CASE-FINDING IN TUBERCULOSIS PATIENTS

DIAGNOSTIC AND TREATMENT DELAYS AND THEIR DETERMINANTS IN PAKISTAN

Dr. Mubina Agboatwalla [1]

Dr. G. N. Kazi [2]

Dr. Karam Ali Shah [3]

Dr. Ashique Domki [1]

Mr. Sohail Saeed [1]

Mr. Asif Ahmed [1]

1. Health Oriented Preventive Education (HOPE), Pakistan
2. World Health Organization, Geneva, Switzerland
3. National Tuberculosis Programme (NTP)

HOPE

NTP

National Tuberculosis Program

World Health Organization

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Executive Summary

Delay in diagnosis of Tuberculosis has reaching implications by contributing towards the high mortality due to tuberculosis. Delay in diagnosis results in increased infectivity in the community contributing to late sequaele and overall mortality. Pakistan ranks as the country with the 6th highest burden of Tuberculosis globally with an estimated incidence of 171/100,000. Pakistan has a low case detection rate of 6% while the overall case detection rate in EMRO is 24% and the global target is 70% DOTS case–detection rate case detections rate can only by improved by admiring the delay in case finding. The delay may occur at the level of the patient or at the level of the health system. Factors which contribute to these delays are numerous and it is important to identify and address these factors by drawing strategies through the National TB Control Programme. A study was conducted to elicit these delays in Pakistan.

This is part of a multi–center study conducted in 7 countries of the EMRO Region– Egypt, Iran, Iraq, Pakistan, Somalia, Syria and Yamen. This cross–sectional study was conducted in the mega city of Karachi through 3 Chest Clinic of NTP from January 2003 to December 2003.A total of 844 patients with sputum positive tuberculosis above the age of 5 years were enrolled. The objectives of the study were to assess the delay in TB diagnosis and treatment of new positive pulmonary TB cases detected in DOTS areas and their determinants.

Standard case definitions for the various delay as recommended by WHO and IUALTD. Data entry was done using the statistical package of EPI Info Ver. 6 and statistical analysis was done using the same software. A Multivariate logistic regression analysis was performed to adjust for confounding effects of several identified determinants of diagnostic and treatment delay. Around 73.5% patients were between 15–35 years of age with a mean of 30–75 years. Of these 55% resided in suburban areas. Nearly 55–57% were illiterate or just able to read and write. Cough and fever was present universally in all patients. The health seeking pattern indicated that the initial action taken by the patients was either self –medication (50%) or direct purchasing of drugs from a medical store (42%). Homeopathic (Traditional Medicine) was used by 74.2% patients. In an over

whelming majority (90.9%), the patients consulted a private HCP in close proximity to the neighborhood of the patients. None of the patients consulted the NTP facility in the first instance. Though nearly 90% of the patients consulted the Private HCP within proximity to the residence, only 5.7% of them could make the diagnosis of tuberculosis. A mean of 5 Health Care Providers were consulted before the patient was referred to the NTP facilities. The total Delay i.e. the time period from the onset of symptoms to initiation of treatment was a mean of 100.7 days. Patient delay i.e. the time period which the patient took from the onset of symptoms to seeking advise from a HCP contributed to only 10% of this delay i.e. 9.9 days. The health care component i.e. the time from seeking health care to diagnosis was a mean of 52.75 days. This was contributed chiefly by the Private HCP. The significant determinants to diagnostic delay included the stigma associated with the disease, the income (the lower the income, the longer the delay) as well as the time taken to reach the health facility. Also, patients who consulted other alternate forms rather than HCPs also had a longer delay. Private HCPs took a longer time in starting treatment after diagnosis. It is clear from the afore mentioned results that the health system is chiefly responsible for the long delay between onset of symptoms and treatment of tuberculosis. Involvement of the private HCP with the main stream National Tuberculosis Control Programme is essential to reduce the delay in diagnosis of TB. The NTP Diagnostic centers can be linked with the private HCPs (GP's) where patients suspected of having tuberculosis could be referred for diagnostic tests. Free of cost laboratory tests for tuberculosis, well help increase care detection rates, as income was an important determinant in diagnostic delay. Linkage with private practitioners, who practice within close vicinity of patients as well as increasing the number of DOTS treatment centers in the periphery will help in reducing the delays, as distance to the health facility was also an important determinant to the delay. Efforts are also needed to lessen the stigma associated with tuberculosis as many patients avoid contacting the NTP and on the contrary visit multiple private HCPs, in the hope of looking for an alternate diagnosis. Patients awareness on tuberculosis especially related to the sigma and symptoms of tuberculosis as well as the DOTS programme needs to improved though mass media distribution of IEC material and IPCs. The medical practitioners also need to become more familiar with the NTP progarmme and a strong linkage needs to be developed between the public sector National Tuberculosis Programme and the private practitioners.

Introduction

Delay in diagnosis of tuberculosis has far reaching implications by contributing towards the high morbidity due to tuberculosis. Early diagnosis and prompt effective therapy form the key elements of the Tuberculosis Control Programme. Delays in diagnosis results in increased infectivity in the community and it is estimated that an untreated smear positive patient can infect on an average 10 contacts annually and over 20 during the natural history of the disease until death (1). Delay in TB diagnosis may also lead to a more advance disease state at presentation, which contributes to late sequalae and overall mortality. Smear positive cases are more likely to infect other individuals. In Pakistan, case finding of TB patients is passive depending upon the patients to present themselves at the health facility, either private or public, when they suspect they have the symptoms of the disease and then it is left to the discretion of the health care provider to diagnose the case and start treatment. The National TB Control Programme (NTP) in Pakistan includes the components of case–finding, case–holding and treatment and health education.

Pakistan ranks as the country with 6th highest burden of Tuberculosis globally with an estimated incidence of 171/100,000 (2) Al though DOTS was initiated in Pakistan in 1995, its expansion did not begin until 2000, when the NTP Programme was reactivated. As a result both DOTS coverage and DOTS detection rate doubled (3) Although DOTS activities are rapidly expanding in Pakistan, with DOTS population coverage increasing from 28% in 2001 to nearly 45% by 2002 the DOTS case detection rate remains a low 6% (3) The overall case detection rate in the EMRO region is 24% while the global target is to reach 70% DOTS case detection rate by the year 2005. The low case detection rate in EMRO is chiefly due to the low detection rates in Pakistan (6%) and Afghanistan (9%).

Case – detection rates can only be improved by addressing the delay in case – finding. The delay may occur at the level of the patient delay or at the level of the health system Doctors (4,5). The health care system delays are further divided into health system delay, diagnostic delay and treatment delay. The combined "Patient" and "Doctor" delay is known as "Total Delay". Factors which contribute to these delay are numerous, and it is important to identify and address these factors by devising strategies through the National TB Control Programme (NTP).

Material And Methods

Study Setting

This study is part of a multi-country study being conducted in 7 countries: Egypt, Islamic Republic of Iran, Iraq, Pakistan, Somalia, Syria and Yemen. The study was conducted in a mega city of Karachi and three Chest clinics were chosen as study sites where DOTS has been implemented using the WHO-IUATLD recommended DOTS strategy. The centers were Nazimabad Chest Clinic, Malir Chest Clinic and Ojha Institute of Chest Diseases.

All newly diagnosed smears positive cases aged more than 15 years were included in the study.

This was a cross sectional study of newly diagnosed TB cases. A representative sample (no=800)* of newly diagnosed smear positive pulmonary TB cases affected and notified during an 8-month period in the metropolis of Karachi were consecutively included in the study. Persons below the age of 15 years excluded from the study. Cases were interviewed consecutively according to the questionnaire developed for this multi-country study. The questionnaire was pre-tested (Annex 1) and was translated into the local language (Urdu) of the country. Health workers underwent intense training on interview and probing techniques. Health personnel included doctors and paramedical staff who directly interviewed the patients during the first 2 weeks of their treatment, after getting a formal consent.

The patients were asked questions regarding the knowledge of the individuals concerning tuberculosis and perceived causes of tuberculosis. The questionnaire also included questions related to age, sex, literacy and socio economic status of the respondents. The patients were also asked questions regarding the elements that might influence health seeking behavior such as fear of what would be found on diagnosis, fear of social isolation, stigma. One of the components of the questionnaire included questions relating to satisfaction of care and on the medical costs faced until the TB diagnosis. To assure reliable answers about quality of care interviewers did not include the health center staff.
With a population of more than 140 million, and disease frequency of 1.8%, with allowed

error 0.1%, the least reliable sample size that would be representative to the population is 235 subjects, at 95% confidence interval. However, owing to the large number of studied variables that may affect the study power, 800 cases will be included.

Although it was best to get a list of all smear positive cases for all the TB centers and then to perform proportional to size cluster sampling (PPS), this was not possible in Pakistan hence we considered all new pulmonary TB cases managed in the selected center to be included in the study till reaching the required sample size from each center.

The following case definitions were followed

Diagnostic delay:

Time interval between the presentation to a health care provider and labeling the patient as TB patient (TB diagnosis)

Patient delay (health seeking duration):

Time interval between onset of symptom and the presentation to a health care provider

Health care systems delay:

Time interval between timing of seeking care at health care provider (HCP) and TB treatment

Health care related component of diagnostic delay:

Time interval between the timing of seeking care at a health care provider and TB diagnosis

Treatment delay:

Time interval between TB diagnosis and onset of treatment

Total delay:

Time interval between onset of symptoms and TB treatment

Data Entry was done using the statistical package of Epi Info6 and statistical analysis was performed using the same software. A Multivariate logistic regression analysis was performed to adjust for confounding effect of several identified determinants of diagnostic and treatment delay of TB patients. Level of significance was determined at 95% (p value < 0.05).

