (p<0.001). Similarly, HIV positive status was found to be a significant risk factor associated with increased probability of total delay (p=0.003) and visits made to multiple providers was significantly associated with an increased likelihood of total delay (p=<0.001). However, level of education (p<0.001), self suspecting symptoms as due to TB (p=0.002), self decision to seek

medical help (p=0.024), and lesser level of lost income (p<0.001) were found to be significantly associated with reduced likelihood of total delay. The random effect was not significant (p=0.183).

Table 45a: Multilevel analysis for all cases: type III tests of effect

Total delay (days)	
Variables	P-value
Sex-female	.755
Caste	.548
Age	.954
Education	.007
Self suspecting symptoms as TB	.004
Self decision for medical help	.056
Chest pain lead to decision	.036
Felt ashamed having TB	.115
Acquired TB due to sinful act	.244
Bacteria is the cause of TB	.977
Perceived cough is not a serious matter	<.001
Other households member may vulnerable to get TB	.541
Perceived TB makes jobless	.842
Installed chimney in the kitchen	.419
Ever smoked	.631
HIV positive status	.021
Met private physician at sometime prior to TB diagnosis	.222
No. of health provider visited prior to diagnosis TB (ascending order)	<.001
Total help seeking cost (direct medical cost)	.713
Lost income	<.001

Table 45b: Final multilevel analysis for all cases: type III tests of effect

Total delay (days)	
Variables	P-value
Sex-female	.432
Education	<.001
Self suspecting symptoms as TB	.002
Self decision for medical help	.024
Chest pain lead to decision	.020
Perceived cough is not a serious matter	<.001
HIV positive status	.003
No. of health provider visited prior to diagnosis TB (ascending order)	<.001
Lost income	<.001

Table 45c: Final multilevel analysis for all cases: regression coefficient, 95% confidence intervals, and p-value

Total delay (days)				
Variable	Coefficient	95% CI		P-value
		Lower	Upper	
Intercept	165.0	126.0	204.0	<.001
Female (reference = male)	8.2	-12.3	28.8	.432
Education	-16.4	-24.9	-7.9	<.001
Self suspecting symptoms as TB	-28.9	-46.7	-11.1	.002
Self decision for medical help	-23.4	-43.7	-3.1	.024
Chest pain lead to decision	23.2	3.7	42.8	.020
Perceived cough is not a serious matter	55.4	29.4	81.5	<.001
HIV positive status (reference = HIV unknown)	61.8	21.7	101.9	.003
No. of health provider visited prior to TB diagnosis	24.9	16.7	33.2	<.001
Lost income (reference, >5,706 rupees)				
None	-61.5	-88.8	-34.2	<.001
≤5,706 rupees	-96.4	-126.4	-66.3	<.001
Random effect, DOTS Centre				
Estimate of covariance parameters	(269.0)	61.7	1171.8	.183

4.2 Qualitative study results

Themes were introduced and questions were asked by the moderator of the focus group discussions (FGDs). The results presented below mainly describe participants' own views and experiences of TB. Four FGDs were organized separately among tuberculosis patients, private practitioners, community people, and DOT providers. The views, feelings, opinions, and experiences were summarized by key themes as follows:

4.2.1 Gender differences in knowledge and perception of TB

TB patients in focus group discussions perceived that knowledge about TB varied considerably between men and women. Most of the participants pointed out that TB is a dangerous disease which affects particularly poor people. Few of the participants thought that TB is an incurable disease and it is caused by the evil things done in the past life. This perception was held predominantly by elderly and illiterate people. One female TB patient expressed her feelings as:

"I had a cough for a year. I thought it is due to cold and smoking. After six/seven months I went to private pharmacy and bought the medicines. I felt there was slight improvement of my symptoms. One day while I was taking medicines, I had vomiting and I saw there was some blood stain. I suspected I might have Sukuterog (TB). I went to Maiti (Parent's home) asked the mother for my treatment. My mother took me to the temple of Kali (Goddess) to pray for me and sacrificed a black hen in the temple in the name of Goddess Kali. My mother told me that your Sukuterog (TB) will be cured very soon by the Goddess Kali. My cough was not improved. I was losing my weight, although I did not see the blood stain in my cough anymore. After one year my sister-in-law took me to the private clinic. I was examined there. Three sputum specimens were tested. She (female doctor) referred me to Friends of Shant Bhawan (an NGO DOTS clinic). I am taking medicine for a month but I don't know what was wrong with me." (female TB patients currently under DOTS treatment)

Different types and causes of TB were discussed in the FGD. In the view of some of the female TB patients, TB is caused by worries, social pressures, smoking/drinking, and too much thinking. Mainly it affects the females after they get married. Different views were highlighted by male participants; they believed that TB is caused by hard work, poor diet, and frequent sex with their wives, too much drinking alcohol and smoking, as well as the heredity mainly affecting the men.

