Research Thesis

Entitled

Socio Economic Cost of Tuberculosis: A Case Study of District Hangu

Submitted to: Dr. Muhammad Jahangir Khan

Submitted by: Ahmed khan Bangash

Department of Development Studies

Pakistan Institute of Development Economics

Islamabad Pakistan 2019

Pakistan Institute of Development Economics

P.O. Box 1091, Islamabad, Pakistan

CERTIFICATE

This is to certify that this thesis entitled: "*Socio Economic Cost of Tuberculosis: A Case Study of District Hangu*" submitted by Ahmed Khan Bangash is accepted in its present form by the Department of Development Studies, Pakistan Institute of Development Economics (PIDE), Islamabad as satisfying the requirements for partial fulfillment of the degree in Master of Philosophy in Development Studies.

Supervisor:

Dr. Muhammad Jehangir Khan
Assistant Professor
Department of Development Studies
Pakistan Institute of Development Economics
Islamabad

External Examiner:

Dr. Sarfraz Khan
Assistant Professor
Department of Sociology,
Quaid-i-Azam University
Islamabad

Head,
Department of Development Studies:

Dr. Zulfiqar Ali
Assistant Professor
Pakistan Institute of Development Economics
Islamabad

Date of Examination: June 11, 2019

Dedicate to my loving parents
who are my actual source of inspiration

& Motivation

Acknowledgment

I express my profound thanks to Almighty Allah, who granted me courage, determination and potential to undertake and accomplish this piece of applied research work. As a matter of fact, it was not possible for me to perform this difficult task without His blessings and help. So I am indebted to Him from the core of my heart.

I feel great pleasure in extending my sincere gratitude to my teacher / research supervisor Dr. M. Jehangir Khan, Department of Development Studies, Pakistan Institute of Development Economics, Islamabad, Pakistan. I am one of those luckiest students who get benefited from his lectures on Development Economics. As a teacher, he provided us courage and constant guidance to carry out this research task. He accorded us his scholarly and adept advice for improving the stuff contained in this work. It is due to his kind supervision and support that this study took the present form. I, once again, express my heartfelt gratitude for him and pray for his health and services for the nation as well as for the noble profession.

Ahmed Khan Bangash

Abstract

Tuberculosis is an infectious but curable disease, and increasingly spreading health problems around developing countries. The increase in tuberculosis coupled with difficult economic conditions in developing countries put a lot of pressure on the health budget. In such conditions a cost effective treatment is to be used by the health departments that might provide effective health treatment, at the lowest cost to the patients. Urgent interventions are needed to reduce TB transmission. Pakistan, being under-developed country, the reported cases of tuberculosis are screened. Due to limited screening among registered TB patients; scale-up of surveillance activities, integrating TB and HIV care services, active case finding among key affected populations will have a positive impact on TB-HIV co-infection and disease control. Tuberculosis is an economic burden for Pakistan, and Patients are facing high cost, where the literacy as well as health education is scarce. This research study focused on one specific objective. To inquire the socio-economic cost of Tuberculosis among the Tuberculosis Patients of district Hangu. This study probed two type of costs, social and economic cost by quantitative method. Questionnaire were designed for collection of data from the respondents. Descriptive research design was used for this study**,** Purposive random sampling was used for all unit of data collection. Major findings of the study showed that patients bear more cost in the form of direct, indirect cost and intangible cost.

CHAPTER 1

1. INTRODUCTION

Tuberculosis is infectious but curable disease but at the same time it is increasingly spreading health problem around developing countries. According to the WHO (2015) report Bacteria known as bacillus mycobacterium tuberculosis that causes infectious disease known as (TB) which typically affects lungs and other parts of the human body as well. The bacteria spreads through air, people with pulmonary TB eject bacteria through coughing and spreads Tuberculosis to others through this process. People who are infected with the mycobacterium tuberculosis will develop Tuberculosis once during their lifetime. It also affects the lungs, which is curable and preventable. Economic impact of tuberculosis arises in form of size and fact of the problem. Diseases and deaths occurred in majority of developing countries affecting the most economically active segment of the country population. About 75% of the population comes under the age of 15 to those of 54 years (Murray, 1996, p.212). Among these age limits 20% of deaths are caused due to tuberculosis and 26% deaths are prevented due to treatment (Murray et al. 1993, p.241).

An estimate of 7.96 million new cases of tuberculosis was found in 1997 and 16.2 million prevalent cases as well (Dye et al.1999). It is one of the largest single infectious disease that cause death among the adults worldwide which accounts approximately about 2 million deaths per year. In global prospectus the problem of tuberculosis increases day by day. The reason behind is the insufficient control of this problematic disease and also the decline in the economies of the developing countries

In former Soviet Union and Eastern Europe the involvement of the economic disturbance leads an increase in tuberculosis disease for example from 1991 to 1995 the Russian federation

reported 69% increase in the tuberculosis new cases which indicated the highest TB mortality rate in the Russian federation (Migliori et al.n.d).

The increase in tuberculosis and difficult economic conditions of the developing countries put a lot of pressure on the health budget. In such conditions a cost effective treatment is to be used by the health departments that might provide effective health treatment and cure as well, at the lowest cost to the patients. This cost effective treatment are rarely used because of the decisions that are often based of budget allocation of these treatment depends on the health ministry, that how much budget can a health ministry can afford to pay. While the cost that are being borne by the patients are mostly ignored. For example Sunderson (1995) found that 70% of the TB treatment cost in Uganda was borne by the patients. When the benefits of the investment and cost for health are considered, the total social cost is also to be taken into account not just the governmental costs, in order to make efficient choices in health care (Weinstein et al.1996). If the cost borne by the patient are ignored the investment made on health might be too little to allocate and minimize the burden of the disease.

Anyone can be infected by tuberculosis just by breathing in the germs. In USA tuberculosis involves disproportionately in minorities and immigrants. A big reason for latent tuberculosis infection is time in prison or health care employee or extended travel in high risk areas. Most of the time tuberculosis is seen in adult population and the risk increases day by day with increasing age. However those children in households having active TB, case like that are at high risk.

Tuberculosis (TB) is nowadays a major global health problem alongside (HIV) and other major diseases. Every year millions of people got ill health because of Tb and causes death which ranks it alongside the immune deficiency virus (HIV). In 2014 an estimate of 9.6 million new TB cases were registered in which 5.4 million cases were found among men, 3.2 million among women and 1.0 million among children. Death cases caused by tb were 1.5 million in which

1.1 million were found to have HIV- negative and 0.4 million among HIV positive and approximately 890,000 deaths caused by TB in men and 480,000 in women and 140,000 in children) WHO report 2015.

TB can be found in every part of the world. In 2016 large number of new TB cases were found in Asia with 45% then followed by Africa which is 25% new cases. In 2016, 87% of new TB cases were found in 30 countries having high burden of TB among which seven countries were accounted for 64% of new TB cases which are India, Indonesia China, Philippine, Pakistan, Nigeria and South Africa. Global progress depends on advances in TB stoppage and health care in these countries.

Tuberculosis (TB) diseases kills 1.4 million every year and remains a major problem of global health. Many poor and middle income countries were unable to meet the millennium development goals (MDG) for TB reduction. This is because of low income countries having poor people and experiencing inequitable healthcare and access and suffering of disproportionate burden of morbidity and mortality from TB disease.

Poverty is one of the main factors that increase the risk of TB and TB worsens poverty, which affects most economically productive age group. While many countries aims to offer free TB treatment to their people. This treatment only covers some TB diagnostic tests and provide medicines to the patients. Patients and their household may face hidden costs but they may also face direct cost such as symptoms reliving medicines, transport, additional food or they may also face indirect cost such as lost in income as well.

In 2015 the global strategy and targets for prevention of tuberculosis, care and control at the 67th world health assembly in May 2014, world health organization (WHO) adopted a target to eradicate catastrophic cost for TB affected families by 2035. However the hidden costs related to TB remains under study and agreement about defining catastrophic costs is awaited. On the other hand psychological and social cost which includes mobility understanding and

knowledge are the key concerns are needed to be discussed. In all the most common emotion to express are the feeling of hopelessness and the accessibility towards resources. The false attitude among the patients and their relatives is one of the major obstacles among the effected individuals who further trap in anxiety and psychological stress.

Tuberculosis which is a major cause of death and also have a huge impact on people who have this disease and also on their and community the infection affects the most productive segment of the society in the form of loss of productivity and also the other family members productivity is also affected. (USAID, 2013)

An article by health and human services USA estimation of tuberculosis and their economic cost averted in united states over the past 2 decades shows the 3,68,184 incidents of TB cases decrease in the duration 1992-2014 reports .and the efforts of the TB prevention and control program and generated a remarkable number of TB cases were averted. (K. G. Castro, 2016).

Pakistan, a geographically diverse country with a population of 18.5 million, currently ranks fifth worldwide in terms of estimated TB incidence with an annual incidence of 510000, and it ranks sixth in estimated incidence of multidrug-resistant TB (MDR-TB).1 Urgent interventions are needed to reduce TB transmission. As underdeveloped country like Pakistan, where the reported cases of tuberculosis are screened in which TB patients 145 (0.66%) were found HIV reactive. Due to limited screening among registered TB patients scale-up of surveillance activities, integrating TB and HIV care services, active case finding among key affected populations will have a positive impact on TB-HIV co-infection and disease control. This high rate of reporting exceeding from Millennium Development Goals (MDG's) targeted 2015.