Strengths and limitations

This is one of the very few only multi-country study on delay of TB diagnosis and treatment after the one conducted by The Research Institute of Tuberculosis, Japan between 1991 and 1994. It was performed on a large number of patients (800 for each of the 7 countries), the largest among the studied performed so far. It was also the first one performed in this world region on this specific research field. There were certain limitations to the study these included

- **Interviewer bias:** This was controlled by testing the interrupter reliability of the questionnaire during pre-testing
- **Recall bias:** This is generally present in all retrospective studies. We minimized this by collecting data from records.
- **Patient bias:** (mostly recall bias)
- Only new and smear positive pulmonary TB cases were included in the study (about 55% of total pulmonary TB cases) and the results may not be applicable to patients affected by smear negative pulmonary TB or by extra-pulmonary disease.

Informed Consent

Informed Consent was obtained from the study subjects, which was in the local language Urdu. Oral consent was taken in the presence of the interviewer. The consent form was approved by the ethical review board of HOPE.

Results

This was a twelve-month study conducted from January 2003 to December 2003. Patients were enrolled from March 03 to December 03. A total of 844 patients with sputum positive tuberculosis above the age 15 of years were enrolled. The study was conducted in three chest clinics of Karachi Malir Chest Clinic, Nazimabad Chest Clinic and Ojha Institute of Chest Diseases.

Table1: Patient distribution according to the health facility

Health facility name	n	%
Malir Chest Clinic	262	31
Ojha Institute of Chest Disease	185	21.9
Nazimabad Chest Clinic	397	47

As seen in Table 1 the maximum numbers of patients were enrolled from Nazimabad Chest Clinic 397(47%), followed by Malir Chest Clinic 262(31%) and Ojha Institute of Chest Diseases 185 (21.9%).

Table 2: Socio-Demographic Characteristics of TB Patients

Age	
<=15-35	620 (73.5%)
>35	224 (26.5%)
Mean (SD)	30.075 (13.173)
Sex	
Male	417 (49.4%)
Female	427 (50.6%)
Education	
University	8 (0.9%)
Primary-senior	358 (42.4%)
Illiterate/read & write	478 (56.6%)
Occupation	
Technical/professional	53 (6.3%)
Clerical/workers	127 (15.1%)
Students	77 (9.1%)
Unemployed/hw	586 (69.5%)
Income	
Savings	4 (0.5%)
Income=expenses	314 (37.2%)
In debt	526 (62.3%)
Residence	
Urban	339 (40.2%)
Suburb	464 (55%)
Rural	34 (4%)
Homeless	7 (0.8%)
Marital status	
Married	498 (59%)
Single	323 (38.3%)
Divorced/Separated	5 (0.6%)
Widowed	18 (2.1%)

Of these patients, 49.4% were males and 50.6% females.

Majority of the patients (73.5%) were between 15 to 35 years of age. The mean age being 30.075 years. The age distribution indicates that majority of the patients were between 15 to 30 years of age. About 20% patients were between 20 to 24 years of age, while 14.6% patients were between 25 to 29 years of age. Around 24.9% patients more then 40 years of age. Overall literacy rate was very low with 478 (56.6%) being either illiterate or just able to read or write. University education was seen in only 8 cases. It was interesting to note that both male and female TB patients had a similar educational background with 55 to 57% patients being either illiterate or just able to read or write. While 42% patients had studied up to primary or middle level. Very few patients (4) were able to save some amount from their income, the majority 62.3% were generally in debt. Most patient belonged to urban 339 (40.2%) or suburban areas 464(55%).

By and large, most TB patients were married (male 57.8%: female 60.2%). However, 40.3% males and 36.3% were single. Other were either divorced or widowed.

Figure 1: Age Distribution of TB patients

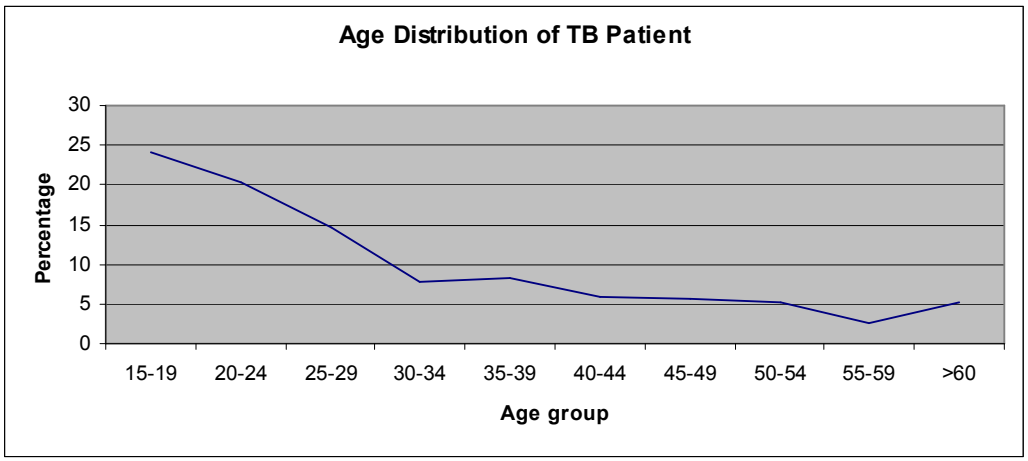


Table 3: Education status of TB Patients by Gender

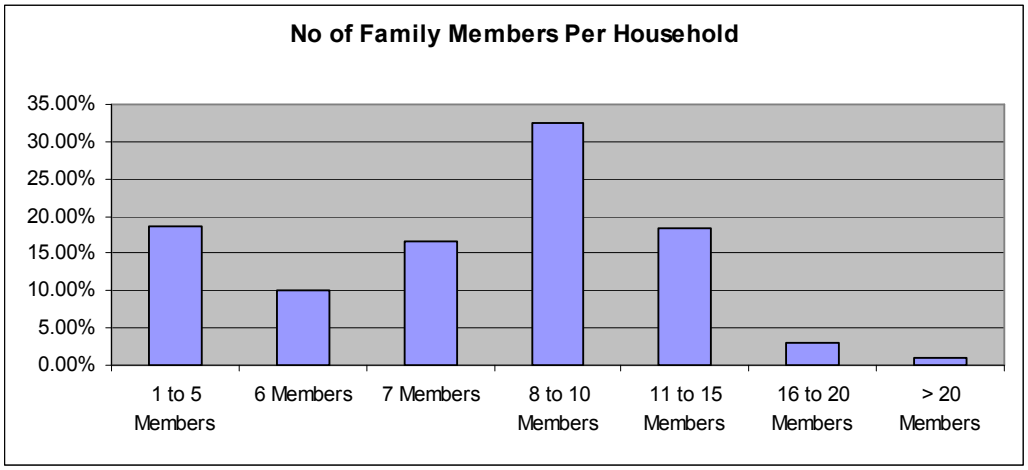
Education	Male %	Female %
University/higher	1.40	0.50
Primary /middle	42.70	42.20
Illiterate/read/write	55.90	57.40
Total	49.40	50.60

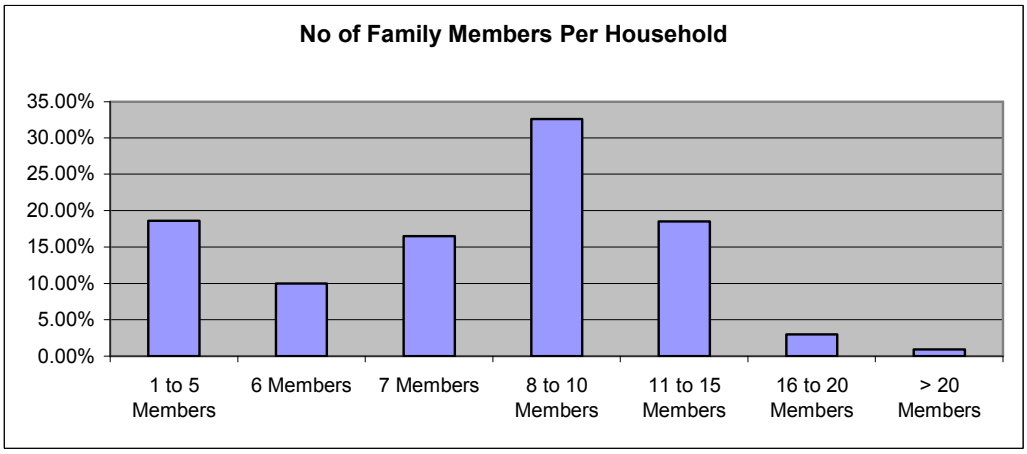
Table 4: Occupation of TB Patients

Occupation	Male %	Female %
Technical/Professional	11.50	1.20
Clerical/Workers	26.40	4.00
Students	6.00	12.20
Unemployed/Housewife	56.10	82.40
N	100	100

The majority of the male TB patients were unemployed (56%), while a quarter of them were either clerks or workers. Very few 11.5% were professionals. Most of the women 82.4% were housewives while some 12.2% were students.