"I worked in the garment factory for 3 years. I smoke about 10-15 cigarettes every day and I drink whisky once a week. I got married in January (last week) i.e. it was two months before. I felt weak. I lost my appetite and weight for a month. I went to Bir Hospital to see the doctor. I was asked for chest x-ray and sputum test. After two days I was referred to DOTS centre to take TB medicines. Now I am taking medicines for a month. I think I got TB due to hard work in the factory, lack of sufficient food and smoking too much." (male patients currently under DOTS treatment).

Knowledge and perceptions regarding TB also influenced patients' health care seeking behavior and tendency to have someone accompany them. The DOTS providers said that they (women) could not present their symptoms, illness, and other things related to TB as strongly as men. It could be due to their poor education, language barrier (most of the TB patients attending DOTS clinic come from a minority ethnic group; i.e. Tamang and their mother-tongue is not primarily Nepali), fear, shyness and hesitation. That explains why they (especially women) need someone accompany to them.

One of the participants noted a very interesting point that "*women are unwilling to go to health services for their own health and they hide their illness because they think their absence will disturb household and economic activities, that's why male has to accompany them.*"

4.2.2 Gender differences by socio-cultural aspects

TB patients during the discussion raised the issue of fear of social consequences of the TB disease. It might be the isolation of the individual in the family and in the community. Both male and female patients expressed this fear. The fear of social isolation, the tendency of hiding the TB disease and fear of breaking the relationship between wife and husband was most common among women.

Hiding disease is a serious matter in delay in care seeking. Hiding the disease, knowing about it, but not initiating treatment, is a serious matter where the TB cause problems individual remains a serious source of infection and where others may not be aware of the risks. Some participants (TB patients) described that they were afraid of disclosing the truth out of a sense of shame at being diagnosed with TB. The fear of losing friends and neighbours and not being able to socialize with

others were also mentioned as strong contributing factors to reactions of concealment of the disease. Women expressed a fear of losing the opportunity for unmarried sons and daughters to get married and themselves losing their husbands. Participants generally thought that women were most likely to hide their diagnosis.

"I had a fever and night sweats for last six months. I did not tell anybody in family in this regards. I together with friend went to the public hospital (Bir Hospital) for examination after 4 months. I had no idea about TB symptoms. Doctor told me I had TB. I was afraid. I became sad. I did not take medicines as he (doctor) prescribed. I did not tell anyone in the family about it. I knew I would have problem in getting married. After three months I got married. I lived about one month with my husband in his home. Then I went back to my parents' home. I told my mother about my health. She told my father. They became very afraid that I would get divorced from my husband if he knew about my disease. They took me to private physician. He made all the examinations and told me I got TB. I did not tell him about my previous history of TB diagnosis. He prescribed the medicines. I started to buy medicines from his pharmacy. It costs 60 rupees per day. It was so expensive. My parents were not able to afford. After one month, the pharmacist advised me TB drugs available free of charge in the DOTS centre. I felt hesitation to go there. My parents went there and requested to the doctor of the DOTS centre to maintain the confidentiality of my TB medication. Now I am eight months of treatment. My husband and other members of his family hopefully do not know about my disease. I am going back to my husband's place after one month as doctor advised me." (Female TB patients, aged 26 currently under DOTS treatment)

DOTS providers felt that negative perceptions of TB were rampant. People usually did not want to talk and to share the things with TB patients. They always tried to avoid them. These negative statements were more common among

female patients. To avoid these negative feelings, patients hid their diagnosis from friends, community, and family members. Cases of husbands leaving their wives were reported by health workers: 'I asked the lady, what was the cause of your staying with your parents, she said my husband said any woman who is having TB might have HIV/AIDS' (female DOTS provider). They also reported that they were some cases, especially among unmarried girls, who faced marital difficulties resulting from their illness. Health providers believed that women felt more stigmatized than men as they were more likely to hide or concealment of TB diagnosis and treatment.