Pakistan is socially and culturally a strong state where individuals are somehow economically strong but their moral and psychological values are dominant. The traditional values may cause hindrance towards the treatment of a disease. In this research both the cases are intend to discuss which comes under the social and economic cost of TB patients. Stop TB strategy,

focusing on early diagnosis and successful treatment completion, has been the primary intervention in global TB control. Nevertheless, in recent times, socio economic determinants have gained attention in their role to support TB control.10–17. Social determinants of health inequities involve material circumstances; psychosocial circumstances; behavioral and/or biological factors and the health system itself. The Commission on Social Determinants of Health (CSDH) has highlighted that 'the circumstances in which people grow, live, work, and age, and the systems put in place 0to deal with illness' leads to health inequities. Socioeconomic and political mechanisms lead to social stratification of populations, which in turn shape the determinants of health. The structural determinants of health are the mechanisms that generate stratification and the ensuing socioeconomic position of individuals in a society which leads to inequities in social determinants of health. The structural stratifies that generate stratification comprise of income, education, occupation, social class, gender and race/ethnicity.

Beside the tuberculosis control programs, based on diagnostics and treatment, focus on prevention can also help to arrest the TB levels in resource-limited countries. Thus, identifying factors that influence transmission of TB such as social determinants can provide pivotal knowledge to design and implement effective prevention and control strategies. Although, recent effort have been made to review literature on social determinants of TB they were neither conducted as systematic review nor focused on a particular region (Ismaila Adamu Saidu, 2014). There is dearth of systematic review on social determinants of TB in high prevalent region such as sub-Saharan Africa. It is reasonable to argue that social determinants of health would vary greatly among different communities due to socioeconomic, socio-demographic, political, environmental and cultural differences. There is urgent need to gather knowledge on the social risk factors of TB in different regions globally. The study was carried out to critically examine the social determinants of TB in sub-Saharan Africa. The innovative socioeconomic

interventions against TB (ISLAT) project suggests that simple psychological interventions, coupled with micro enterprise and credit, vocational training food and cash transfers can result in poverty mitigation and income generation. Poverty reduction increases the resources available to then improve environmental conditions and reduce TB susceptibility (Rocha, 2011).

1.1 Research gap

Many studies are conducted on TB which shows different results but this study is specifically done on the economic and social cost incurred by tuberculosis patients which is specifically done in District Hangu. A lot of studies are conducted in Pakistan but none highlighted the issues regarding the social cost which is the gap.

1.2 Statement of the problem

Tuberculosis is an economic burden for Pakistan and currently Pakistan ranks 5^{th} in terms of estimation of tuberculosis. Patients facing problems against fighting this problem are facing cost while living in Pakistan which is a developing country where the literacy as well as education about health is scarce.

This study will be a preliminary work on the said issue as it is nonexistent in district Hangu. This research actually focuses the cost incurred by the TB patients which they bear during their free treatment from TB care centers.

1.3 Research Hypothesis

H_1. There is significant socio-economic cost of patients associated with Tuberculosis.

H_o. There is no significant socio-economic cost of patients associated with Tuberculosis.

1.4 Research Objectives

This research study focused on one specific objective.

To inquire the socio-economic cost of Tuberculosis among the Tuberculosis Patients of district Hangu.

1.5 Significance of Research

The study will add to the existing knowledge of tuberculosis and also help to identify the number of TB patients and their cost incurred in curing the disease in Hangu district which will help the policy makers to devise better policy for the future treatment of TB patients in the district.

1.6 Locale of the Study

Pakistan has mixed healthcare system, and largely unregulated private sectors According to the Ministry of National Health Services Regulation there are standardize implication of the federal and provincial level programs who are sharing their resources. The locale of my study is District Hangu which is situated south to Kohath division, it is a small district composed of population about 6 million people. The public sector TB care centers in a district Hangu is provided through a network of primary healthcare services.

CHAPTER 2

Review of literature

It is well known that can economy resources are limited as they need to be distributed and to be used in a way that over all benefits are to be maximized. For health sector it is also true that economic evaluation is a technique which is used to assist the decision makers that how the resources are to be distributed (Briggs et al., 2006) and it is useful method for enhancing policy making by obviously pinpointing suitable substitute (Drummond et al., 2005).

There are three most commonly used methods of economic evaluation namely cost utility study, cost effectiveness and cost benefit analysis (Drummond et al., 2005). Cost effectiveness study is a compare of the costs and effects of definite health care intervention (Walker, 2002, Shiell et al. 2002). All of these technique calculate both costs and effects of health interventions, where costs are in terms of opportunity costs. Opportunity cost can be explained as "the value of a resource in its most favored alternative use" (Shiell et al., 2002).

Jamison et al., (2006) commented that when more costs are included in cost effectiveness study then cost per unit of health effect looks to be higher and intervention will come out to be less cost effective. Whereas, when less costs are included, the cost per unit of health gain will be lower showing that the intervention is highly cost effective actually this is not true.

The concept of public private Mix DOTS was emerged in reaction to poor NTP achievement in TB case identification (WHO, 2001). In 2000, the NTP facility could only detect twenty one percent of new sputum smear positive TB cases internationally, which decrease the pace to achieve the international target of TB eradicate as given in Millennium Development Goals. (WHO, 2000a; WHO, 2003a). Similarly a few studies exposed the strength of private sector in developing nations to report a maximum of TB cases (WHO, 2001; Uplekar et al., 2001).

In England tuberculosis is considered as a serious health problem and the level of poverty is recently reemerged and this has also been reported in United States, Japan, Canada and United Kingdom. The cause behind the long treatment in these countries is the white ethnicity problems, lack of education and poverty (Abu-Bakr and Jones, 2000-2005).In United Sates the anti-tuberculosis campaign paid special attention towards the socio-economic conditions of individuals who are facing these problems and this occurs due to some of the existing societal problems. On the other hand the communication ability and economic conditions of the individual are as well as the condition of the houses added level of income is very important (Lowell, 1956).

In Nigeria the anti-tuberculosis treatment is free but it incur cost during the visit of the patient of access which includes traveling cost, pathway of care and the food cost. According to Akwaja in China the most of the patients are fall into medical poverty trap and the estimated cost are recorded in dollars, the data collection were done by face to face interviewing the registered patients. The major concern for this study is the management of the cure of TB disease, and the berries behind the delays are the distance access of TB care centers and belief system. Furthermore TB patients according to patient characteristics. Over 66% of all respondents experienced no negative social effects from TB illness. However, 11.7% experienced loss of work, 4.4% divorced or separated from their spouses or partners, while 4.3% experienced disruption of their sexual life (Gande, 2015).

Similarly, cost effectiveness study in Nepal found that community based strategy is more cost effective than family member strategy. They used structured and semi-structured questionnaires to collect cost data (Mirzoev et al., 2008).

In another study in Syria and Egypt cost effectiveness is measured from the societal perspective. Costs were collected using step-down method. Facility based survey and stratified questionnaire is used to measure patient costs. Moreover, cure rate is considered as the measure

of effectiveness. Cost effectiveness is measured by dividing total incremental cost by cases cured (Vassall et al., 2002).

A review in the article of economic burden of tuberculosis in Denmark a cost analysis in patients and their spouses shows the evaluation of the economic burden of tuberculosis in the form of health related costs and socio economic parameters by taking data from national database. The results obtained related to the health costs were higher throughout the period of 2 years. The direct cost the TB patient was estimated to be €10,509 (Andreas Fløe, 2014). The Patients and the households were characterize by increase in the lower income employee and higher dependency rate but the socio economic deterioration was taken as a risk factor for TB than the direct concern of the disease

A review of report published financial burden of TB in low and middle income countries on by ERS publications funded by WHO to find out the cost of TB patient in low and middle income countries, the study showed the total cost ranged from $55 to $8198, with an unweight average $847. On average the total direct medical cost was 20% and 20% direct non-medical cost and 60% due to income loss due to cost incurred before TB treatment. The percentage of Cost as income was particularly high in poor people and to those who are multi drug resistant MDR TB patients. (Tadayuki Tanimura, 2014)

TB prevention and control by National Tuberculosis Control Program (NTP) is an effort to highlight the public health as well as clinical aspect of this infectious disease which can be applied practically in the hospitals, clinics and the community. According to a report generated by Robort Koch 10.4 million of people falling ill while the treatments are procurable believed by the United Nations that this disease would be eliminated by 2025[1].

[1] https://www.medicalnewstoday.com/articles/8856.php

Study conducted by the (USAID, 2013) on the TB care at national level as an economic burden of tuberculosis in Indonesia in 2013 which shows that the economic burden of tuberculosis US$ 2.1 billion, the study also shows the relation between the wage rate and productivity loss as an economic loss which increase with increase in number of patients.

A study conducted in Nigeria on estimating the cost of TB and its social impact on tuberculosis patient and their households shows that TB often possess a significant amount of financial burden to the affected patient and their household even though TB treatment is free of cost in Nigeria. The patients incurs cost due to multiple visits during their treatment. The study examine the health seeking behavior, costs borne by the infected persons and the social impact of the TB on their family and households. The estimation of the study shows that on average the TB patients spend US$ 52.02 per person and the household experienced a shortfall of about 24.9% of income loss due to TB. The report also revealed that 9.7 % of the patients are children of the school age and are below the finance cost of TB illness, the study also revealed that 29.5% among those patients have no formal education and he majority of 68.8 % were engage in informal education (Onazi, 2015).