Figure 2: No of Family Members Per Household2





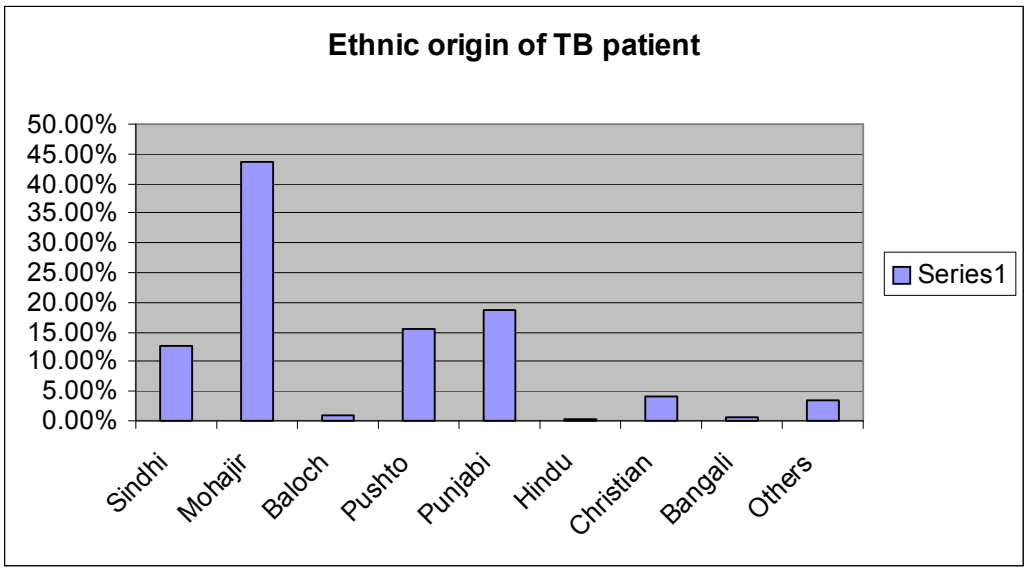
The average family size of these patients was 8.4 persons per household. 32.6% of households had 8 to 10 members while 18.5% households had between 11 to 15 persons in the house. 28% households had around six members.

Table 5: Number of Rooms Per Household

No of rooms	Total No	Percentage (%)
1 room	139	16.50
2 rooms	409	48.50
3 rooms	196	23.20
4 rooms	70	8.30
5 rooms	15	1.80
>5 rooms	15	1.80
n	844	100

Patients belonged to households which were small comprising of either one or two rooms (1 room 16.5%: 2 rooms 48.5%). Very few 3.6% patients lived in households with five or more rooms. The mean crowding index was 3.169(1.902), with a median of 3.500.

Graph 3: Ethnic Origin of TB Patients



The ethnic pattern shows that TB patient were predominantly Mohajirs (one of the ethnic groups), 43.6%, followed by Punjabis (18.8%), Pushtos (15.4%) and Sindhis (12.5%). This pattern indicates the cultural mix of the mega city Karachi.

Table 6: Risk factors for TB among newly diagnosed patients in Pakistan

Characteristics	n (%)
Smoking	
Never	594 (70.4)
Current smoker	14 (1.7)
Quitted	236 (28)
Daily consumption of Cigarettes	
Median	10
Min-max	2-23
Duration of cig. Smoking (yrs)	
(current/quitted) Median	18
Min-max	0-33
Previous exposure to TB patient	788 (93.4)

Smoking was most common in males (99.5%), only 18 females smoked. Of them 2 were current smokers, while 16 had quit smoking. Nearly 52.8% males who were previous smokers had quitted smoking. Only 2.9% were still smoking after developing tuberculosis. In keeping with cultural norms, 95.8% females were non-smokers though 3.7% had smoked in the past. Of the 14 patients who were still smoking, 46.7% patients were smoking 10 to 15 cigarettes per day, with a minimum of 2 and the maximum of 23 cigarettes. The median duration of smoking was 18 years. History of contact with a TB patient was an important risk factor and 93.4% patients had previous exposure to a TB patient.

Table7: Symptoms of Patients with Tuberculosis

Symptoms	n	%
Cough	844	100
Fever	844	100
Loss of weight	843	99.90
Haemoptysis	97	11.50
Chest pain	777	92.30
Others	109	12.90

Cough and fever were the predominant symptoms present in all cases. Weight loss and chest pain were also present in 92 to 99% cases. However, haemoptysis was present in only 11.5% cases. After the onset of symptoms the patients either tried self-medication or consulted health care providers or other alternate forms of treatment.

Table 8: Symptoms that Motivated TB Patients to Seek Health care

Symptoms	n=809
Cough+ any other symptom	728(86%)
Fever + weight loss	101(11.9%)
Others	-

Cough accompanied by another symptom was the most common symptom, which prompted the patient to seek health care (86%). In 101 patients, fever accompanied by weight loss was a main reason for the patient to seek health care.

Table 9: Types of health care providers consulted by Patients after Onset of Symptoms

Provider	Total	Percentage (%)
Doctor	844	100
Self Treatment	504	59.7
Homeopathic	627	74.2
Health Worker	77	9.1
Medical store	618	73.2
Others	70	8.2

Interestingly, patients not only consulted doctors (HCPs) but a sizable proportion also considered other alternate forms of treatment. After onset of symptoms, 59.7% patients with suspected TB started self-medication, while 73.2% took medicines directly from the medical store. It was striking that 74.2% patients consulted homeopathic doctors for the complaints. Only 9.1% patients consulted health workers only. We tried to correlate the onset of symptoms as regards consultation with the health care providers.

Table 10: Relation of Onset of Symptoms as Regards Consultation with HCP

Symptoms	Before Consultation with HCP	After Consultation with HCP
Cough	12.3%	87.7%
Fever	2.5%	97.5%
Loss of weight	59.4%	40.6%
Haemoptysis	2.0%	98.0%
Chest pain	1.5%	98.5%

It was interesting that in 87% cases, the symptoms of cough and in 97.5% cases symptoms of fever occurred before the patient consulted the HCP. However, 98% of cases of haemoptysis, 98.5% cases of chest pain and 40.6% cases of weight loss occurred

after consultation with HCP. Cough, fever and chest pain were the most common symptoms encountered.

Table 11: Health seeking behavior with the onset of illness

Health seeking behavior	**n=844**	
First action	***844***	***%***
HCP	25	3
Self medication	422	50
Traditional	32	3.8
Health Worker	9	1.1
Drug stores	356	42.2
Second action	***844***	***%***
HCP	239	28.3
Self medication	54	6.4
Traditional	283	33.5
Health Worker	47	5.6
Drug stores	221	26.2
Third action	***809***	***%***
HCP	535	66.1
Self medication	14	1.7
Traditional	210	26
Health Worker	14	1.7
Drug stores	21	2.6
Others	15	1.9
Fourth action	***197***	***%***
HCP	32	16.2
Self medication	11	5.6
Traditional	93	47.2
Health Worker	4	2
Drug stores	17	8.6
Others	40	2.3

Nearly 50% patients practiced self medication immediately after onset of symptoms or in 42.2% cases consulted the drug store for medication. Only 25 patients went to a health care provider. However, the number of patients consulting the HCP increased to 239

(28.3%) when the symptoms did not subside. Still 33.5% went to a traditional healer, the second time or consulted a drug store (26.2%). Traditional healers still played a very important role as 210 patients consulted the traditional healer, the third time when the symptoms did not subside. A larger percentage 66.1% now consulted the HCP as the third action, when symptoms continued to occur. 197 patients continued to seek health care for the fourth time and of them 93 patients consulted a traditional healer.

Table 12: Expenditures for illness before initial diagnosis in $US

Mean (SD)	**$ 18.6 (14.62)**
Median (min-max)	17.1 (1-296)
Sum	15747
25^{th} percentiles	11.5
50^{th} percentiles	17.1
75^{th} percentiles	22.4

Most patients incurred heavy expenditures before the diagnosis of tuberculosis was made. The median expenditure incurred was $ 17.1 with a mean of $ 18.6(14.62), some even incurring an expenditure of $ 296. The 25^{th} centile for expenditure was $ 11.5.

Table 13: Categories of private doctors consulted by TB Patient

Type of HCP consulted	**Total**	**Percentage (%)**
Chest specialist	65	7.70
Internist	12	1.40
General practitioner	766	90.90
n	844	100

The HCPs consulted by the TB patients included general practitioners within the neighborhood of the patient as well as chest specialists. The first consultation of nearly 90% TB patients was with the general practitioner most likely to be practicing with in the neighborhood, though 7.7% patients did consult a chest specialist.

Table 14: Specialty of the HCP who made initial diagnosis

HCP specialty	n=844	%
Chest specialist	686	81.3%
Internist	110	13%
GP	48	5.7%
Others	-	

Though Chest Specialist was the last one to be consulted, by and large the diagnosis of tuberculosis was made by the Chest Specialist at the TB clinic (81.3%). The internist made the diagnosis in 13% cases while the general practitioner could diagnose only 5.7% cases though nearly 90.9% patients initially first consulted the general practitioner.

Table 15: Different types of delay for TB Patients in the Community and Healthcare Facilities

	Min	25%ile	Median	75%ile	Max	Mean
Total Delay (days)	23	75	97	119	267	100.7
Health system delay (days)	6	15	59	78	99	52.75
Diagnostic Delay (days)	21	71	91	116	256	96.3
Treatment Delay (days)	0	1	2	6	43	4.2
Patient Delay (days)	0	3	9	13	74	9.9

Case Definition

Patient related component of diagnostic delay (The duration between onset of symptoms and seeking healthcare)

-Healthcare related component of diagnostic delay (The mean duration between the timing of seeking healthcare and diagnosis).