It was discussed in the FGD with the community people that females are not allowed to travel long distances alone. A male member of the family, even the youngest brother or son, is required to accompany a woman. These types of cultural norms delay TB diagnosis. Shame and embarrassment can lead to reluctance on the part of women to share disease conditions with family and health providers and this may prevent them from reporting to health services for the diagnosis and treatment of TB. An unwillingness to tell others is due to the stigma associated with TB.

4.2.3 Gender differences in their role in the family

All focus group discussions participants described: Men were characterized as hard working, as being independent, as being the pillar of the family, as having extensive social networks, as having decision making power, as having access to resources, as having good education, as being more respected in the family and community than women, and as having less responsibility towards their children and housework.

Women were characterized as being dependent on husbands and their families, as thinking a lot and always worrying, as being patient fear of social isolation, always being at home taking care of her children and senior members of the family, being less status in the family, community and in the workplace, as being lack of decision making power, as having poor access to resources, as being pressure to hide illness and as having poor social network and movements.

The family would make sure that the man was diagnosed and treated before other family members. A wife was expected to care for her husband, while the husband was not subjected to the same expectations. The following metaphor demonstrates the importance of the pillar of the family.

"Individuals, who are pillars of the household, should be taken care of by the family. If the head of the household is strong enough, he can drive the family very well and he can take care all of the members of the family. If he is weak and suffering from the illness, the whole family will come into a difficult situation" (Man who is under DOTS treatment).

DOTS providers acknowledged that women needed to ask permission from their husbands or elders to attend treatment. One health worker expressed it was an important problem: *'even if she is dying, she has to abide by that advice.' (male DOTS provider).*

4.2.4 Gender differences in seeking care

Gender difference was described by both males and females patients. The typical health seeking pattern of men was said to mainly consist of neglecting symptoms until the disease was in an advanced stage.

One of the most most common choices of care seeking was the private sector, including private pharmacies, private practitioners, and traditional healers

(Dhami-Jhankri). This was more common among women. Easy access, convenient time, possibility of keeping the disease a secret, and possibility to have more healers' attention once they pay the money for consultation.

"I had a cough for a long time and went to public hospital (University Hospital) for check up. I visited the doctors after 7 hours, a long waiting time. He sent me for x-ray and asked to come next day. I went to X-ray section and waited 2 hours to get it. I find their behavior was not friendly. And he (the doctor) did not listen my voice carefully. I lost my whole day and I did not go for work. I decided not to go to that hospital anymore. I visited private doctor at the evening. Everything was done within an hour. I was told I got TB. I am taking medicines as he prescribed from one of the DOTS centres established in private sector. I am very satisfied with getting TB treatment from that centre." (Women TB patients, working as a teacher in public school)

Patients expressed a need for prompt communication about test results of their sputum. They stated that they often worried when they did not hear back from their providers. They often get informed after a long waiting about 4 to 6 hours.

One of the female participants said

"My husband took me to TB hospital for check up. We spent whole day and got nothing. We were asked to come back next day early in the morning. We went early morning next day got chance to see doctor (a man with white coat) after 6 hours. Again I was sent to laboratory for sputum test. I was asked to come back next day with sputum collecting in the sputum container which was given to me. If this was the case why should I have to lose my work for two days? Why didn't they make a communication with me that I would have to come with early sputum collection and just sent to laboratory? I did not visit the hospital anymore. My husband went there and brought the results of sputum after 2 weeks. I would not like to refer any people to there. I found people working there not friendly and not supportive.

Patients valued being treated with respect and dignity by providers. They wanted providers to respect their needs and individuality, and to extend respect to family members as people who can provide additional information and improve patient-provider communication. Patients defined showing courtesy as displaying a warm and welcoming manner. They valued providers with whom they were able to establish a trusting relationship. One of the female TB patients noted her feelings as

"We feel like they (doctors) are truly the good mothers who give good care to their children. If we have someone who just does not care us a lot, maybe we would not have good TB treatment and maybe we would die".