A study conducted in India by (Pantoja, 2009) on Economic evaluation of public-private mix for tuberculosis care. The results showed that 50% patients were from low income background and 39 % patients were from middle standard background and 77% patients were from households having household per capita income less than US$ 1 per day. The study was primarily conducted from a private practitioner patients. The results showed the mean patient delay was low at 21 days and the mean of health system delay was 52 days. The cost that averagely incurred by the patients before treatment was US$ 145 and during treatment was US$ 21. Cost as proportion of annual household income per capita was 53% and 41% from those of the other households. The average cost during the treatment faced by the patients outside Revised National TB Control Program (RNTCP) was US$127. The patients treated

under the RNTCP through a private-public mix approach were poor, and many of them experienced health expenditures as well before even treatment.

It is a global health problem of 2015 and Pakistan ranks fifth with estimated population of 10.4 million with notification of 1.8 million of death and many missed cases are there due to limited access of hospitals and health care centers, in this study most of the cases are not added because they are not reported properly. As in case of Baluchistan the largest province of Pakistan there are best equipped hospitals are reported but the treatment of the tuberculosis patients are still poor. In this report the five year data is taken regardless sex and age (Ullah et.al, 2017).

The first national anti-tuberculosis drug resistance survey conducted in Pakistan (2012–13) showed that the proportion of MDR-TB patients was 3.7% (95% CI, 2.5–5.0) among new and 18.1% (95% CI, 13.0–23.4) among previously treated cases . Pakistan ranked 3rd among the countries with the highest number of estimated TB cases who were not notified "missing". In recent years, several studies have documented the overall trends of MDR-TB in Pakistan. A study has shown an almost consistent increase in the number of MDR-TB cases of tuberculosis from 1990 - 2007 with more than 15,000 isolates alone reported during that period. The relatively low proportion of presumptive TB cases and overall yield of TB among children in our study is worrying. Even though, little is known globally about the actual disease burden among children, they likely represent a large pool of exposed, undiagnosed, and untreated active and latent infections. We therefore suspect that the yield in our setting is likely underestimated. Our screening strategy based on "verbal screening" among index cases and limited home visits may have missed an important number of symptomatic children. Moreover we did not have access to specific diagnostic procedures such as sputum induction and gastric aspiration which are indicated especially for younger children (Isaakidis, 2017).

A descriptive and case control study was conducted in Sahiwal district in Pakistan. The study focuses on socio-demographic factors which are accountable for the prevalence of tuberculosis.

They are of the opinion that majority of the patient are between the ages of fifteen to forty five year. Further, the study revealed that poverty, congested, bad living condition, lack of proper food, use of raw milk, smoking, addiction, poor housing, absence of health education are prominent reasons in the spread of tuberculosis (Khan et al., 2007).

According to (Dennis Tatarkov, 2017) report, there were 33 million deaths due to TB between 2000 and 2015, which according to our analysis caused a loss of US$ 616bn to the world economy. For comparison, this figure is roughly equivalent to the size of the economy of Norway in 2016. Across the 166 countries covered by our analysis, the greatest losses occurred in the South East Asia region3, which were caused by the high rates of mortality in large economies such as India and Indonesia, as well as by mortalities in other economies in the region.

The majority of the economic costs associated with TB-related mortality were borne by developing economies such as India, China and Nigeria. Together these countries accounted for 39% of the total global economic costs, as measured by the loss of GDP from TB related mortality. Figure 4 below outlines the cumulative losses in GDP between 2000 and 2015 for the 10 highest affected countries. The high economic burden of TB in India and China, of 123 and 59 bn $US respectively, reflects the large size of these economies relative to the world economy, together with a relatively high TB related mortality rate.

(Katherine Floyd, 2006) Most of them are likely to belong to the poorest segment of society. It is believed that the poor are relatively under-represented among people treated in National TB Programs (NTP). However, there is a lack of studies assessing the socio-economic profile of patients reaching NTPs as compared with the profile of people with TB in the community

According to (Knut Lonnroth, 2007) Several previous studies have shown that such initiatives can improve treatment results in the private sector and also help increase TB reporting and thereby case notification rates (Katherine Floyd, 2006). However, it is not known to what extent

such approaches actually reach the poor and help to protect them financially. One study showed that patients' cost of care was between 50 and 100 US$ lower when treated with drugs free of charge in quality-assured private clinics under NTP guidelines, compared with conventional private TB treatment financed out-of-pocket (Katherine Floyd, 2006) However, the socio-economic profile of these patients was not studied and it is possible that such initiatives improved access and provided subsidized care to the better-off only.

TB is a disease mainly of the poor. TB is also a disease that can make the poor poorer. Studies have documented that direct and indirect health care costs can be catastrophic, even when NTPs provide TB drugs free of charge (Wyss et al. 2001). For example, a study in India showed that the total cost on average corresponded to 40% of the yearly family income and that about 70% of patients incurred TB-related debts (Rajeswari et al. 1999). Much of patients' direct expenditure before treatment in NTPs is for tests and treatments in the private sector, where diagnostic and treatment quality is often poor (Knut Lonnroth, 2007).

According to (Anurag Bhargava, 2012) We reanalyzed data from the sociomedical experiment performed at the Papworth Village Settlement in England, where the impact of stable employment and adequate housing and nutrition on the incidence of TB infection and disease in children living with parents with active TB was documented during 1918–1943.

Information on 315 children of patients, who lived at Papworth, was abstracted from a published monograph. Overall and age-specific occurrence of TB infection, disease, and deaths among children born in the settlement were compared with those of children born In the admitted cohort, among children 13 years of age and older, the incidence of TB before admission to Papworth was 5,263/100,000 person-years, whereas it was 341/100,000 person-years while living in Papworth.

Conclusions: At Papworth social interventions including adequate nutrition did not reduce TB transmission but did reduce the incidence of TB disease in children living with parents with

active TB. These results are relevant today for prevention of TB in children of patients with active TB, particularly with multidrug-resistant TB in high-burden settings outside and admitted later (admitted cohort) to Papworth.

The annual risks of infection in the village-born and admitted cohortswere20 and24%, respectively. Of 24 children who developed TB disease, only one was village-born Among children 5 years of age or less, there was zero incidence of TB in the village-born, compared with five cases (1,217/100,000 person/years) among children born outside Papworth.

According to (Boccia, 2011) to quantify the impact of cash transfer and microfinance interventions on a selected list of tuberculosis (TB) risk factors and assess their potential role in Supporting TB control. Published and unpublished references identified from clinical and social electronic databases, grey literature and web sites. Eligible interventions had to be conducted in middle- or low-income countries and document an impact evaluation on any of the following outcomes: 1) TB or other respiratory infections; 2) household socioeconomic position; and 3) factors mediating the association between low household socio-economic position and TB, including inadequate health-seeking behaviors, food insecurity and biological TB risk factors such as human immune deficiency virus (HIV) and adult malnutrition. Interventions targeting special populations were excluded. Fifteen cash transfer schemes (four unconditional and 11 conditional) and seven microfinance programs met the eligibility criteria. No intervention addressed TB or any other respiratory infection. Of 11 cash transfer and four microfinance interventions, respectively seven and four reported a positive impact on indicators of economic well-being. A positive impact on household food security was documented in respectively eight of nine and three of fi ve cash transfer and microfinance interventions. Improved health care access was documented respectively in 10 of 12 cash transfer and four of five microfinance interventions. The only intervention evaluating impact on HIV incidence was a microfinance project that found no effect. No cash transfer or

microfinance interventions had an impact on adult malnutrition. Cash transfer and microfinance interventions can positively impact TB risk factors. Evaluation studies are urgently needed to assess the impact of these social protection interventions on actual TB indicators.

According to (Devra M Barter, 2012) it is also well-known that TB can contribute to poverty by reducing patients' physical strength and ability to work. However, another pathway through which TB can affect households' economic situation, the costs patients incur when utilizing TB care, has been less studied. These costs include both direct out-of-pocket costs incurred when seeking treatment and care and the indirect, or time costs, associated with utilizing healthcare. While most countries with high TB burden provide free sputum smear microscopy for patients with suspected pulmonary TB, more than half of these 22 countries charge for other TB-related diagnostic tests such as radiography, sputum culture, and drug susceptibility testing. Under Directly Observed Therapy Short-course (DOTS) programs, all high burden TB countries provide free first line anti-TB medication, but many patients purchase anti-TB drugs in private pharmacies (some without prescriptions), which can be costly. In high TB burden countries, 60% of overall health expenditure is in the private sector, and a large proportion of these expenditures are paid out-of-pocket by patients.

A number of previous studies have documented the downstream consequences of the direct and indirect costs that TB patients incur. More than 50% of TB patients have been reported to experience financial difficulties due to TB, and these costs can be "catastrophic" in that they amount to more than 10% of patients' or households' annual income. TB patient costs have been shown to lead to reduced food consumption, diversion of resources from other types of healthcare, taking children out of school, and borrowing or selling assets. Furthermore, financial constraints have been shown to predict non-adherence to TB medication (Devra M

Barter, 2012). In general, the World Health Organization (WHO) estimates that 100 million people every year fall into poverty from paying for health services.