-Diagnostic delay (time interval between onset of symptoms and diagnosis)

-Treatment delay (time interval between diagnosis and treatment)

-The total delay (diagnostic + treatment delay)

-Healthcare system delay (The mean duration between the timing of seeking healthcare and treatment).

The patient delay comprising of the interval between onsets of symptoms and seeking health care, varied from a minimum of same day with a maximum of 74 days with a median of 9 days and a mean of 9.9 days (9.37). The health system delay i.e. the interval between timing of seeking health care and diagnosis showed a mean of 7(±4.35) with a median of 8 weeks. In some cases the health system delay extended to 14 weeks.

The mean diagnostic delay was 6.5(4.7 days) and a 75th centile of 11 weeks. The median treatment delay was 2 days, with a maximum of 43 days. A mean period of 4.2 days (4.65) was seen between the diagnosis of tuberculosis and its treatment. The total delay i.e. the diagnostic and treatment delay was a mean of 3.3(1.13) months and a median of 3.2 months. In some cases the total delay extended to 8.9 months.

Table 16: Difference observed in diagnostic delay between private HCPs and NTP

	Minimum	25th centile	Median	75th centile	Max	Mean
Total delay	21	71	91	116	256	96.3
NTP	21	72	91	114	249	95.6
Private HCP	32	74	95	122	256	101

Patients who were referred earlier to the TB centers had a shorter time period between first consultation with a HCP and diagnosis (mean 95.6 days) with a minimum of 21 days. The diagnosis in these cases was made by the TB center. In cases where private practitioners made the initial diagnosis a longer time period of diagnostic delay elapsed (mean 101 days) with a minimum of 32 days.

Table 17: Difference observed in total Delay between private HCPs and NTP

	Minimum	25th centile	Median	75th centile	Max	Mean
Total delay	23	75	97	119	267	100.7
NTP	23	73	94	118	251	99.02
Private HCP	58	84	104	133	267	110.8
<5 HCPs consulted	23	70	89	111	213	94
>5 HCPs consulted	44	93	111	132	267	115

One of the contributing factors towards delay was repeated visits to a private HCPs before the patient is diagnosed as a case of tuberculosis. As seen above in patients that the diagnosis is made by private HCPs the minimum delay was 58 days as opposed to 23 days in cases where the TB center made the diagnosis. Similarly a mean total delay of 110 days was seen in case of diagnosis by private HCPs as compared to 99 days by TB centers. The total delay was extended to a mean of 115 days in patients consulted more then 5 HCPs while it was 94 days in patients consulted less then 5 HCPs.

Table 18: Time interval between first consultation with a HCP and initiation of treatment between private HCPs and NTP

	Minimum	25th centile	Median	75th centile	Max	Mean
Total delay	10	66	87	109	265	90
NTP	10	64	85	106	235	88.8
Private HCP	48	79	94	126	265	102.2

The role of private HCPs in contributing towards delay in starting treatment is emphasized in the above table where by after the patient consulted a HCP and treatment was started by the private HCP, a minimum of 48 day elapsed with a mean of 102 days. Prompt action was initiated when the patient was diagnosed by the TB centers, as there was less circulation among private HCPs and a mean of 88 days elapsed between first consultation with the HCP and initiation of the treatment.

Table 19: Difference observed in treatment Delay between private HCPs and NTP

	Minimum	25th centile	Median	75th centile	Max	Mean
Total delay	0	1	2	6	43	42
NTP	0	1	2	4	43	33
Private HCP	2	8	10	11	40	98

A significant difference was seen in initiation of treatment after diagnosis between private HCPs and NTP Centers. When the patient was diagnosed by the NTP centers a median of 2 days and mean of 33 days was seen between diagnosis and initiation of treatment. However when private practitioners diagnose a case of TB they took a very long time to initiate treatment (median 10 days and mean 98 days).

Table 20: Time Interval between Onset of Cough and Consultation with HCP

Time Period of Cough	Number	Percentage (%)
Before consultation with HCP	104	12.3
Same Day	46	5.5
One week	207	24.5
Two week	325	38.5
Three weeks	99	11.7
Four weeks	27	3.2
Five weeks	13	1.5
Six weeks	12	1.4
Seven weeks	2	0.2
Eight weeks	1	0.1
Nine weeks	2	0.2
Ten weeks	3	0.4
Eleven weeks	5	0.6
Total	844	100

About a quarter of the patients consulted the HCP two weeks after onset of cough, while 38.5% patients consulted the HCP three weeks after the onset of cough. Only 4.2% patients contacted the HCP six weeks after the onset of cough. The average being 8 days with a median of 9 days.

Table 21: Time interval between Onset of Fever consultation with HCP

Time Period of fever	Number	Percentage (%)
Before consultation with HCP	21	2.5
Same Day	162	19.2
One week	524	62.1
Two week	75	8.9
Three weeks	25	3.0
Four weeks	14	1.7
Five weeks	6	0.7
Six weeks	9	1.1
Seven weeks	2	0.2
Eight weeks	2	0.2
Nine weeks	2	0.2
Ten weeks	1	0.1
Eleven weeks	3	0.3
Total	844	100

In case of fever, the patients were prompt in consulting with HCP and 19.2% of them contacted HCPs on the same day as fever, and 62% went to the HCP within a week of onset of fever. Only 4.5% patients took more than a month to contact the HCP after fever. A mean period of four day and a median of 2 days were seen.

Table 22: Time interval between Onset of Chest Pain and consultation with HCP

Time Period of Chest	n	Percentage (%)
Before consultation with HCP	462	59.4
Same Day	70	9
One week	210	27
Two week	12	1.5
Three weeks	10	1.3
Four weeks	6	0.8
Five weeks	2	0.3
Six weeks	2	0.3
Eight weeks	1	0.1
Nine weeks	3	0.4

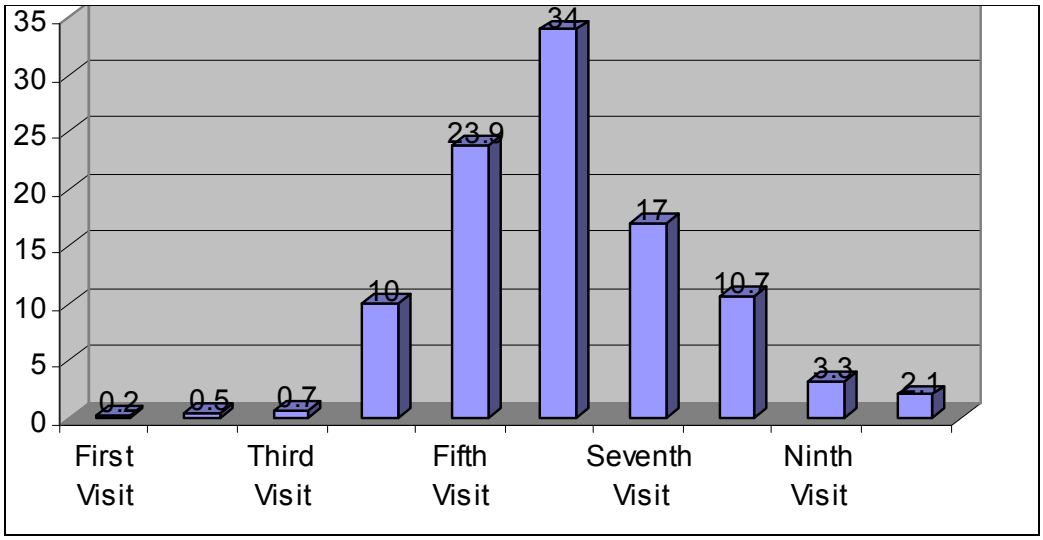
As mentioned earlier nearly, 59.4% patient had already consulted the HCP before they developed chest pain. About 36% patients went to the HCP with in a week of onset of chest pain.

Table 23: Number of Health Care Providers Visited by the patients before reaching the Tuberculosis clinic

No. of health care providers	Total	Percentage (%)
1	1	0.1
2	12	1.4
3	9	11.3
4	236	28.1
5	237	28.2
6	108	12.9
7	79	9.4
8	42	5.0
9	16	1.9
10	7	0.8
11	4	0.5
12	2	0.2

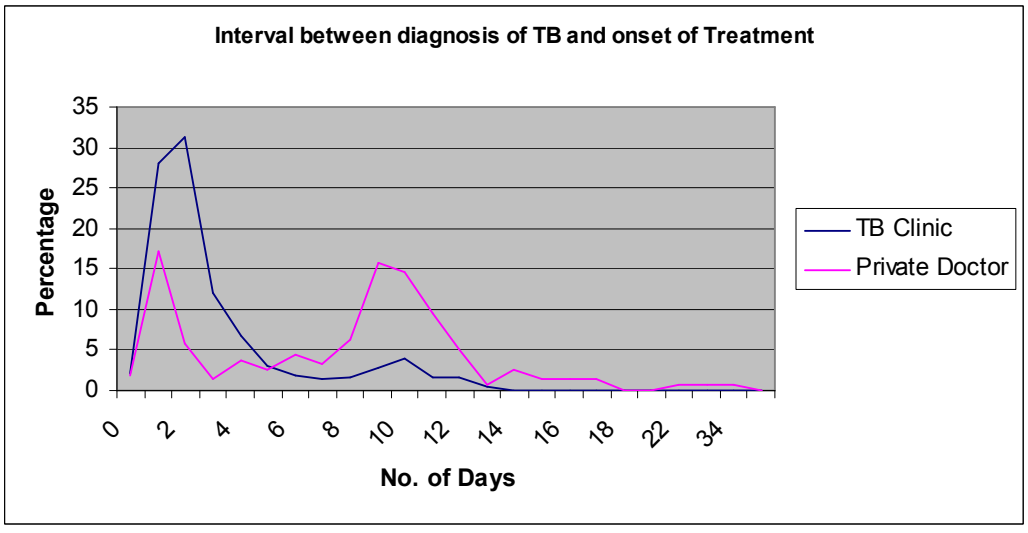
Patients consulted several private health care providers before finally reaching the Chest Clinic. The number varied from one HCP in some cases nearly to 12 private health care providers (HCPs). Nearly 56% patients visited four to five health care providers before they reached the Chest Clinic with a mean of 5 HCPs (SD 1.624). Hardly, 1.5% patients consulted two doctors before they were referred to the NTP clinic. Some patients even visited 9 to 12 health care providers before they were diagnosed with tuberculosis.