Female patients often described being more worried than males as the women are often socially and economically dependent on their husbands and in-laws. *"I think when women have this disease; it will affect their spirit more. They are often afraid and worried that other people will keep away from them. Especially those women who are not primarily bread-winners of the family, or who cannot earn money or who live with the husband's extended family are often much more affected by other family members like me" (women TB patient).*

As mentioned above, male patients more easily accepted to eat and live normally with the whole family when they were so requested by family members. On the contrary, female patients often wanted to protect other family members from the disease. Thus, even when they were requested by family members to eat together with them, female patients more commonly continued to isolate themselves. *"I always used to eat last. I pretend them (other family members) I had no hunger right now. I used to keep myself busy outside work (taking care of cattle) especially when they sat to eat either dinner or lunch. I tried to keep myself isolated. It was because my friend (a former cured TB patient) said to me it (TB) could be transmitted to others during the treatment period as well (first two*

month of treatment). Therefore, I was afraid of spreading the TB to my children, husband, and other family members. Even they asked me to eat together, I always avoided them, and I wanted to see my family healthy" (women TB patient).

One of the private physicians highlights her views as *"the TB patients usually come from very poor families, and they usually live under poor conditions. As practiced in the community that the man should get treatment before the woman since he is the pillar of the family. In the countryside, the status of the women is much lower than of men. When men get TB or any type of disease, all the family resources may be spent and, moreover, financial resources from the relatives may be collected, but this is not the case for women. So they hide their illness and it leads to delayed TB diagnosis and treatment." (Female doctor, working in the private clinic)*

In general, women were described as shy and hesitant which was thought to have a negative effect on their care seeking behavior and their interaction with the doctor. They were perceived as delaying seeking medical care, and when finally seeing the doctor, being reluctant to and ashamed of talking about their symptoms. Compared to men, they were said to have a greater fear of TB associated stigma. Women were also thought to have limited knowledge in care seeking matters. The care taking role of women was emphasized as one of the factors limiting women's access to time. Overall resources for women in terms of time and money were considered scares, due to their inferior position in the household as well as the fact that they were busy taking care of their family and children.

"Nepalese women are very shy, they have a character of their own. You know they are afraid when they make contact. They consult me about their health, and after examining them I asked for chest x-ray and sputum examination. They come back to me after 10 days with chest x-ray and result of sputum examination. I asked, "why did you wait such a

long time?" They said that they were very busy taking care of their children and the family. They further replied that school examination was going on of their children. Maybe this is how the TB diagnosis gets delayed." (Male doctor)

The delay mentioned here was understood as being caused by the patients delaying these analyses by simply not attending to them promptly. The gender characteristics such as shyness among women, causing them to avoid medical examinations, or lack of decision making power to a need to ask for permission before seeking care could be performed.

DOTS providers thought women initially consulted pharmacies more in urban areas and traditional healers in rural areas. It is because confidentiality is more important to them. They thought that most TB patients could not afford the fares to attend treatment clinics, and felt women experienced more problems due to lower income and characteristic of dependency. It was acknowledged that this reduced care seeking. Some patients stopped work. It was due to inconvenience of opening and closing time of the DOTS centre. They had to go early in the day for work, but our DOTS centres usually open at 10 in the morning and close at 2 in the afternoon. They expressed that male patients who were still working did not feel that treatment interfered with their work; however, women whose work, if any, was usually in a garment factory, were inconvenienced by the time demands of the treatment. Discussion came up that medical facilities are perceived as more time consuming and less confidential.

DOTS providers expressed that even if a women notices symptoms of TB, she may completely ignore these symptoms because of competing demands. Women may believe that they cannot afford the luxury to take time out to visit a

health centre because this would represent time and effort lost to other essential and possibly more important, activities such as child care, food production and farm work. We have seen patients working in factory attending our clinics mostly temporary or daily paid. It makes it difficult for them to leave their work to attend to their health problem.