According to (Olivia Oxlade, 2012) there is substantial evidence that poverty is a determinant of TB, both at the macro-scale and in individual and hierarchical analyses. Janssens and Rieder documented a linear association between per capita GDP and TB incidence, and Dye found that the country level human development index was a strong predictor of changes in TB incidence over time. Although several studies report discrepant findings, most analyses of data have confirmed the positive association between household and area poverty indicators and TB in such diverse settings as South Africa, Brazil, Vietnam and Zambia. Among the social, environmental and biological determinants of TB, many are more prevalent among the poor than in wealthier groups and these determinants likely contribute to a complex web of poverty-based risk factors that is difficult to tease apart. With the recognition of poverty as a root cause of TB, the need to intervene not only on economic status, but also on the proximal risk factors that put the poor at risk is increasingly clear. Several groups have described frameworks that suggest how and when common proximate risk factors act on the TB pathogenic pathway that includes exposure, infection, active disease and eventual disease outcomes. Although some epidemiologic studies have sought to measure the impacts of these determinants, only a few have addressed this question in the context of understanding the routes by which poverty leads to TB. The objective of our study was to investigate the mechanisms by which poverty increases the risk of TB.

According to (Christopher Dye, 2001) The estimated risk and prevalence of *Mycobacterium tuberculosis* (MTB) infection and tuberculosis (TB) incidence, prevalence, and mortality, including disease attributable to human immunodeficiency virus (HIV), for 212 countries in 1997. A panel of 86 TB experts and epidemiologists from more than 40 countries was chosen by the World Health Organization (WHO), with final agreement being reached between

country experts and WHO staff. Incidence of TB and mortality in each country was determined by case notification to the WHO, annual risk of infection data from tuberculin surveys, and data on prevalence of smear-positive pulmonary disease from prevalence surveys. Estimates derived from relatively poor data were strongly influenced by panel member opinion. Objective estimates were derived from high-quality data collected recently by approved procedures. Agreement was reached by participants reviewing methods and data and making provisional estimates in closed workshops held at WHO's 6 regional offices, principal authors refining estimates using standard methods and all available data, and country experts reviewing and adjusting these estimates and reaching final agreement with WHO staff. In 1997, new cases of TB totaled an estimated 7.96 million (range, 6.3 million–11.1 million), including 3.52 million (2.8 million–4.9 million) cases (44%) of infectious pulmonary disease (smear-positive), and there were 16.2 million (12.1 million–22.5 million) existing cases of disease. An estimated 1.87 million (1.4 million–2.8 million) people died of TB and the global case fatality rate was 23% but exceeded 50% in some African countries with high HIV rates. Global prevalence of MTB infection was 32% (1.86 billion people). Eighty percent of all incident TB cases were found in 22 countries, with more than half the cases occurring in 5 Southeast Asian countries. Nine of 10 countries with the highest incidence rates per capita were in Africa. Prevalence of MTB/HIV coinfection worldwide was 0.18% and 640 000 incident TB cases (8%) had HIV infection. The global burden of tuberculosis remains enormous, mainly because of poor control in Southeast Asia, sub-Saharan Africa, and Eastern Europe, and because of high rates of tuberculosis and HIV coinfection in some African countries.

According to the study (Rocha, 2011) Tuberculosis (TB) affected households in impoverished shantytowns, Lima, Peru. To evaluate socio-economic interventions for strengthening TB control by improving uptake of TB care and prevention services. DESIGN: Barriers to TB control were characterized by interviews with TB-affected families. To reduce these barriers,

a multidisciplinary team offered integrated community and household socio-economic interventions aiming to: 1) enhance uptake of TB care by education, community mobilization and psychosocial support; and 2) reduce poverty through food and cash transfers, microcredit, microenterprise and vocational training. An interim analysis was performed after the socio-economic interventions had been provided for 2078 people in 311 households of newly diagnosed TB patients for up to 34 months. Poverty (46% earned <US$1 per day), depression (40%), stigmatization (77%), and perceived isolation (39%) were common among TB patients (all $P < 0.05$ vs. non-patients). The project had 100% recruitment, and involved 97% of TB-affected households in regular visits, 71% in community groups, 78% in psychosocial support and 77% in poverty-reduction interventions. The socio-economic interventions were associated with increases in household contact TB screening (from 82% to 96%); successful TB treatment completion (from 91% to 97%); patient human immunodeficiency virus testing from 31% to 97%); and completion of preventive therapy (from 27% to 87%; all $P < 0.0001$). Socio-economic interventions can strengthen TB control activities.

A cross sectional study in Karachi Nazimabad analyzed the cost of DOTS borne by TB patient. The study found that majority of the patient were female and poor and the cost of treatment especially travel and time has detrimental effect on poor families (Habib and Baig, 2006).

Pakistan is portrayed as the multicultural society and the society of rich and poor with large existing social and economic gaps. High social stigmas and economic risk which needs to be evaluate and specifically through interventions. Addressing the issues to seek the positive outcomes could be targeted while the social barriers such as low income, unemployment and poor social interaction intend to be highlighted in the findings of this study.

Chapter 3

RESEARCH METHODS & METHODOLOGY

3.1. Research strategy

This study probed two type of costs, social and economic cost by quantitative method. Questionnaire will be designed for collection of data from the respondents.

3.2. Research Design

Descriptive research design was used for this study**.**

3.3. Sampling and sample size

Purposive random sampling was used for all UDCs (Units of Data Collection), because the lists of patients was available from the concerned departments. The study collected the data from registered tuberculosis patients in district Hangu from main city hospitals

3.4. Data collection

This study is based on primary data, which is cross section in nature. The data was collected through questionnaire, which was translated into Urdu for Urdu speakers and in Pashto for Pashto speakers, the unite of data collection was tuberculosis patient registered in city hospital at district Hangu

3.5. Tools of data collection

Questionnaire as an instrument which was used to gather the information from respondents of interest.

3.6. Data analysis method

The study used quantitative techniques to estimate the health cost of tuberculosis patients, which include direct and indirect cost. For direct cost OLS method used to investigate the determinants of health cost of tuberculosis patients in district Hangu and for intangible cost the index was developed from multiple components in-closed in chapter 3 with help of multiple dummy variables Index[2] score was used as a dependent variable for social cost model, which is also Linear OLS model. The functional form of the model is given as follow for the both of dependent variables distinctively.

3.7. Monetary cost of tuberculosis:

3.7.1 Model one of the study.

$$\boldsymbol{MCTB} = (\mathrm{f})\ \boldsymbol{\beta 0} + \boldsymbol{\beta 1} + \boldsymbol{\beta 2} + \boldsymbol{\beta 3} + \boldsymbol{\beta 4} + \boldsymbol{\beta 5} + \boldsymbol{et}$$

$$\boldsymbol{MCTB} = \boldsymbol{\beta}_{\circ} + \boldsymbol{\beta_1 x_1} + \boldsymbol{\beta_2 x_2} + \boldsymbol{\beta_3 x_3} + \boldsymbol{\beta_4 x_4} + \boldsymbol{\beta_5 x_5} + \boldsymbol{\beta_6 x_6} + \boldsymbol{\beta_7 x_7} + \boldsymbol{\beta_8 x_8} + \boldsymbol{\varepsilon_t} \quad (\mathbf{1})$$

Where $\boldsymbol{x_1}$ is variable: Duration of stay at hospital, $\boldsymbol{x_2}$ is variable Out patients visits to the hospital, $\boldsymbol{x_3}$ is prescribed drugs, $\boldsymbol{x_4}$ is travel cost during regular checkup, $\boldsymbol{x_5}$ is Time spent in hospital, $\boldsymbol{x_6}$ is loss of productivity, $\boldsymbol{x_7}$ is loss of job, $\boldsymbol{x_8}$ is Caregivers, and $\boldsymbol{\beta_i}$ *a*re their respective coefficients. $\boldsymbol{\varepsilon_t}$ Is error term .i.e. $\varepsilon_t \sim iid\ N(0, \sigma^2)$

MTCTB is monetary cost of tuberculosis, which is dependent variable of the study, beta one two three and so on represent independent variables of the study which is age, income, education, duration of disease, number of visits to doctor etc.

