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# Measurement of SF-6D Utility among Patients with Active Tuberculosis

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## Abstract

In spite of so much development in medical technology, Tuberculosis (TB) is still the problem for humans. Few studies, in Pakistan highlighted the factors that affect patients health related quality of life (HRQOL) with active TB. The aim of this study is to measure short form six dimension (Sf-6D) utility scores of patients with active TB of Sargodha district. 120 active TB patients were interviewed and short form-36 questionnaire was followed. District TB hospital of Sargodha district was visited. Results show that Utility scores of female patients were better than male, while patients belong to urban areas have better utility scores as compared to rural patients of TB. Indoor patient's utility scores were better than outdoor patients. Disease severity, use of drugs, depression, pain and death threat were the factors that negatively affect the patients health related quality of life, while opportunity of leisure and income level increase patients HRQOL.

**Keywords:** Sf-6D, Pakistan, TB

## 1. Background

In clinical research measure of health related quality of life is very important. Every disease has some explicit and implicit effects on the life of the patient. Use of medicines may cure the patient from infection but seems to be ineffective to reduce the physical, psychological and mental distortions which he or she faces during infection time period.

Assessment of HRQOL has become important area of conversation and researchers paid their attention towards public health issues during past years. Disease affects the patient's daily activities, economic condition, social life etc. HRQOL instrument consist on those domains which affect the patient's explicit life functioning. Person's perceptions about his physical, psychological, social, mental, economic and spiritual functioning are referred as HRQOL.

With the development of effective medical treatment tuberculosis is still considered as a dangerous disease. TB is the second common disease after HIV, which creates deaths. According to estimates of 2007 two billion people are

under the risk of TB, whereas it causes the death of 1.7 million people all over the world. TB destroys respiratory system, tissues and other organs of the body. This disease spreads through coughing, sneezing, talking etc.

The people in age group of 15-59 years are mostly hit by this disease, which shows that it creates major economic burden for individuals and hence for countries. Most of the Asian countries like Pakistan, India, China, Bangladesh and Indonesia accounted more than half of the world disease burden. Among 22 highest disease burden countries, Pakistan is at 22<sup>nd</sup> number where 286000 new cases appear per year. Punjab is the most populous province in Pakistan, where 0.3 people of the population are diagnosed with active TB and 2.2% people are under the symptoms of TB. Sargodha is the eight largest district of Punjab, where 0.4 of people are diagnosed with active TB and 4.4% are under severe symptoms of TB. Different studies explore the HRQOL of TB patients; however a little work is done by researchers on this aspect with reference to Pakistan. The intention of this study is to explore the HRQOL of TB patients in Sargodha. The study uses SF-36 questionnaire to construct SF-6D utility algorithms. Moreover this study highlights the factors that affect the HRQOL of TB patients of Sargodha.

The rest balance of paper is designed as: part two explains about the SF-6D Utility Algorithm, part three discusses the literature review, part four discusses the data sources and empirical methodology, part five investigates and interprets the empirical results. Finally, part six presents the conclusions of the study and also provides some policy implications.

## **2. SF-6D Utility Algorithm**

SF-6D converts the eight domains of SF-36 into six domains. It is a generic preference based single index, which generates health utility algorithms. It describes 18,000 health states and the utility values, which shows that the value of full health as 1 and 0 for poor health. SF-36 and SF-12 questionnaires are only used to generate the utility values from SF-6D.

## **3. Review of Literature**

Khan et al. (2000) showed that most of the Pakistani patients were poor even than they preferred private practitioners. Study also showed that patients are reluctant to disclose their disease but the same time they are facing some social as well as economic problem.

Guo (2009) found that TB affects HRQOL of patients negatively. 310 patients of Canada were interviewed by using SF-36 and health utility index 3 (HUI-3). Study also reviewed the different studies which were done on HRQOL during 1981-2008. Results showed that after treatment, HRQOL was better in TB patients. Moreover, mental health recovery was low as compared to physical health recovery in TB patients.

Marra et al. (2008) tried to examine HRQOL of active and latent TB patients of Vancouver by using SF-36. Beck depression inventory was used to check the severity of depression among TB patients. 104 and 102 patients of active and latent TB were interviewed respectively. Scores of SF-36 of active TB patients were low as compared to latent TB patients, whereas Beck DI scores were in better condition in latent TB patients than active patients. Ordinal logistic regression results showed that age, HIV and hypertension were significantly related to quality of life scores, whereas diabetes and drinking showed insignificant relationship.

Muniyandi (2007) used SF-36 to investigate HRQOL in the patients with TB whose treatment was completed and they were cured. The study interviewed 436 patients of India. Mean score of economic well being was 62 whereas; mental, social and physical scores were 68, 84 and 74 respectively. Study concluded that education, employment, age, persistent system and sex was associated to well being.