Graph 4: Number of visits to HCP before Patient reached the TB Clinic



Very few patients reached the NTP Clinic during their first or second visit. The majority of the patients reached the NTP Clinic after visiting four HCPs (23.9%) or 5 HCPs (34%), Some even reached the chest clinic after visiting 9 or 10 HCPs (5.4%).

Graph 5: Interval between diagnosis of TB and onset of Treatment



A similar pattern was seen between the diagnosis of TB and onset of treatment. Incase, of the public sector NTP Clinic treatment was initiated between one to three days after diagnosis in nearly 71.4% cases. While in case of private doctors, in 17% cases treatment was initiated within one day of diagnosis, while in nearly 30% cases therapy was initiated after nearly 9 to 10 days of treatment. In case of private doctors the gap between diagnosis and onset of treatment extended to more then a month.

Table 24: Reasons for first consultation with private practitioner

Reasons	Total	Percentage (%)
Close to the house	514	61.00
Confidence in HCP	254	30.10
Service available anytime	30	3.60
Referred by previous health service provider	3	0.40
Advised by friend/relative	42	5.00

As mentioned earlier, most of the TB patients consulted the private practitioners near their own neighborhood. We tried to elicit the reason for this. The private practitioner was consulted chiefly because the clinic was located close to the house of the patient (61%), However 30% patient went to the private doctor because they have confidence in his treatment. Around 5% patients were referred by friends or relatives.

Table 25: Reasons for not consulting TB clinic as an initial consultation

No Reasons	Total	Percentage (%)
Too far from house	461	54.70
Too crowded/Long waiting time	319	37.80
Previous bad experience	46	5.50
Others	17	2.00

As most patient did not go to the NTP clinic as their first choice, we tried to find the reason for it. The reason why patients did not initially consult the TB clinic was either because it was to far from their house (54.7%) or because they felt the TB clinic was too crowded or they would have to wait for a long time in the queue (37.8%). Also 5.5% patients previously had a bad experience.

Table 26: Investigation done on TB patients

Provider	Total	Percentage (%)
Sputum Test	14	1.6
X-ray	201	23.8
Both sputum and X-ray	634	75.1
Referred to other doctor/hospital	2	0.2
Others	89	10.1
Blood CBC	149	17.6

In the vast majority, the investigations done on TB patients included sputum testing and X-ray. (75.1%), Isolated X-rays were done on 23.8% patients. Some doctors 17.6% also advised complete blood count and ESR of the patients. Of the patients in whom X-ray was done, it was found that 99.6% cases X-ray was positive.

Table 27: Interval Between Investigation of TB and initiation of Treatment

TB Specialist			Private Doctors		
Total Days	**Total No**	**Percentage (%)**	**Total Days**	**Total No**	**Percentage (%)**
1-5 days	13	1.9	5 days	5	3.2
6 days	49	7.1	6 days	9	5.7
7 days	55	8.0	7 days	10	6.3
8 days	69	10.1	8 days	5	3.2
9 days	109	15.9	9 days	6	3.8
10 days	110	16.0	10 days	5	3.2
11 days	75	10.9	11 days	3	1.9
12 days	61	8.9	12 days	5	3.2
13 days	23	3.4	13 days	3	1.9
14 days	17	2.5	14 days	9	5.7
15 days	8	1.2	15 days	7	4.4
16-21 days	79	11.5	16 days	16	10.1
22-30 days	18	2.6	17-21 days	52	32.9
			22-30 days	19	12.0
			>30 days	4	2.5

It was interesting to know in cases where the diagnosis of tuberculosis was made by the public sector NTP hospital the interval between laboratory investigations of TB and initiation of treatment varied from one to seven days in 17% cases, while in 51.8% of patients treatment was initiated between eight to twelve days (10.8% mean). Most of the case 97.4% patients' treatments were initiated within three weeks of performing the investigations. On the contrary, in case of private doctors the minimal time period for initiation of treatment was five days after investigations were completed, however in most cases (55%) patients treatment was initiated after 15 to 30 days of the investigations (15.7 Mean).

To assess the patient's perception of services being provided at the TB clinic and whether that had an impact on the delay in diagnosis and treatment of tuberculosis, we asked number of questions concerning the availability of services at the TB Clinic as well as response of doctors, availability of medicines and the patient load. All three centers were assessed individually.

Table 28: Patients perception of services at Malir Chest clinic

	Best	Good	Average	Worst
Satisfaction with the services	0	3.8%	96.2	0
Prompt action from HCP	0	4.2%	95.8	0
Well equipped TB clinic	0.8%	3.4%	95.8%	0
Free medicines	77.9%	14.5%	7.6%	0
Hospital providing all facilities	0	3.8%	96.2%	0
Heavy patient load/few facilities	0	2.3%	72.5%	25.2%

Patients generally felt the average services were provided at the Malir Chest Clinic and most patients felt that doctors were prompt in their response to them. The Malir Chest Clinic was well equipped according to 95% patients. However, free medicines were easily available according to 77.9% patients. A quarter of the patients said that the facilities at the Malir Chest Clinic were inadequate as compared to the heavy patient load.

Table 29: Patients Perception of Services at Ojha Chest clinic

	Best	Good	Alright	Worst
Satisfaction with the services	0	0.5%	99.5%	0
Prompt action from HCP	0	0.5%	99.5%	0
Well equipped TB clinic	0	2.7%	97.3%	0
Free medicines	43.2%	49.7%	7%	0
Hospital providing all facilities	0.5%	0.5%	98.9%	0
Health facility work load	0.5%	1.5%	94.6%	3.2%

Patients at the Ojha Chest Clinic made similar observations regarding satisfaction with services and prompt response by doctors. They felt that overall average services were provided at the Ojha Chest Clinic. Though the patient load was less then in other chest clinics. Availability of free medicines was a concern expressed by half the patients.

Table 30: Patients perception of services at Nazimabad Chest Clinic

	Best	Good	Alright	Worst
Satisfaction with the services	0.3%	28.5%	71.3%	0
Prompt action from HCP	0	1.5%	98.5%	0
Well equipped TB clinic	4.0%	28.7%	67.3%	0
Free medicines	90.7%	5.0%	4.3%	0
Hospital providing all facilities	1%	29.7%	69.3%	0
Health facility work load	28%	70.8%	1.3%	0

By far patients were most satisfied with services at the Nazimabad chest clinic where free medicines were easily available, doctors were responsive to patients and the hospital generally provided all facilities to patients. Comparatively patient load too was comparable to the facilities available.

Table 31: Time Period Required for Patient to reach the Chest Clinic

	Malir	Ojha	Nazimabad	Total
Less than half hour	10.30%	25.90%	34.00%	24.90%
One to one and a half hour	80.90%	70.80%	66.00%	71.70%
More than 2 hours	8.89%	3.20%	0.00%	3.40%

Time taken to reach the TB clinics and the distance from the house of the patient to the TB clinic was one of the reasons why the patient consulted so many private practitioners before reaching the TB clinic. Hence we tried to find the distance patients had to traverse

before reaching the TB clinic. Patients said that it takes from one to one and a half hours to reach the TB clinic in nearly all three-chest clinics. The Nazimabad chest clinic was little close by but even then 66% patients said that it takes more than an hour to reach it. Overall around 25% patients said that it takes half an hour to reach most of the chest clinics. Malir chest clinic was the farthest.

Table 32: Distance to the TB Clinic

Distance	Total	Percentage
1 to 5 km	132	15.7%
6 to 10 km	373	44.4%
11 to 20 km	233	27.70%
21 to 30 km	14	1.70%
>30 km	46	5.50%
Don't know	46	5.50%

The TB clinics were located within six to ten km of 44% patients. While 27.7% patients had to travel to the distance of eleven to twenty km before reaching the TB clinic. In some cases (5%) the TB clinic was as far as thirty or more km.