[2] This index development method is adopted from the study of Sarasvati (2014)

3.7.2. Model two of the study

The second model of the study was used to cover the social cost determinants

$$\boldsymbol{Index\ score\ of\ social\ cost} = \text{(f)}\ \boldsymbol{\beta 0 + \beta 1 + \beta 2 + \beta 3 + \beta 4 + \beta 5 + et}$$

$$\boldsymbol{y = \beta_{\circ} + \beta_1 x_1 + \beta_2 x_2 + \beta_3 x_3 + \beta_4 x_4 + \beta_5 x_5 + \varepsilon_t} \qquad (\mathbf{2})$$

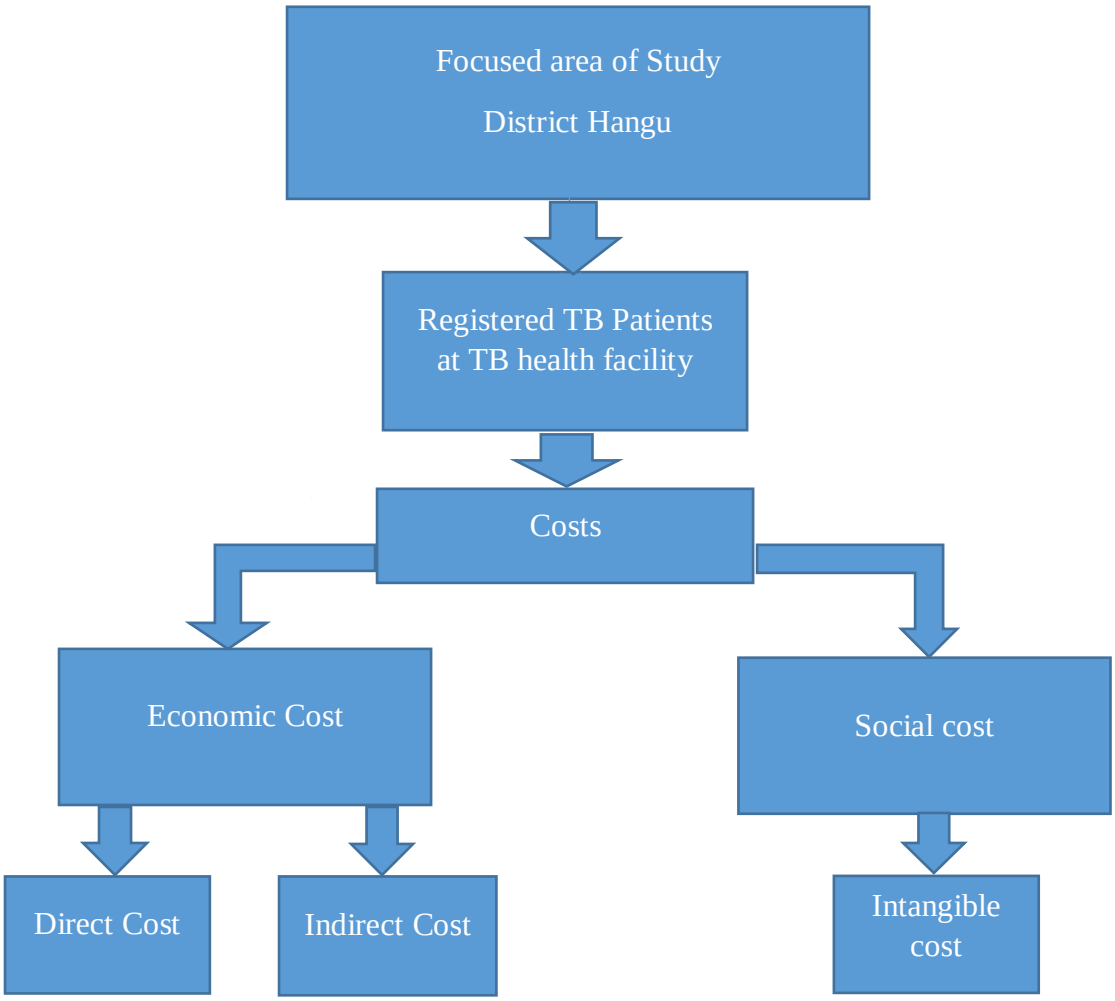
Where $\boldsymbol{x_1}$ shows pain felt by the patients, $\boldsymbol{x_2}$ is mobility of the patient, $\boldsymbol{x_3}$ is social interaction, $\boldsymbol{x_4}$ is social stigma, $\boldsymbol{x_5}$ is the fear of death. Where $\boldsymbol{\beta}$ is their respective coefficient $\boldsymbol{\varepsilon_t}$ is their error term.

Social cost of tuberculosis patients is calculated as an index score through multiple dummy variables, which score range is (0, 5) if all the social cost components are available in patient takes 5 value otherwise according to number components he /she agree to, will be the score of index for specific respondent.

4.0 Analytical framework

The conceptual framework is designed to indicate and conduct the research study and it also give the complete picture that which area needs to be focused. Firstly, the registered patients were selected for the interviews so that the cost they face in treatment should be analyzed, like these patients get treated from the government hospitals and health care centers but the cost incurred by them which includes the economic as well as the social cost could be list down and estimate their finances against their income level. Further the costs includes the direct and the indirect cost bear by the TB patients, the relevant other factors are about the social cost which are most of the time invisible and does not incurred and realize by the patients and his/her family.

4.1 ANALYTICAL FRAME WORK



4.2 Economic Cost

It is the combination of losses having some value attached to them by any one individual. It is mainly used in order to compare one course of action with that of another. Economic cost is further divided into many categories but here in this study direct and indirect cost is focused.

4.2.1 Direct Costs

It refers to the consumption of the resources provided in the provision of the health care interventions. It also encompasses the use of the entire current resources and depends on the

timeframe that is under consideration, and also some of the future resources used that can attribute to the program.

Direct costs are further divided into two categories i.e.

Direct medical costs

Direct non-medical costs)

4.2.1.1. Direct Medical Costs or Direct Health Care Costs

It refers to the consumption of the resources in health care sector which is further associated with the provision of the health care interventions. The consumption of the resources includes:

- Duration of the stay at the hospital
- Outpatient visits to the hospital
- Prescribed drugs
- Travel cost beard by the patient during regular checkup.

4.2.1.2. Direct Non-Medical Costs or Direct Non Health Cost

It refers to the resources that support medical services that are delivered in the health care sector. It depends on the prospective of the households or health providers. The direct non-medical cost can be time spent by the patient's family caregivers in the relation to their illness.

4.2.2. Indirect Cost

It can also be known as opportunity cost. Indirect costs are different from the financial costs which include the cost of forgone income due to the inability caused by illness and also time loss because of health facilities, time spend in road to and at health facility, loss of productivity, it may also occur in the form of loss of job in high stigma societies.

4.3 Social Cost

4.3.1 Intangible Cost

Costs that are nowadays rarely used. These costs refers to the items that are difficult to measure and values of cost terms, e.g. pain, treatment suffering, stigma and fear of death. Some parts of

intangible costs are not counted as costs (i.e. no resource are denied an alternative use). And overall they are often not strictly intangible, as can be valued through quality of measures or willingness to pay approach.

To measure this variable index will be developed on following components:

1. Pain if the person is going through pain takes value one otherwise zero
2. Mobility if the mobility of person is affected takes value one otherwise zero
3. Social interaction: if regular social interactions of the person is affected takes value one otherwise zero
4. Social Sigma if the person feel social stigmatization around him takes value one otherwise zero
5. Fear of death: if the person feel fair of death due to illness takes value one otherwise zero

Index score range will be from (0-5), where if all the replies are yes the person index score is 5 and vice versa. Index score will be used as a dependent variable for social cost model, which will be Linear OLS model

4.4. List of variables

For first dependent variable: economic cost:

	Variable name	Construction
1.	Age	Taken in number years
2.	Income	Monthly income PKR
3.	Education:	Number schooling years
4.	Duration of illness:	Number of days
5.	Stage of illness:	Starting, critical, unrecoverable
6.	Number of hospital visits:	Number of visits frequency
7.	Mode of transport:	Own care, public transport or rented cars
8.	Awareness	If the person is aware about disease takes value one otherwise zero
9.	Pain	If the person feels pain take values one otherwise zero
10.	Mobility	If the person mobility is affected takes value one otherwise zero

11. Social interaction	If a person social interaction is affected takes value one otherwise zero
12. Social stigma	If a person feels socially stigmatized takes value one otherwise zero
13. Fear of death	If a person feels fear of death takes value one otherwise zero
14. Index score	Social cost of tuberculosis patients is calculated as an index score through multiple dummy variables, which score range is (0, 5) if all the social cost components are available in patient takes 5 value otherwise according to number components he /she agree to, will be the score of index for specific respondent

CHAPTER 4

4.1 Results and Findings

The chapter includes results and analysis of the data as well as description of the results.

4.2 Results:

Table 4.1. Descriptive estimates of independent variables

Descriptive Statistics					
Variables	N	Minimum	Maximum	Mean	Std. Deviation
Age	100	3.00	78.00	33.8000	18.31321
household monthly income	100	3500.00	102000.00	53615.0000	22260.94726
own personal monthly income	98	.00	70000.00	13448.9796	19753.17928
number of rooms	100	1.00	13.00	5.8000	2.38683
Number of dependents	100	1.00	30.00	13.3200	6.14123

Here:

The study result shows that the age of the respondent's lies between 3 to 78 years, where 3 is minimum age of the patient and 78 is maximum. The average age of the respondents is 33.8 which means TB is affecting the most active segment of the society and the standard deviation is 18.31321 and the average monthly income of the household is 53615 PKR. The minimum income of the household is 3500 PKR and maximum 102000 PKR with standard deviation 22260.94 and Own personal monthly income of few respondents is 0 PKR and the maximum income of the respondent is 70,000. The average personal income of the respondents is 13448.97 with the standard deviation of 19753.17 while the results show that the minimum Number of room is only 1, which means that some of the patients must be having the problem in taking care of their illness as they are suggested to stay alone in their rooms the results show that the maximum number of rooms are 13 rooms. The average number of rooms are 5.8000 which means there are almost 6 rooms on average with standard deviation of 2.386 and the number of dependents starts from minimum 1 person, on average the number of dependents

are 13.3 members and the results shows the maximum number of dependents on a single household are 30.

Table 4.2 Estimates of independent variables.