Pasipanodya (2007) tried to explore HRQOL of those patients who completed a treatment of 20 weeks. Study used St. George Respiratory questionnaire (SGRQ) and interviewed 105 pulmonary TB patients.

Dhingra (2005) tried to explore the HRQOL by making serial HRQOL assessment between the patients during anti-tubercular therapy and after completion of treatment. DR-12 questionnaire was used and 76 patients of pulmonary or extra pulmonary patients on DOTS were interviewed. Results showed that those patients have higher scores of HRQOL who have higher outcomes after treatment than the patients having lower outcomes.

**4. Data Sources and Methodology**

120 patients of TB are interviewed from Sargodha district. For this intention Divisional TB Hospital of Sargodha is visited. SF-36 questionnaire is used along with data on age, disease severity, gender, education, vaccination, income, region and drug addiction. Age of disease is used as a proxy for disease severity. The SF-6D offers a way for using the SF-36 and estimate preference-based single index for economic evaluation. By utilizing ordinary least square (OLS) method Multiple linear regression analysis is performed to explore the factors that affect HRQOL of TB patients.

$$HRQOL = \alpha_0 + \alpha_1 gender + \alpha_2 age + \alpha_3 region \dots\dots (1)$$

$$HRQOL = \alpha_0 + \alpha_1 dissev + \alpha_2 patype + \alpha_3 druguso \dots\dots (2)$$

$$HRQOL = \alpha_0 + \alpha_1 pain + \alpha_2 depr + \alpha_3 sleep + \alpha_4 income + \alpha_5 dthr + \alpha_6 leisur + u \dots\dots\dots (3)$$

First model is the demographic model, which shows the impact of demographic variables on HRQOL with active T.B. second model shows the impact of medical variables, where independent variables are disease severity (dissev), type of patient (patype) and use of drugs (druguso). Third model shows the impact of physical and psychological thinking of patient’s HRQOL, where pain (pain), depression (depr), sleep (sleep), log of income (lnincome), death threat (dthr) and opportunity of leisure (leisur) are independent variables.

**5. Results and Discussion**

The data shows that 59.2 percents of active T.B are males, while the females are 40.8 percent. The percentage of rural patients is 57.5, whereas 42.5 percent belongs to urban areas. This shows that active T.B is higher in rural areas than urban. This study also distinguished the patient into two categories, indoor and outdoor. Indoor patients are those patients, who admit in the hospital for treatment, while outdoor patients are those who do not admit in the hospital for the treatment of disease. They just go to hospital get their medicines. Indoor patients are 37.5 percent, while 62.5 percent are outdoor patients. Four types of active T.B are identified in our study; pulmonary, bones, lungs and throat. 57.5 percent patients caught by pulmonary T.B, whereas 18.3, 23.3 and 0.8 percent are the patients of bones, lungs and throat T.B, respectively. 80.8 percent patients lived in airy homes, while 19.2 percent lived in closed houses. Percentage of married patients is 78.3, while 20 percent are unmarried and 0.8 percent of patient with active T.B are divorced and separated.

Most of the patients are uneducated (65.8 percent), while 12.5 percent patients completed Primary level education. 10.8 percent completed Middle level education, while 6.7, 2.5, 0.8 and 0.8 percent patients completed their Metric, Inter, Bachelor, and Masters level education, respectively. 44.2 percent are smokers and 1.7 percent are drinkers whereas, 55.8 percent are the patient who used no drugs. Out of 120 patients, 22.5 percent patients have an under ground sewerage system, while 71.7 percent have open sewerage system. 5.8 percent patients have no sewerage system. 74.2 percent patients feel bodily pain due to TB, while 76.7 percent patients feel depression. 74.2 percent patients of active TB caught by threat of death, whereas leisure improves the quality of life, but our results shows that 60 percent of patients have no opportunity of leisure (see table 1 & 2).

*5.1 Multiple regression results*

In our analysis dependent variable is SF-6D utility scores. In first model independent variables are gender (male=1, 0 otherwise), age of the patient and region (urban=1, 0 otherwise). All the variables are significant except gender. Age of the patient was significantly negatively related to utility scores. Negative sign of the coefficient of region explores the fact that rural patient quality of life is better than urban patient. Moreover, if the patient is female her quality of life is better than male patient.

Second model results show that disease severity negatively affect the patient quality of life. Negative sign of the coefficient (type of patient) shows that indoor patient quality of life is superior as compared to outdoor patients. Moreover, results show that the patients who use drugs their quality of life is worse than the patient who is not using any type of drug.