Table 33: Reasons for delay in reaching the chest clinic

Reason	Total	Percentage (%)
No delay in reaching HF	11	1.3
Fear of diagnosis	320	37.9
Illness will be cured by itself (denial and concealment)	512	60.5
Fear of social isolation	140	18.1
Financial problem	140	16.5
Inappropriate staff attitude	57	6.8
Poor quality of health services	10	1.2

Considering all the above delays, we tried to elicit from the patients the reasons why they reached the TB Clinic so late or why the treatment of tuberculosis was initiated after the delay. Fear of being diagnosed as a case of tuberculosis was evident in causing a delay in reaching chest clinic as expressed by 37.9% patients. Social stigmatization was evidenced by the fear of social isolation if the patient was diagnosed with TB, (18.1%). The fatalistic attitude of patients is expressed by the fact that 60.5% patients felt that the illness will be cured by itself. This is also an indirect indicator of fear of being diagnosed of tuberculosis and the cultural isolation associated with it. Financial issues creating a delay in accessing health facility was the reason given by 16% patients.

Table 34: Perceived stigma's concerning tuberculosis in Males

Male	Strongly Agreed	Agree	Average	Don't Agree	Don't Agree at all
Feeling of shame on having TB	7.7%	82.7%	1.4%	7.9%	0.2%
Tend to hide diagnosis of TB	7%	84.9%	0.2%	7.9%	0
Affect relations with others	5%	89%	0.2%	5.8%	0
Costly treatment because of long duration	3.6%	83.9%	1.4%	11%	0
Prefer to live isolated because of TB	3.4%	91.1%	0	5.5%	0
Affects performance of work	3.1%	95.2%	0.7%	1%	0
Affects marital relations	8.3%	82.1%	2.8%	6.7%	0
Affects family responsibilities	3.8%	93.5%	0.7%	1.9%	0
Chances of marriage reduced	5.5%	90.4%	0	4.1%	0
Affects family relations	4.6%	90.4%	0.7%	4.3%	0
Affects Female infertility	4.4%	20.6%	1.2%	73.8%	0
Leads to serious complication during pregnancy	2.7%	81.6%	2%	13.7%	0
Affects breast feeding	0	86.3%	4.3%	9.4%	0
Affects outcome of pregnancy	0	86.7%	3.5%	9.8%	0
Unable to decide for girl treatment	2.5%	80.8%	0.7%	3%	0

Table 35: Perceived stigma's concerning Tuberculosis in Females

Female	Strongly Agreed	Agree	Average	Don't Agree	Don't Agree at all
Feeling of shame on having TB	4.9%	87.4%	1.2%	6.3%	0.2%
Tend to hide diagnosis of TB	3.5%	89.2%	0.5%	6.2%	0.2%
Affect relations with others	3.5%	91.6%	0.9%	4%	0
Costly treatment because of long duration	1.9%	82.9%	1.6%	13.6%	0
Prefer to live isolated because of TB	2.1%	91.3%	0.9%	5.6%	0
Affects performance of work	4.2%	95.6% 0	0	0.2%	0
Affects marital relations	13.7%	80.5%	3.6%	2.2%	0
Affects family responsibilities	5.4%	93.7%	0.2%	0.7%	0
Chances of marriage reduced	1.6%	96.3%	0	2.1%	0
Affects family relations	4.7%	90.6%	0.7%	4%	0
Affects Female infertility	3.6%	27.2%	1.4%	67.8%	0
Leads to serious complication during pregnancy	0.7%	89.2%	1.4%	8.7%	0
Affects breast feeding	0	88.1%	2.5%	9.4%	0
Affects outcome of pregnancy	0	89.6%	2.5%	7.9%	0
Unable to decide for girl treatment	1.2%	91%	0.7%	2.6%	0

As shown in table 34 and 35 stigmatization of TB is a very important factor in affecting the patient's decision to seek treatment for tuberculosis. Interestingly, both males and females had the same perceptions regarding the social factors which affect patients with tuberculosis. 85 to 95% patients feel ashamed that they had developed tuberculosis and tried to hide disease. Nearly 90% patients, both male and females said that family and marital relation are affected due to TB. More females, (96%) than males (90%) said that chances of a girl getting married are less if she has tuberculosis. Similarly, more females 91% as opposed to males 80.8% are hesitant to start treatment for a young girl if she has

tuberculosis, probably because of the stigma associated with visiting the chest clinic. Neither males 73.8% nor females 67.8% felt that tuberculosis would affect female fertility. Social cultural isolation and stigmatization were over all manifest in the both the genders perceptions about tuberculosis as an illness.

Table 36: Source of Information about Tuberculosis

Source of information	Total	Percentage (%)
Newspaper/TV/Radio	49	5.8
Educational institutions	9	1.06
Friends/relatives	377	44.6
TB patients	434	51.9

It is interesting that before developing tuberculosis 86% of the patients had not heard of this disease irrespective of gender. Media did not play an important role in providing any kind of information about tuberculosis as evidenced by 5.8% patients. The main source of information about tuberculosis was friends/relatives (44.6%) as well as other TB patients (51.9%).

Table 37: Knowledge about Tuberculosis

	Yes	No	Don't know
Awareness of there own illness	92.8%	3.8%	3.4%
Is TB hereditary	37.3%	21.3%	41.4%
Is TB contagious	38.2%	17.5%	44.3%
Is TB curable	61.6%	1.9%	36.5%
Is there a vaccine for TB	4.0%	22.2%	73.8%
Duration of Anti TB Treatment	43.7%	9.6%	46.6%
Types of Anti TB drugs	4.6%	18.1%	77.3%

Patients were questioned about their knowledge concerning tuberculosis. Though 92.8% patients were aware of what illness they were suffering from, their knowledge, about

tuberculosis was extremely deficient. 37.3% patients thought TB was a hereditary disease while 41% said that they had no knowledge about it. Though the contagious nature was expressed by 38.2% patients, nearly 17% said that TB was not contagious and 44% had no knowledge about it. About 61% patients were confident that they would be cured against TB, 36% were not sure. Again 73.8% patients were not sure whether there was any vaccine for tuberculosis. Although 43.7% patients knew the duration of their treatment, 46% were unaware about it. The knowledge about type of anti tuberculosis drugs was quiet deficient (77.3%).

Table 38: Comparison between males and females regarding SES, knowledge, stigma and satisfaction with care

Mean percent score Mean (SD)	Male n=417	Female n=427		p
SES	25.11(7.406)	28.102(4.989)		<.00001
Knowledge	7.623(3.15)	7.34(3.205)		0.715
Stigma	4.18(0.769)	4.22(0.774)		0.0001
Satisfaction with care	9.081(1.488)	8.97(1.52)		0.625

As seen in Table 38 gender had a significant impact on perceptions regarding stigma's associated with tuberculosis. Male and female perceptions showed significant variations concerning the stigma's associated with tuberculosis, p value <.00001. There was no significant difference between the genders as regards knowledge concerning tuberculosis or the degree of satisfaction with the health services.

Table 39: Risk factors for treatment delay among TB patients

Risk factor	<=median		>median		Crude OR and 95% Confidence interval	Adjusted OR and 95%Confidence interval
	No=460	54.5%	No=384	45.5%		
Age						
<=25 ®	228	52.1	210	47.9	0.81	1.0063 (0.9963-1.0164)
>25	232	57.1	174	42.9	0.62 – 1.07	
Sex						
Male ®	216	51.8	201	48.2	0.81	1.0780 (0.7837-1.4827)
Female	244	57.1	183	42.9	0.61 – 1.07	
Education						
Univers ®	4	50	4	50	1	1.1655 (0.8616-1.5766)
Prim-senior	183	51.1	175	48.9	0.96 (0.2 – 4.68)	
Illiterate	273	57.1	205	42.9	0.75 (0.15 – 3.65)	
Occupation						
Tech ®	16	30.2	37	69.8	1	1.1345 (0.9603-1.3403)
Clerical/workers	76	59.8	51	40.2	0.29 (0.14 – 0.61)	
Students	49	63.6	28	36.4	0.25 (0.11 – 0.56)	
unemployed/hw	318	54.3	268	45.7	0.36 (0.19 – 0.70)	
Residence						
Urban ®	195	57.5	144	42.5	1	0.9388 (0.7325-1.2032)
Suburb	236	50.9	228	49.1	1.31 (0.97 – 1.76)	
Rural	27	79.4	7	20.6	0.35 (0.13 – 0.88)	
Homeless	2	26.6	5	71.4	3.39 (0.57 – 25.92)	
Income						
Savings	3	75	1	25	1	0.6122 (0.4468-0.8390)
Income=expenses	199	63.4	115	36.6	1.73 (0.16 – 44.51)	
In debt	258	49	268	51	3.12 (0.28 – 79.57)	
Marital status						
Married ®	282	56.6	216	43.4	1	0.9221 (0.6980-1.2181)
Single	169	52.3	154	47.7	1.19 (0.89 – 1.60)	
Separated/div/	3	60	2	40	0.87 (0.10 – 6.53)	
Wid	6	33.3	12	66.7	2.61 (0.89 – 8.02)	
Crowding index						
<=2.7	247	53.9	211	46.1	0.95 (0.72-1.26)	1.0511 (0.9722-1.1364)
>2.7*	213	55.2	173	44.8		
Time to reach health facility	125	59.2	86	40.8	1	0.7544 (0.5697-0.9990)
<=1/2 hr	323	53.5	281	46.5	1.26 (0.91 –1.77)	
½-1hr	12	41.4	17	58.6	2.06 (0.87 – 4.90)	
>1 hr						
Expenses						
Low cost (<=1USD median)	210	49.8	212	50.2	0.68 (0.51 – 0.91)	1.4721 (0.8171-2.6523)
high cost	250	59.2	172	40.8		
First Health seeking behavior before diagnosis						0.9634 (0.8593-1.0802)
HCP	9	36	16	64	0.46 (0.18 – 1.12)	
others	451	55.1	368	44.9		
Health facility first consulted						
NTP	0	0	1	100	0 (0 – 14.74)	2.7591 (0.5566-13.67)
Others	460	54.6	383	45.4		
Health facility that made initial Diagnosis						
NTP	455	71.9	178	28.1	131.64 (46 – 426.19)	0.0254 (0.0113-0.0574)
Others	4	1.9	206	98.1		
No of Health care encounters						
1	0	0	1	100	0 (0.00 – 14.83)	1.6145 (1.4509-1.7966)
>1	456	54.4	382	45.6		
Satisfaction with care*						
Adequate (<=6.12) ®	300	49.3	308	50.7	0.46(0.33-0.64)	1.1110 (1.0085-1.2238)
Inadequate	160	67.8	76	32.2		
Stigma*						
Low degree ®	238	50.1	222	60.2	0.66(0.50-0.89)	0.9930 (0.7781-1.262)
High degree	237	49.9	147	39.8		
Knowledge*						
Good ®	345	59.0	240	41	2.05(1.49-2.83)	0.8995 (0.8580-0.9431)
Poor	98	41.2	140	58.8		