Descriptive Statistics					
Variables	N	Minimum	Maximum	Mean	Std. Deviation
Visits u made to Government hospital	100	1.00	16.00	3.8500	1.95595
Cost of each visit (consultation, fares, drugs) count in PKR	100	300.00	8000.00	1595.4000	1207.00516
How long u did took to go to hospital?	100	.00	90.00	33.5000	20.95859
Illness duration	100	.00	90.00	33.5000	20.95859
Number of visits to private facility	100	.00	8.00	2.1700	1.76415
Transportation cost on each visit	100	.00	1000.00	329.3000	231.76641
How much time you took to start treatment	100	.00	90.00	37.2100	19.50048

Here:

The results shows that number of visits to the government hospital which starts from minimum 1 to maximum 16. The average number of visits that patients made to the hospital in a month are 3.850 with the standard deviation of 1.95595 and Cost of each visit which also includes the cost of consultation fares and drugs counted starts from minimum R.S. 300 PKR to R.S 8000 maximum. The average cost on each visit is RS. 1590 PKR with standard deviation of 1212.6979 and the Number of days taken to access the T.B health facility starts from minimum 0 to maximum 90 days. The average number of days taken to access the health facility is 33.5 with the standard deviation 20.9585. The Illness duration show us the duration of the illness which is counted in days starts from minimum 0 (means from the present day) to maximum 90 days. The average duration of the illness is 33.5.with the standard deviation 20.958 and the number of visits to private health- facility by the respondents is minimum 0 and maximum 8.The average visits to the private health facility for general treatment is 2.17 with the standard

deviation of 1.76415 and the transportation cost show's us the cost of each visit which is starts from minimum 0 PKR to maximum 1000 PKR the average cost on each visit is RS 329.3 PKR and Time to start the treatment shows us how much time a person took to start his/her treatment. The minimum number of days taken by a patient is 0 (mean the present day) to maximum 90 days. The average number of days taken by the patient are 37.2 days with the standard deviation 19.500

4.3 Frequencies

Table 4.3.1: Demographic characteristics

Gender	**Frequency**	**Percent**	**Cumulative Percent**
female	55	55.0	55.0
Male	45	45.0	100.0
Total	100	100.0	
Marital status			
Marital status	Frequency	Percent	Cumulative Percent
single	31	31.0	31.0
married	59	59.0	90.0
other	10	10.0	100.0
Total	100	100.0	
Family type			
Family type	Frequency	Percent	Cumulative Percent
nuclear	41	41.0	41.0
Joint family	59	59.0	100.0
Total	100	100.0	

The above table shows the demographic characteristics of the male and female. Here gender is define as male and female. The table also shows that 55% female attended the T.B health facility and 45% males attended the T.B health facility. Which also show the ratio of infection among females prevails more and the Marital status shows the frequency of patients that are single 31%, married 59% and others 10% which include widowed and divorced, and the above

table also shows us the frequency of the Family type, 41% of the patients belong to nuclear family and 59% among the patients belong to joint family.

Table 4.3.2: Education and Occupation

Education

Education	Frequency	Percent	Cumulative Percent
no schooling	27	27.0	27.0
primary	30	30.0	57.0
secondary	35	35.0	92.0
tertiary	8	8.0	100.0
Total	100	100.0	
Occupation			
Occupation	Frequency	Percent	Cumulative Percent
unemployed	12	12.0	12.0
agriculture sector	14	14.0	26.0
formal sector	16	16.0	42.0
informal sector	7	7.0	49.0
student	27	27.0	76.0
house wife	24	24.0	100.0
Total	100	100.0	

The above table 2 shows education and occupational background of the infected persons.

The table shows that a 27% of the people were illiterate and 30% patients attended primary education and 35% patients accessed secondary education and 8% patients are tertiary educated while having TB.

Occupation fragment shows 12% patients were unemployed and 14% patients were from agriculture background, 16% patients are from formal sector, 7 % patients were from informal sector, 27% patients were students and 24% patients are housewives.

Table 4.3.3: Transportation

Do u have your own transportation?			
Variables	**Frequency**	**Percent**	**Cumulative Percent**
NO	57	57.0	71.0
Yes	43	43.0	100.0
Total	100	100.0	
Mode of transportation used to get health facility			
Variables	**Frequency**	**Percent**	**Cumulative percent**
Walking	18	18.0	18.0
Motorcycle	15	15.0	33.0
Motorcar	28	28.0	61.0
commercial vehicle	11	11.0	72.0
private vehicle	28	28.0	100.0
Total	100	100.0	

The above table shows Mode of transportation and mode of transportation that people use access the health facility, people having personal transportation.

The above table shows that 43% patients have their own personal vehicle and 57% patients have no personal vehicle.

The table also shows that how people access to T.B health facility while using different mode of transportation in order to get to the health facility. The above frequency table shows that 15% patients used motorcycle and 28% patient's motorcar in order to get to the health facility and 18% patients accessed T.B health facility by walking while 11% patients used commercial vehicle and the rest of 28% patients used private vehicle in order to get to the health facility.

Table 4.3.4: Distance covered by respondents to access health facilities (kilometers)

Mode transportation	Minimum	Mean	Maximum
Walking	0.5	3.5	7
Motorcycle	1.5	15.0	33.0
Motorcar	2	48.0	120.0
commercial vehicle	11	71.0	112.0
private vehicle	18	28.0	100.0
Total	100	100.0	

The table explains the distance covered by the patients in kilometer towards the health facility. The above table shows that the minimum walking distance covered by the patients is 0.5 km and maximum distance is 7 km with mean distance 3.5 km on average. The table shows that the average distance covered by the patients on motorcycle is 15 km. the minimum distance covered by the respondent is 1.5 km and the maximum distance is 33 km. The above table shows that the minimum distance covered by the patient through motor car is 2 km and maximum distance is 120 km with the average distance of 48 km The above table shows the minimum distance covered by the patient through commercial vehicle is 11 km and the maximum distance is 112 km with the average distance of 71 km. The above table show that the minimum distance covered by the patients through private vehicle is 18 km and maximum 100 km. the average distance is 28 km.

Table 4.3.5: Family stay, type of building:

Where do the Family stay?

Variables	Frequency	Percent	Cumulative Percent
own house	67	67.0	67.0
family house	25	25.0	92.0
rented house	4	4.0	96.0
employed apartment	2	2.0	98.0
other	2	2.0	100.0
Total	100	100.0	
Type of building household resides			
Variables	**Frequency**	**Percent**	**Cumulative Percent**
Thatched	2	2.0	2.0
Wooden	1	1.0	3.0
Bricks	71	71.0	74.0
mud house	26	26.0	100.0
Total	100	100.0	2.0

The above table shows the frequency of the family stay and type of the building of the patients.

The above table shows the frequency of the family stay as 67% patients are living in their own houses and 25% patients lived in their family houses and 4% patients lived in the rented houses 2% patients are living in the employed apartments.

The frequency of the type of the building shows that 2% patients are living in thatched houses, 1 % of the patients are living in the wooden houses, 71% patients are living in the house made of bricks and 26% are living in the mud houses.

Table 4.3.6: Realization and illness notice:

How do u came to know that u are infected with TB			
Variables	**Frequency**	**Percent**	**Cumulative Percent**
not aware	16	16.0	16.0
chest pain	36	36.0	52.0
Temperature	18	18.0	70.0
spinal TB	11	11.0	81.0
results after tests	3	3.0	84.0
tape water	5	5.0	89.0
infected from others	2	2.0	91.0
abdominal pain	9	9.0	100.0
Total	100	100.0	
What did u do when you notice that you are not well			
Variables	**Frequency**	**Percent**	**Cumulative Percent**
self-medication	10	10.0	10.0
went to the Govt hospital	33	33.0	43.0
went to private doctor	57	57.0	100.0
Total	100	100.0	

The above frequency table shows the realization of the illness and how did they react to that illness.

The above frequency table of realization shows that 16% patients are not aware about their illness, 36% patients realize their illness by noticing chest pain, 18% patients notice illness in the form of temperature, 11% patients realize it in the form of spinal pain, 3% patients were waiting for their test results, 2% patients were infected from others and 9% patients realized their illness in the form of abdominal pain

The frequency table of the reaction to their illness shows 10% patients started self-medication, 33% patients went straight to the hospital while the rest of 57% went straight to the private doctors. As they found private doctors clinics easily accessible with respect to government hospital.

Table 4.3.7 Referred to another facility.

Were you referred to another facility			
Variables	**Frequency**	**Percent**	**Cumulative Percent**
No	43	43.0	43.0
Yes	57	57.0	100.0
Total	100	100.0	

The above table shows the percentage of the people referred to another facility 43% of the people went directly to the hospital for treatment while 57% of the people were referred to TB health facility by private doctors. The reason behind the a large percentage of the accessibility to the private doctors is due to the general chest pain and coughing treatment and which also increases the cost of their illness as the patients suffers from TB the general treatment did not work to ease the patient's chest pain and coughing and the patients lost a month or two in general treatment and the TB gets worst day by day.

Table 4.4.1: Knowledge and awareness about TB

How TB spreads			
Variables	**Frequency**	**Percent**	**Cumulative Percent**
Not aware	59	59.0	59.0
Infected from other	3	3.0	62.0
Through coughing	35	35.0	97.0
Polluted area near house	3	3.0	100.0
Total	100	100.0	

The table 5.4 shows the awareness and knowledge about TB, among infected people. 59% patients were not aware about the reasons and causes of spreading TB. 3% patients were infected from others and 35% patients argued that the illness has spread through coughing and most probably they have also got infected due to the same factor, only 3% patients among them were infected from polluted areas near their houses which is not very common phenomenon.