"When women suffer from conditions such as tuberculosis, they often deny their symptoms until they are too severe to ignore because of heavy competing workloads." (Female DOT providers)

They said that before a woman decides to seek care, she must be able to recognize the signs and symptoms that indicate the need for care. However, a lack of educational opportunities and poor understanding of health related matters that many women are not familiar with different diseases and their presentations. It leads to delay in seeking help. For example,

"Some women assume that coughing for a long time is due to cold and personal smoking or think that chest pain is normal because they used to carry heavy pots full of drinking water daily from far and because they have suffered from it for as long as they can remember. Moreover, as a result of cultural taboos, women may be unable to interpret symptoms of illness, particularly as they relate to the chest. (Female DOTS provider)

A leader of the community reported that *"woman here does not take care of herself at all. The husband or the children always come first, for the family and children she does have time, but for her own health, she has never"*. (a male community leader)

Women are less likely than men to consult modern health services, wait longer than men to seek treatment when ill, are reluctant to spend limited resources on their own needs, and often cope with illness by self treatment, by consulting traditional healers, or by simply living with the condition and its resulting discomfort.

Women associate the use of a dispensary, clinic, or hospital services with the health of their children and generally attend health centres primarily to obtain care for their children, although they may also be suffering from a health problem like TB.

"To take care of her own health, a woman must recognize herself as an individual, find herself worthy, strengthen her self-esteem, and have the power to decide about own health." (a female community volunteer)

Regarding the access issues, the community people pointed out that people should be able to receive reliable care close to where they live. However, health facilities are often poorly distributed poor presence of the health personnel, and lack of laboratory facilities for sputum examination. Difficulties in reaching health facilities, lack of traveling costs and receiving poor support from the family, community, and workplace are the major barriers for women to get TB diagnosis in time.

4.2.5 Suggestions for improvement

When discussing various aspects of gender differences, some of the discussion pointed out the problems with the existing public health programmes run by the government, including the TB control programme. It appears that there was poor co-ordinations and collaboration between NTP and the private sector, no role in

the policy making process of TB control, DOTS strategy and other activities of the physicians working in the private sector. Thus it is needed to develop a strong public private partnership mechanism ensuring referral of the patients to DOTS centres, their respect ensures full course of TB treatment, and regular feed back of the treatment to the private physicians of their referred patients from the DOTS centres (public sector). Doctors in the private sector were considered to have less knowledge about tuberculosis diagnosis and treatment as per the National guidelines developed by the NTP. Therefore they are more likely to prescribe antibiotics or other medications irrationally. Improved knowledge of the doctors who work in the private sector through regular training and orientation from NTP, easier referral to TB diagnosis were mentioned.

Participants of our focus group discussions expressed that social support from others, such as relatives, friends, and neighbors can play an important role in fostering the physical and psychological health of women, and can greatly influence the care seeking behavior to TB treatment of women. Many women, particularly poor women, and those solely responsible for the care of their households, lack the support of the family, someone to tell her to go to the doctor, to take care herself, no one worries about her. Less importance may be placed on the health of female members of the household, compared with male members, and consequently, a woman's TB illness may receive little attention from others. Although men are strongly pressured by other family members, particularly from mothers and wives, to seek medical treatment for TB and other types of diseases, women are unlikely to receive such back-up. *"A woman's role is to nurse, not to be nursed."* (female community volunteer)

- TB awareness activities should be carried at the community level through DOTS centre
- Contact tracing at least those who are close contact of infectious TB cases should be strictly followed up.
- To increase the chances of working women and men receiving TB care, DOTS services might also be established near to working place or at working places (factory and industries).
- Public and private partnership activities need to be ensured both in rural and urban settings, not only at district or national level but also at the DOTS centre level.
- Women need to be broadly educated about the importance of regular health care for themselves, as well as for their children. Because women tend to place great importance on their children, it may be useful to present health educational messages and awareness activities that instill the notion that it is important that a mother be healthy to maintain her child's health.
- Health service must be sensitive to the shame and embarrassment. If the stigma associated with TB is recognized, health services could improve the prospects of involving mothers' groups, as community volunteers in the DOTS system.
- Health facilities must be made more accessible to improve their use in the prevention and control of diseases like TB, leprosy and others. Mobile clinics or the provision of collection of sputum samples and transportation to the microscopy centre might greatly improve timely diagnosis of TB especially for women.

- A women centred strategy would be required such as encouraging and involving community female health volunteers to visit homes or organizing TB educational advocacy meeting at the community level. This would promote identification of TB suspects and referral to TB diagnosis centre.
- Health personnel should educate TB patients of contacts' examinations and the value of contact tracing. In this way delays in TB diagnosis and treatment could be reduced and the chain of transmission would be cut down.