Results of third model show that the negative sign of the coefficients of depression depicts that depressed patient's quality of life is worse than the patient who has no depression. Same as, the patient who has no pain and death threat his quality of life is better than the patient caught by pain and death threat. The patient who has an opportunity of leisure enjoys better quality of life than the patient who has no opportunity of leisure. Income shows positive relationship with quality of life, which shows that as income increase the patient's quality of life also increases (see table 3).

## 6. Conclusions

The rationale of this study is to measure Sf-6D utility scores of patients with active T.B. this is also the aim of the study to find the factors that affect the HRQOL of patients with active T.B. of Sargodha district. 120 active T.B patients are interviewed by visiting District T.B hospital of Sargodha district. Results show that Utility scores of female patients are better than male patients, while patients belong to urban areas have better utility scores as compared to rural patients of T.B. Multiple regression analysis results show that indoor patient's utility scores are better than outdoor patients. Disease severity, use of drugs, depression, pain and death threat are the factors that negatively affect the patients HRQOL, while opportunity of leisure and income level increase patients HRQOL. The study gives several suggestions on the basis of present analysis. With the advancement of medical technologies the treatment also should focus on those aspects that increase patients health related quality of life, like by giving the opportunity of leisure to patients their health related quality of life may be maximized. Giving them the financial assistance will also help in removing their financial hindrances. Government and concerning authorities should focus on controlling drugs among the people. Death threat and depression may be control by teaching the patients and by giving them cognitive behavioral therapy.

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Table 1: Descriptive statistics of the data

	Percentage
<b>Gender</b>	
Male	59.2
Female	40.8
<b>Region</b>	
Rural	57.5
Urban	42.5
<b>Patient type</b>	
Indoor	37.5
Outdoor	62.5
<b>Type of T.B</b>	
Pulmonary	57.5
Bones	18.3
Lungs	23.3
Throat	0.8
<b>Type of houses</b>	
Airy	80.8
Closed	19.2
<b>Marital status</b>	
Married	78.3
Unmarried	20.0
Divorced	0.8
Separated	0.8
<b>Education</b>	
Never attended school	65.8
Primary level	12.5
Middle level	10.8
Metric level	6.7
Inter level	2.5
Bachelor level	0.8
Masters and above	0.8
<b>Type of drugs</b>	
Smoking	42.5
Drinking	1.7
<b>Use no drugs</b>	55.8
<b>Sewerage system</b>	
Underground	22.5
Open system	71.7
<b>No sewerage system</b>	5.8
<b>Bodily pain</b>	74.2
<b>Depression</b>	76.7
<b>Death threat</b>	74.2
<b>Opportunity of leisure</b>	60.8

Table 2. Short form six dimension (SF-6D) scores

Short form six dimension (SF-6D) scores				
	N	Maximum	Minimum	Mean
<b>Overall</b>	120	0.77	0.31	0.53
<b>Male</b>	71	0.77	0.31	0.53
<b>Female</b>	49	0.75	0.33	0.54
<b>Rural</b>	69	0.71	0.35	0.54
<b>Urban</b>	51	0.77	0.31	0.52

Table 3. Multiple regression results

<b>DEMOGRAPHIC MODEL</b>	
<b>Constant</b>	0.591***
<b>Gender ( Male=1, Female=0)</b>	-0.007
<b>Age of the patient</b>	-0.001**
<b>Region (Urban=1, Rural=0)</b>	-0.201*
<b>R<sup>2</sup></b>	0.501
<b>F-Statistics</b>	110.635
<b>SER</b>	12.366
<b>MEDICAL MODEL</b>	
<b>Constant</b>	0.568***
<b>Disease severity</b>	-0.005
<b>Type of patient (Outdoor =1, Indoor =0)</b>	-0.014
<b>Use of drug (Yes=1, No=0)</b>	-0.025*
<b>R<sup>2</sup></b>	0.362
<b>F-Statistics</b>	85.999
<b>SER</b>	9.110
<b>PHYSICAL AND PSYCHOLOGICAL MODEL</b>	
<b>Constant</b>	0.465***
<b>Pain (Yes=1, No=0)</b>	-0.054***
<b>Depression (Yes=1, No=0)</b>	-0.041**
<b>Sleep (Satisfied=1, Dissatisfied=0)</b>	9.463**
<b>Log of income</b>	0.021*
<b>Death threat (Yes=1, No=0)</b>	-0.062***
<b>Opportunity of leisure (Yes=1, No=0)</b>	0.020*
<b>R<sup>2</sup></b>	0.523
<b>F-Statistics</b>	57.336
<b>SER</b>	6.853
***=99% significance level    *= 95% significance level	