Table 4.5.1.: Effect on social life

DO you think your social life has been infected			
	Frequency	**Percent**	**Cumulative Percent**
no	48	48.0	48.0
yes	52	52.0	100.0
Total	100	100.0	
Rank the following in the matted of contribution to bad feelings			
Variables	**Frequency**	**Percent**	**Cumulative Percent**
side effect of drugs	9	9.0	9.0
pain	35	35.0	44.0
stigma	5	5.0	49.0
fear of death	27	27.0	76.0
anxiety	24	24.0	100.0
Total	100	100.0	

Table 4.5.1 shows the perception of patients about TB effects on social life and the tangled situation of their bad feelings.

The above table shows that 48% patients perceived that there is no effect of TB on their social life while 52% patients accepts as their social life has been affected due to TB. The affected social life of the patients is due to the weakness and illness as patients are weak enough to interact and communicate with other people normally and thus the patients lose their social circle.

The ranking in the tangled situation of the bad feeling shows us that 9% of the patients were affected due the side effects of the drugs as it has effects their body and it also effects the skin color, while 35 % argued that pain is the most unpleasant feeling that patients suffer during the

illness as they feel chest pain during their illness which is found among the children's and elders the most ,While 5 % argued that they felt stigmatize as they were left alone by their family members and friends and the Doctors suggests it as a communicable disease which can be transfer through utensils while eating together, 27% think that fear of death is the most unpleasant feeling during their illness as people suffers badly as they were parents to their children's and 24% argued as anxiety is the most unpleasant feeling as the patients feels to do something like playing or running or walking but they were not able to run and play or to go outside of their room and they felt as they restricted to their room.

Cost descriptive

Table 4.6.1 Cost estimates

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
cost spend on food per month	100	4000.00	23000.00	11310.0000	4343.10088
cost on each visit counted in PKR	100	.00	500.00	309.0000	217.00207
transportation cost on each visit	100	.00	1000.00	331.3000	229.75022
total cost	100	4500.00	24500.00	12625.3000	4927.25433
Valid N (listwise)	100				

The above table shows different the costs that bore by the patients during their illness.

The minimum cost of the patients that are spend on food per month is R.S. 4,000 and maximum R.S. 23,000 with the mean which is 11,310 with the standard deviation of 4343.10088 which means that during the illness patients bore costs on food which is highly costly

The cost on each visit to the private doctor starts with minimum cost R.S. 0 which means the patients didn't attend the private doctor and maximum R.S. 500 per visit with the mean 309 and standard deviation of 217.00207

The transportation cost per visit starts with minimum range of R.S. 0 which means the patient walked to the health facility to maximum R.S. 1,000 with the mean 331.3 and the standard deviation 229.75022.

The total cost is the sum of the special diet food cost per month and Doctor fees and transportation cost. The minimum cost bore by the patient during their illness is 4500 and the maximum cost is 24500 with the mean of 12625.3 and the standard deviation is 4927.25443.

4.7 Empirical results and Description

4.7.1 Monitory cost

Dependent Variable: TOTAL_COST
Method: Least Squares
Date: 02/21/19 Time: 13:59
Sample: 1 100
Included observations: 100

Variable	Coefficient	Std. Error	t-Statistic	Prob.
HOUSEHOLD_INCOME	0.062581	0.017610	3.553745	0.0006
ILLNESS_DURATION_OF_1ST_	157.1697	24.07224	6.529084	0.0000
VISITS_TO_HOSPITAL	527.1158	233.4547	2.257893	0.0262
DISTANCE	27.96438	17.04157	1.640952	0.1041

R-squared	0.186136	Mean dependent var	12625.30
Adjusted R-squared	0.160702	S.D. dependent var	4927.254
S.E. of regression	4514.015	Akaike info criterion	19.70694
Sum squared resid	1.96E+09	Schwarz criterion	19.81115
Log likelihood	-981.3470	Hannan-Quinn criter.	19.74911
Durbin-Watson stat	1.558460		

Interpretations

The study results show, that total cost of illness is affected by these important factors, where household income positively influence the total health cost. Increase in household income across respondent leads to increase in health cost of patients. Because family with good income level tend to spend more money on patients to immunize them quickly. Simply if a person can afford to spend on his/her ill son/daughter or husband/wife, the person will spend.

The duration of illness is positively associated with total cost of illness. Because as much longer the person is ill, he/she cannot work and the opportunity cost also increases due to work days missed. The relation is positive because of increasing days of illness leads to increasing days

of treatment, which need extra cost to support the medical and other important expenditure. Visit to hospital also increase the cost of illness for the person as every cost need to spend extra money on rent of car and stay of the family if the person is coming from long distance, the cost will get higher and higher.

5.7.2 Social cost

Dependent Variable: RANK_BAD_FEELING_CONTRIB
Method: Least Squares
Date: 02/21/19 Time: 14:09
Sample: 1 100
Included observations: 100

Variable	Coefficient	Std. Error	t-Statistic	Prob.
AGE	0.053854	0.006380	8.441515	0.0000
TIME_TO_START_TREATMENT	0.006702	0.002817	2.379150	0.0193
KNOWLEDGE_ABOUT_INFECTIO	0.034878	0.070266	0.496378	0.6208
SOCIAL_LIFE_INFECTED	1.249051	0.320767	3.893946	0.0002

R-squared	-0.506630	Mean dependent var	3.220000
Adjusted R-squared	-0.553712	S.D. dependent var	1.382283
S.E. of regression	1.722988	Akaike info criterion	3.965175
Sum squared resid	284.9941	Schwarz criterion	4.069382
Log likelihood	-194.2588	Hannan-Quinn criter.	4.007350
Durbin-Watson stat	2.144779		

Ranking the bad feeling from less bad to worst feeling, the study results shows that increase in age increase the intensity of bad feeling, the relationship is positively significant in our case. Age increase to higher tension because of reducing the time of healthy life. The study results show, that patients, which started treatment late face higher intensity of bad feelings. The reason behind this is the stage of illness. At higher stage patients feel more pain and other bad feelings and at lower stage the tensions of the person is low. This is because of hope the person has generated at lower stage that is treatable easily and it is not going to take my life. The study result shows that people, whose social life was affected, had worst feeling because of the dieses and they were more disturbed because their social life was restricted due to illness. The study results are significant, because the p value is less than 0.05, which indicates the relationship between the variables of interest is statistically significant.

4.8 Major findings

Major findings of the study shows that patients bear more cost in the form of direct, indirect cost and intangible cost

The direct cost is caused in the form of self-medication for coughing and also visits to private doctors where they are treated for chest pain, coughing for month or two and they pay the private doctors fee and medication charges for general treatment and also in the form of transport charges while indirect cost are caused in the form of special diet food that their family bear during the illness which is costly for the poor household to survive

The intangible cost is caused in the form of social cost that patients bear. They argued as they are left alone by their family members and friends, they are not able to eat with their family and friends, and also their utensils are separated as they can transfer their disease to other persons. The patients also felt anxiety, chest pain and stigmatized as well.

Chapter 5

Conclusions and policy recommendations

5.1. Introduction

The main objective of the study is to estimate the social and economic cost of the tuberculosis in district in Hangu

This chapter includes the major findings from data analysis and the overall conclusion and recommendations.

5.2 conclusions

The study confirms that tuberculosis can affect a significant amount of income and also affects the household income.

The estimations of the cost shows a substantial amount of economic cost of TB on the household and a considerable amount of direct cost as a percentage of the overall household monthly income. This cost can also be pronounced as the pre-treatment period of TB as TB is free of cost but these long patient delays are due to the general chest pain and coughing treatment of the patients at the rate of 2.17 visits in 33 days at private clinics as well as this delay of their treatment is also because 10% patients started self-medication as well as cost can also be counted in the form of the number of days lost from work due to illness. The study establishes the main cause that a patients bears is indirect cost which is a main burden for households. The households bears a considerable amount of loss of work days which results in form of income and productivity loss, effecting negatively the household's welfare. Anxiety, pain and fear of death is also a major contributor. TB also leads to the accumulation of debt among the patent which also leads to threaten the sustainability of the households over the medium to long term.

We can conclude that tuberculosis can cause a significant economic cost and deterioration in household income which negatively affects the welfare of the households. TB costs are extremely high for the poor households which forces a risky coping strategies that reduces their asset portfolios and increases the vulnerability to the future shocks.

5.3. Policy recommendations

The study provide recommendations for education and awareness about TB be widened, deepen and to make people more aware. The process can help in minimizing the common operational constraint in case detection and management which is long patients delay in seeking care, unreported case, and misconception which fuels stigma and help create the needed atmosphere for the public to treat coughing as an emergency. Targeted education and training should also be given to chemical sellers, “private doctors”, camps to be organized in order to identify the TB symptoms for early referral to health centers for diagnosis and treatment. Continuous patients education on the basic health precautions will help minimize the infection risk of TB generally.

Reference

Ahlburg, D. A., & Stop TB Initiative. (2000). *The economic impacts of tuberculosis* (No. WHO/CDS/STB/2000.5). Geneva: World Health Organization.

Ananthakrishnan, R., Muniyandi, M., Jeyaraj, A., Palani, G., & Sathiyasekaran, B. W. C. (2012). Expenditure pattern for TB treatment among patients registered in an urban government DOTS program in Chennai City, South India. *Tuberculosis research and treatment*, *2012*.