Treatment delay: the mean duration between diagnosis and treatment was 4.2 days. The significant risk factors for treatment delay were: Income, initial consultation from health facility other then the NTP (2.7 fold increase), time to reach the health facility (more then an hour), health facility who made the first diagnosis; inadequate satisfaction with care (1.1 folds increased risk) and knowledge about tuberculosis 2.2 fold increase.

Table 40: Risk factors for patient-related diagnostic delay among TB patients

Risk factor	<=median (9)		>median		Crude OR and 95%Confidence interval	Adjusted OR and 95%Confidence interval
	No=480	56.9%	No=364	43.1%		
Age						
<=25 ®	267	61	171	39	1.41	0.9916 (0.9796-1.0037)
>25	213	52.5	193	47.5	1.06-1.88	
Sex						
Male ®	226	54.2	191	45.8	0.81 (0.61-1.07)	1.0904 (0.7908-1.5034)
Female	254	59.5	173	40.5		
Education						
Univers ®	4	50	4	50	1	0.6988 (0.5160-0.9464)
Prim-senior	228	63.7	130	36.3	0.57 (0.12 - 2.79)	
Illiterate	248	51.9	230	48.1	0.93 (0.19 - 4.51)	
Occupation						
Tech ®	41	75.9	13	24.1	1	1.0417 (0.8829-1.2292)
Clerical/workers	43	41.7	74	58.3	4.40 (2.03 - 9.07)	
Students	45	58.4	31	41.6	2.24 (0.97 - 5.27)	
Unemployed/hw	341	58.2	245	41.8	2.37 (1.14 – 4.58)	
Residence			\			
Urban ®	164	64.6	90	35.4	1	0.9009 (0.7038-1.1532)
Suburb	191	54.6	159	45.4	1.52 (1.07 – 2.15)	
Rural	24	70.6	10	29.4	0.69 (0.29 – 1.58)	
Homeless	6	85.7	1	14.3	0.27 (0.01 – 2.36)	
Income						
Savings	3	75	1	25	1	0.7044 (0.5137-0.9658)
Income=expenses	192	61.1	122	38.9	1.91 (0.17 – 48.9)	
In debt	285	54.2	241	45.8	2.54 (0.23 – 64.7)	
Marital status						
Married ®	269	54	229	46	1	1.2358 (0.9291-1.6439)
Single	197	61	126	39	0.75 (0.56 – 1.01)	
Separated/div/	2	40	3	60	1.76 (0.23 – 15.4)	
Wid	12	66.7	6	33.3	0.59 (0.19 – 1.73)	
Crowding index						
<=2.7	233	50.9	225	49.1	0.58 (0.44 – 0.78)	1.1808 (1.0824-1.2881)
>2.7*	247	64.0	139	36.0		
Time to reach health facility						
<=1/2 hr	107	50.7	104	49.3	1	1.5507 (1.1696-2.0560)
½-1hr	348	57.6	256	42.4	0.54 – 1.05	
>1 hr	25	86.2	4	13.8	0.05 – 0.53	
Expenses						
Low (<=1USD median)	296	69.8	128	30.2	2.97(2.21 – 3.97)	0.3907 (0.2159-0.7067)
High cost	184	43.8	236	56.2		
Satisfaction with care*						
Adequate (<=6.12) ®	389	64	219	36	2.83 (2.05 – 3.92)	0.9020 (0.8222-0.9895)
Inadequate	91	38.6	145	61.4		

Stigma*						
Low degree ®	295	59.5	201	40.5	1.29 (0.97 – 1.73)	1.1628(0.9096-1.4866)
High degree	185	53.2	163	46.8		
Knowledge*						
Good ®	319	54.5	266	45.5	0.83 (0.60 – 1.14)	1.0568 (1.0081-1.1079)
Poor	141	59.2	97	40.8		

* median cutoff
** p< 0.05
@ introduced in the model as quantitative variable.

Patient related diagnostic delay: the mean duration between onset of symptoms and first health seeking behaviour was 9.9 days and approximately half of patients took 9 days to seek health care. The significant risk factors for Patient related diagnostic delay were: income, whereby patients whose income was less then their saving or were indebt more likely to take longer time to seek health care, again stigma played an important part in delaying seeking healthcare (1.1 fold increase), satisfaction with care (2.8 fold increase associated with dissatisfaction with health care), time to reach health facility (1.5 fold increase).

Table 41: Risk factors for diagnostic delay among TB patients

Risk factor	<=median 56		>median		Crude OR and 95%Confidence interval	Adjusted OR and 95%Confidence interval
	No=424	50.2%	No=420	49.8%		
Age						
<=25 ®	212	48.4	226	51.6	0.86	0.9979 (0.9985-1.0104)
>25	212	52.2	194	47.8	0.65 – 1.14	
Sex						
Male ®	207	49.6	210	50.4	0.95	1.0682 (0.7220-1.4780)
Female	217	50.8	210	49.2	0.75 – 1.26	
Education						
Univers ®	3	37.5	5	62.5	1	0.9022 (0.6637-1.2264)
Prim-senior	187	52.2	171	47.8	0.55 (0.10 – 2.71)	
Illiterate	234	49.0	244	51.0	0.63 (0.12 – 3.07)	
Occupation						
Tech ®	28	51.9	26	48.1	1	1.0520 (0.8877-1.2465)
Clerical/workers	63	49.6	64	50.4	1.09 (0.55 – 2.19)	
Students	39	50.6	38	49.4	1.05 (0.49 – 2.25)	
unemployed/hw	294	50.2	292	49.8	1.07 (0.59 – 1.95)	
Residence						
Urban ®	163	48.1	176	51.9	1	0.8418 (0.6440-1.1003)
Suburb	241	51.9	223	48.1	0.86 (0.64 – 1.16)	
Rural	15	44.1	19	55.9	0.17 (0.54 – 2.54)	
Homeless	5	71.4	2	28.6	0.37 (0.05 – 2.21)	
Income						
Savings	3	75	1	25	1	0.6004 (0.4380-0.8228)
Income=expenses	135	43	179	57	3.98 (0.36 – 1.02)	
In debt	286	54.4	240	45.6	2.52 (0.23 – 64.26)	

Marital status						
Married ®	243	48.8	255	51.2	1	0.6941 (0.5028-0.9582)
Single	164	50.8	159	49.2	0.92 (0.69 – 1.24)	
Separated/div/	4	80	1	20	0.24 (0.01 – 2.36)	
Wid	13	72.2	5	27.8	0.37 (0.11 – 1.13)	
Crowding index						
<=2.7	222	48.5	236	51.5	0.86	0.9759 (0.9036-1.0540)
>2.7*	202	52.3	184	47.7	0.65 – 1.14	
Time to reach health facility						
<=1/2 hr	98	46.4	113	53.6	1	1.0914 (0.7947-1.4988)
½-1hr	310	51.3	294	48.7	0.82 (0.59 – 1.14)	
>1 hr	16	55.2	13	44.8	0.70 (0.30 – 1.65)	
Expenses						
Low (<=1USD median)	221	52.1	203	47.9	1.16	2.3705 (1.2861-4.3693)
High cost	203	48.3	217	51.7	0.88 – 1.54	
First Health seeking behavior before diagnosis						
HCP	14	56	11	44	1.27	1.0395 (0.9483-1.1394)
Others	410	50.1	409	49.9	0.53 – 3.06	
Health facility first consulted						
NTP	1	56	0	0	0	1.6669 (0.3702-7.5047)
Others	423	50.1	420	49.8		
Health facility that made initial diagnosis						
NTP	312	49.3	321	50.7	0.85	0.8992 (0.7428-1.0885)
Others	112	53.3	98	46.7	0.61 – 1.18	
No of Health care encounters						
1	0	0	1	100	0	1.0076(0.9693-1.0474)
>1	424	50.5	415	49.5	0 – 17.32	
Satisfaction with care*						
Adequate (<=6.12) ®	304	50	304	50	0.97	0.8133 (0.7340-0.9012)
Inadequate	120	50.8	116	49.2	0.71 – 1.32	
Stigma*						
Low degree ®	256	51.6	240	48.4	1.14	0.8601 (0.6632-1.1154)
High degree	168	48.3	180	51.7	0.86 – 1.52	
Knowledge*						
Good ®	276	47.2	309	52.8	0.57	0.9166 (0.8737-0.9616)
Poor	145	60.9	93	39.1	0.42 – 0.79	

* median cutoff; **p<0.05; @ introduced in the model as quantitative variable.