Anurag Bhargava, M. P. (2012). Can Social Interventions Prevent Tuberculosis? The Papworth Experiment (1918–1943) Revisited. *Respir Crit Care Med*, 8.

Boccia, H. L. (2011). Cash transfer and microfi nance interventions for tuberculosis control: review of the impact evidence and policy implications. *The Union*, 13.

Castro, K. G., Marks, S. M., Chen, M. P., Hill, A. N., Becerra, J. E., Miramontes, R., ... & LoBue, P. A. (2016). Estimating tuberculosis cases and their economic costs averted in the United States over the past two decades. *The International Journal of Tuberculosis and Lung Disease*, *20*(7), 926-933.

Christopher Dye, S. S. (2001). Global Burden of Tuberculosis, Estimated Incidence, Prevalence, and Mortality by Country. *American medical association*, 10.

Dennis Tatarkov, Y. S. (2017). *the global economic impact ot tuberculosis.* bristol: KPMG.

Devra M Barter, S. O. (2012). Tuberculosis and poverty: the contribution of patient costs in sub-Saharan Africa – a systematic review. *BioMed Central Public Health*, 21.

Habib, F., & Baig, L. (2006). Cost of DOTS for tuberculous patients. *JOURNAL-PAKISTAN MEDICAL ASSOCIATION*, *56*(5), 207.

Hafidz, F., Weaver, E., Collins, D., & Rostina, J. (2013). Coverage of TB Services under Social Health Insurance in Indonesia.

Hussain, M. H. A. G., Mohyuddin, A., & Sohail, M. M. (2018). An ethnographic study on TB control program in Pakistan. *Rawal Medical Journal*, *43*(4), 586-592.

Ismaila Adamu Saidu, Z. N. (2014). Social determinants of tuberculosis in sub-Saharan Africa: A systematic review. *GLOBAL JOURNAL OF MEDICINE AND PUBLIC HEALTH*, 14.

Jamison, D. T., Breman, J. G., Measham, A. R., Alleyne, G., Claeson, M., Evans, D. B., ... & Musgrove, P. (Eds.). (2006). *Disease control priorities in developing countries*. The World Bank.

Katherine Floyd, V. A. (2006). Cost and cost-effectiveness of PPM-DOTS for tuberculosis control: evidence from India. *WHO*, 10.

Knut Lonnroth, T. A. (2007). Social franchising of TB care through private GPs in Myanmar: an assessment of treatment results, access, equity and financial protection. *Health Policy and Planning*, 11.

Mirzoev, T. N., Baral, S. C., Karki, D. K., Green, A. T., & Newell, J. N. (2008). Community-based DOTS and family member DOTS for TB control in Nepal: costs and cost-effectiveness. *Cost Effectiveness and Resource Allocation*, *6*(1), 20.

Onazi, O., Gidado, M., Onazi, M., Daniel, O., Kuye, J., Obasanya, O., ... & Gande, S. (2015). Estimating the cost of TB and its social impact on TB patients and their households. *Public health action*, *5*(2), 127-131.

Olivia Oxlade, M. M. (2012). Tuberculosis and Poverty: Why Are the Poor at Greater Risk in India? *plos one*, 8.

Rocha, R. M. (2011). The Innovative Socio-economic Interventions Against Tuberculosis (ISIAT) project: an operational assessment. *The Union*, 8.

Safdar, M. A., Fatima, R., Khan, N. M., Yaqoob, A., Khurshid, A., Haq, M. U., & Wali, A. (2018). Prevalence of Human Immune Deficiency among Registered Tuberculosis Patients across Pakistan during 2013-2015—Prevalence of TB-HIV Co-Infection in Pakistan. *Journal of Tuberculosis Research*, *6*(01), 96.

Shiell, A., Donaldson, C., Mitton, C., & Currie, G. (2002). Health economic evaluation. *Journal of Epidemiology & Community Health*, *56*(2), 85-88.

Tanimura, T., Jaramillo, E., Weil, D., Raviglione, M., & Lönnroth, K. (2014). Financial burden for tuberculosis patients in low-and middle-income countries: a systematic review. *European Respiratory Journal*, *43*(6), 1763-1775.

Vassall, A., Bagdadi, S., Bashour, H., Zaher, H., & Maaren, P. (2002). Cost-effectiveness of different treatment strategies for tuberculosis in Egypt and Syria. *The international journal of tuberculosis and lung disease*, *6*(12), 1083-1090.

Waheed, Y., Khan, M. A., Fatima, R., Yaqoob, A., Mirza, A., Qadeer, E. ... & Kumar, A. M. V. (2017). Infection control in hospitals managing drug-resistant tuberculosis in Pakistan: how are we doing?. *Public health action*, *7*(1), 26-31.

Wali, A., Kumar, A. M. V., Hinderaker, S. G., Heldal, E., Qadeer, E., Fatima, R., ... & Ul Haq, M. (2017). Pre-treatment loss to follow-up among smear-positive TB patients in tertiary hospitals, Quetta, Pakistan. *Public health action*, *7*(1), 21-25.

Weinstein, M. C., Siegel, J. E., Gold, M. R., Kamlet, M. S., & Russell, L. B. (1996). Recommendations of the Panel on Cost-effectiveness in Health and Medicine. *Jama*, *276*(15), 1253-1258.

World Health Organization. (2002). *The world health report 2002: reducing risks, promoting healthy life*. World Health Organization.

Appendix

Questionnaire # 1

Units of Data Collection (UDC 1) =Patient Description

1. Age: …….

2. Gender: …… 1=Male [ ] 2= Female [ ]

3. Marital status: 1=Single [ ] 2=Married [ ] 3=Divorced [ ] 4=Separated [ ] 5= Widowed

4. Are you the head of the household? 1=Yes [ ] 2=No [ ]

5. Do u have joint family or Nuclear family?

6. Number of dependents.....

7. Educational level: 1=No schooling [ ] 2=Primary [ ] 3=Secondary [ ] 4=Tertiary [ ]

8. Primary occupation: 1= Agric sector [ ]; 2 = Formal sector [ ]; 3= Informal sector [ ]; 4=Security agencies [ ]; 5= Student [ ]; 6= Unemployed [ ]

9. State your monthly income; before TB.....;

10. State household income.....;

11. Do u have your own transport? Yes/NO

12. What mode of transport does your household have and use when assessing TB care? 1= none [ ]; 2=bicycle [ ]; motor cycle [ ]; 3= car [ ]

13. Where do the family stay? 1=own house [ ]; 2= family house [ ]; 3= rented compound [ ];- flat [ ]; 4= employer apartment [ ]

14. What type of building do the household reside? 1= thatched [ ]; 2= wooden [ ];

3= brick [ ]; 4= block [ ]; others.....No. of rooms.....

Unit of Data Collection: Patients and Hospital records

1. How did you came to know that you are infected with TB? Specify……..

2. What did you do when you notice you were not well? 1= *Self-medication** [ ]; 2= Went to the hospital the very 1st time [ ]

3.. During self-medication ...1=Chemical/pharmacy shop [ ]; 2= traditional/herbalist [ ]; 3= spiritual (List) leader [ ]; Used sick relative's drugs [ ]. *Tick where apply*

4. How many visits did you made to the above *ticked* places.....?

5. How much did each visit cost (consultations, fares and drugs).....?

6. How long did you took to go to hospital after you 1st noticed symptoms.....?

7. What type of health facility did you 1st reported? 1=Public government facility [ ]; 2= Private facility [ ]; 3= Hospital.....

8. Were you referred to another facility? 1= Yes [ ]; 2=No [ ]

9. How many visits you did to other Doctors before you were referred to TB care? Specify……

10. Did someone help you to the TB health facility or personal?

11. How do you get to the health facility? 1= Walking [ ], 2= Bicycle [ ], 3= Motor car [ ], 4= Commercial Vehicle [ ], 5= Private Vehicle

12. How much does transportation cost on each visit?

13. How do you get to the health facility? 1= Walking [ ]; 2= Bicycle [ ]; 3= Motor cycle [ ]; 4= Commercial vehicle [ ]; Private vehicle [ ]

14. How do you manage your Finance (medical and non-medical)? 1= self from income [ ]; 2= dis-savings [ ]; 3= borrowing [ ]; 4= sold assets [ ]

Units of Data Collection: Family and Hospital Staff

1. How do you get infected?

2. How is TB spread.....?

3. Is it treatable.....?

4. Do you think that your social life has been infected with TB?

5. How has TB affected your social life and how the community relates to your household? 1= Never [ ]; 2= Somehow [ ]; 3= seriously [ ]; 4= Very serious [ ]

6. What was your feeling when you get infected with TB?

7. Rank the following in a matter of contributing to _bad feelings – Side effect of drugs [ ]; Pains [ ]; Stigma [ ]; Fear of death [ ]; Anxiety [ ]; others - Specify..... [ ]

8. How much time did you took to start the treatment? After 1 month, 2 months, 3 months, 4 months?

10. How much are you willing to pay to do away with / accept to maintain TB _bad feelings'. (Assuming unlimited income).....

11. Effect of TB on household welfare1= schooling [ ]; 2= child care [ ]; 3= chores [ ]; 4= consumption [ ]; 5= loss/change of jobs [ ]; others.....*Tick where apply*

12. Are you satisfy with TB care? Yes/ No.

Comment……

13. How can TB services be improved.....?