Diagnostic delay: the mean duration between onset of symptoms and diagnosis was 96.3 days for all patients and approximately half of patients were diagnosed within 91 days (almost 3 months). The significant risk factors for diagnostic delay were: income where by people with indebt were 2.5 times likely to have longer delay, expenses incurred were 2.5 times more likely to have longer delay , if patient consulted any individual other then HCP (1.27 fold increase), stigma associated with TB (1.14 fold crease), sex as well as time to reach the health facility.

Discussion

Each year in Pakistan 2.5 million people develop tuberculosis (2). The incidence of sputum positive TB is 81 / 100,000 population. The National Tuberculosis Programme (NTP) is responsible for managing all tuberculosis cases in the population and provides free of charge anti tuberculosis treatment through the DOTS programme. Inspite of nearly 100% DOTS coverage patients tend to reach the NTP health facilities late, leading to delay in diagnosis and eventually treatment of tuberculosis. The long interval between the onset of symptoms and initiation of therapy contributes to the spread of infection in the community. One untreated smear positive tuberculosis patient can infect upto 15 other people in one year. Delays in diagnosis of TB vary in different countries – 12 weeks in Botswana to 16 weeks in Ghana (7, 8). A number of factors influence delay in diagnosis and initiation of treatment including access to health facilities, stigmatization of the disease, knowledge about tuberculosis etc. This study was conducted to document the delay in different stages and the factors contributing towards it. Strategies can thus be designed to reduce the infections duration in the community and reduce the number of new infections. The gender distribution was equal in both sexes with a mean age of 30 years. The main symptoms for which patients contacted a Health Care Provider (HCP) were cough and fever. Nearly 86% patients consulted a HCP secondary to cough. This is in keeping with other such studies. In a study conducted by Sadiq et al from Rawalpindi it was seen that 87% patients with cough and 75% patients with fever consulted a HCP (9). Similarly in India, 98% TB patients presented with cough while Solonipom from Malawi reported 61% patients with cough and 16% with fever (11).

The median Total Delay i.e. the period from the onset of symptoms to the initiation of treatment was 97 days and a mean of 100 days. In India, the mean total delay has been reported to be 60 (days) (10). In Malaysia it was found to be 12.5 weeks. In Nepal the median total delay for women was found to be 3.3 months (10, 12, 13). In Vietnam the total delay was similar to that seen in our study i.e. a mean of 9.9 week and median of 6.3 weeks (14). The total delay comprises of a component of patient delay and a component of health system delay. Interestingly in our study the patient delay i.e. the time period from the onset of symptoms to seeking of a Health Care Provider was comparatively short as compared to other countries – Mean of 9.9 day. A longer patient

delay of 4 weeks was seen in Ghana (8). A similar patient delay of 3 weeks was seen in Botswana (9) Contrary to our study in Tanzania, the patient delay (161.7 days) contributed to more than 90% of the total delay. A longer distance from the health facility, education level of patients and knowledge about tuberculosis all contributed to this long delay. In our study, the multivariate analysis indicated that stigma played an important part in hindering patients from seeking early health care. Stigma plays an important role in determining the health seeking behavior of patients suspected of tuberculosis as has been documented by the authors in a previous study from Pakistan. As seen in this study 87% patients had a feeling of shame on having tuberculosis and nearly 89% said they were prone to hide the diagnosis of TB. If patients were not satisfied with health care services they avoided seeking HCPs, rather they consulted alternate forms of treatment, including homeopaths (74.2%). Lower incomes i.e. or the long distance to reach the HCP prompted the patient to either try self-medication (50%) or consult a medical store (42.2%) as the first action after symptoms.

The Health System Delay i.e. the time period from seeking of health care to diagnosis in our study was found to be a long median delay of 59 days with a mean of 52.7 days. Except one patient (whose family member was already registered at the NTP) all patients consulted private HCP and in 90.9% cases this was a General Practitioner practicing within the neighborhood of the patient. A small minority i.e. 7.7% consulted a Private Chest Specialist. Majority of the patients were not satisfied with consultation from one HCP. Only 1.5% patients consulted two HCPs before being referred to the NTP Centre and a mean of 5 HCPs were consulted by each patient, some patients even consulting 12 HCPs. Not only did patients consult several HCPs they also contacted Homeopaths (74.2%) or took advice from medical stores (73.2%). Inspite of frequent consultation with local HCPs, the final diagnosis of TB was made by the NTP in 81.3% cases and the local HCPs making the diagnosis in only 5.7% cases. The factors contributing to this included consultations with individuals other than HCPs (e.g. traditional healers or medical store keepers). In Tanzania, longer health care delay were seen when patients especially in rural areas consulted traditional healers (8). In Gambia, patients who initially consulted HCPs had a shorter delay as opposed to patients who initially consulted alternate healers. In Nepal longer patient delay in women was contributed to

consultation with traditional healers and more frequent visits to HCPs before final consultation with the NTP (13). Another study from India, showed the TB patients on an average visit 2.5 doctors before reaching the NTP (18). We found that patients who consulted less than 5 HCPs had a mean total delay of 94 days as opposed to patients who consulted more than 5 HCPs (mean 11.5 days). As mentioned previously 81% patients were diagnosed by the NTP. The diagnostic delay varied from a mean of 95.6 days in cases the diagnosis was made by NTP as opposed to a mean of 101 days where the Private HCP made the diagnosis. Socio – economic status, was important in contributing towards the diagnostic delay, as patients seek private HCPs who advise investigations which many patients are unable to pay for and therefore consult other HCPs before finally reaching the NTP. The long delay in reaching the NTP may also be due to the long distance to the NTP Centres as well as to the stigma associated with TB, as shown by the multivariate analysis. Private HCPs tend to avoid referring patients to the NTP Centres and a proper link between the Private and Public Health Facilities is not present. Long Health Care Provider delay have been seen in Gambia, Botswana and Ghana, and has been attributed to poor access to health services, prior attendance to private HCPs. The diagnostic delay i.e. the period between onset of symptoms and diagnosis in our study had a prolonged mean of 90.3 days with a median of 91 days but as seen above, most of it was contributed by the health system delay, whereby HCPs take a long time to refer patients to the NTP. This could also be related to the weak referral link between the private HCPs and the Public Health System. Lack of resources in the private sector are further manifest by the long treatment delay i.e. the interval between diagnosis and initiation of treatment. In cases where the NTP facilities made the diagnosis a mean of 3.3 days with a median of 2 days as opposed to a median of 10 days and a mean of 9.8 days, when the private HCP made the diagnosis. The multivariate analysis showed a 2.7 fold increase in treatment after diagnosis if the patient first consulted a private HCP, and the health facility which made the diagnosis. Income also played an important part, as patients whose diagnosis was made in the private setup had financial constraints to purchase the anti – tuberculosis medicines, which are otherwise provided free of cost through NTP. These non – affording patients, 62% of whom were in-debt finally were referred to the NTP. An overall assessment of the delay in initiating treatment after onset

of symptoms, brings forth the important point, that patients are knowledgeable to consult HCPs, within a short time after onset of their symptoms. But the private health system is accessed rather than the public health systems. Private HCPs in Pakistan do not have strong linkages with the main – stream public health system. In addition, lack of continuing medical education (CME) contributes to the poor knowledge in immediately diagnosing a case of TB. Patient dissatisfaction results in repeated consultations from private HCPs, including homeopaths and traditional healers. Repeated and unfruitful consultations drain the patients financial resources which would otherwise be utilized for anti – tuberculosis treatment. There is dire need to integrate the private health sector with the main stream public health intervention i.e. DOTS per se. An important step in this context could be by allowing the private sector access to the central laboratory for sputum microcopy through the Tuberculosis Control Programme as well as for patient registrations through the NTP. Patients could then easily pass between public and private health system without redundant investigations, unnecessary paper work and associated delay. One of the reason cited for all the delays was the long travel time to the NTP Centres. One of the reasons for initial consultations with the private HCP was the proximity of the General Practitioners clinic to the patient's residence. The private HCP could be utilized to dispense anti – tuberculosis treatment through their own clinics which could be part of the DOTS strategy. There is also need to decentralize the NTP centres so is to have more treatment and diagnostic centers in the peripheral centers to allow easy access to the patients. This needs to be accompanied by creating awareness in the population regarding tuberculosis.

Recommendations

1. Improved awareness in the population regarding initial signs and symptoms of tuberculosis.
2. Public awareness campaigns to educate the lay public about the DOTS Programme.
3. Decentralization of DOTS diagnostic and treatment centers.
4. Increase in number of DOTS diagnostic and treatment centers especially in peripheral areas.
5. Better patient care in DOTS Centres.
6. Improved availability of drugs in DOTS Centres.
7. Involvement of Private HCPs in the main stream NTP Progamme.
8. Improved referral linkage between Private HCPs and NTP.
9. Provision of free diagnostic facilities for patients visiting private HCPs.
10. Awareness programmes for Private Medical Practitioners concerning the National Tuberculosis Programme and the DOTS strategy.
11. Provision of anti–TB medicines and implementation of the DOTS programme through Private HCPs.

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