

# **Household Economic Burden of Breast Cancer Disease in Female Population**

by

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## **ABSTRACT**

Breast cancer is most common cancer all over the world. The prevalence of the disease is increasing with the age of the patients. Approx. 80% of the women diagnosed with this disease are over fifty years of the age. Reproductive factors, such as early menarche, late menopause, and late age at first childbirth are among the most important risk factors for female breast cancer patients. The objective of this study is to measure the economic burden of breast cancer disease in female population. Breast cancer forces a huge economic burden on households. Therefore, the policy makers and health planners are interested in understanding the economic cost of illness to measure the allocation of resources to the cancer institutions and hospitals as allocation to nuclear medicines disease categories and to evaluate the possible costs and benefits. The data is collected from 225 individuals. the breast cancer patients in the two-hospitals, situated in the capital territory of Islamabad, Nuclear Medicine, Oncology & Radiotherapy Institute and Surgical Center. The methodology of the study is based on two section which is descriptive statistics and empirical estimations. The study has used OLS (Ordinary Least Square) estimation technique to determine the factors influencing breast cancer cost. The study found that, stage and treatment duration is increasing the breast cancer cost and the inflow of cancer patients coming into these hospitals from region of Punjab, Azad Jammu Kashmir (AJK), Sindh, Baluchistan, Islamabad. Most of the respondents reported high intangible burdens including fear, pain emotional suffering and family management having breast cancer majority of the patients experienced a lot of psychological problems due to their illness.

Keywords: Breast cancer, Economic burden Treatment cost

## 1.0 INTRODUCTION

Breast cancer is the common cancer in both the developed and less developed world. According to *Global tuberculosis report (2013)*, It is estimated that worldwide, over 508 000 women died in 2011 due to breast cancer. Frequencies fluctuate significantly from 19.3 per 100,000 women in Eastern Africa to 89.7 per 100,000 women in Western Europe. In most of the emerging regions the incidence rates of breast cancer are under 40 per 100,000 women. It is the most common cancer affecting women with the estimated lifetime risk of 1 out of 8 women. Every year about 1.3 million women are diagnosed with breast cancer worldwide with 465,000 deaths on record. Prevalence of this disease increase with age. Approx. 80% of women diagnosed patients are above the age of 50 years. Breast cancer has become the most common cancer all over the world. Breast cancer remained the main reason for the deaths of 521,817 women in 2012. This is the most frequent diagnosed cancer found in 140 out of 184 countries. This fatal disease in women of the low, middle and high-income countries has created heavy economic burden on the households. The studies have shown that in Pakistan, within a single family several cases of breast cancer incidences at stage one and two mutations were 42.8% and 11.9% families were with a single case of breast cancer. Thus, Pakistani women who carry deleterious mutations face a lifetime risk of developing early onset breast cancer. Several factors including Reproductive factors, such as early menarche, late menopause, late age at first childbirth are among the most important risk factors for breast cancer Bhurgri, Y., Bhurgri, A., Nishter, S., Ahmed, A., Usman, A., Pervez, S., ... & Bhurgri, H. (2006). Oral contraceptive and hormone replacement therapy users are at greater risk. The etiology of breast cancer is complex and can be indicated by several factors such as diet, genetics, chemicals and environmental factors.

Breast cancer forces a huge economic burden on households. so, policy makers and health planners must be interested in understanding the economic cost of illness to measure the allocation of resources within cancer institutions and hospitals. Including the allocation of nuclear medicines with respect to the disease categories. So, it is quite plausible to investigate the cost of breast with respect to age and disease stage of the patients. Furthermore, socio economic drivers of breast cancer can help to upgrade the specific characteristic of target population to prevent the disease. From a social perspective breast cancer is a hungry disease that is contributing to mortality and disability of a common person and it declines the social status and connections of patients. Breast cancer treatment cost is too high that frightens all patients from seeking treatment.

There are various economic implications following the diagnosis of breast cancer confirmed, that breast cancer is a prominent disease in terms of the cost. Diagnosing the disease includes the procedure of mammogram, magnetic resonance imaging, and biopsies etc. which are all costly investigations. Treatments also involve a lot of interventions which is expensive. Interventions may comprise surgery, chemotherapy and radiotherapy. Chemotherapy and radiotherapy are very cost intensive and existing in only a few government hospitals. The high cost creates serious economic budget and force the family to sell assets for the treatment of the cancer. The economic burden deteriorates when complications arise with the treatment. This paper is looking for different interventions in prevention, control and estimating economic cost of treatment with respect to stage of illness. This study will provide general view of the economic burden of breast cancer on the patient and his family which may inform government and policy makers to make informed decision-making allocation of the resources.

## 1.1 Study objective

The objective of the paper is

<sup>5</sup> To investigate the tangible cost of breast cancer in female population

<sup>6</sup> To examine the intangible cost (fear, pain, emotional suffering, family management) of breast cancer patients

<sup>7</sup>To investigate the determinants of breast cancer economic cost.

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<sup>5</sup> To meet this objective both descriptive and inferential analysis is used. Regression analysis technique is used to analyze the dynamic of cost associated with breast cancer patients.

<sup>6</sup> As the indirect cost is latent variable that is not directly measurable, so for the analysis of this intangible cost, we used different indicators for the construction of index and then using that index

<sup>7</sup> Socio economic factors which influence cost breast cancer in female population

## 2.0 OVERVIEW OF BREAST CANCER

Humans have known about breast cancer for a long time. For example, the Edwin Smith Surgical Papyrus describes cases of breast cancer first time in 1600 BC. In ancient Greece, people made votive offerings in the shape of a breast to the god of medicine. And Hippocrates described the stages of breast cancer in the early 400s B.C.E. In the first century A.D. doctors experimented with surgical incisions to destroy tumors. They also thought that breast cancer was linked with the end of menstruation. This theory may have prompted the association of cancer with older age Brechin (2012). Breast cancer is a malignant tumor that grows in the cells of the breast. A malignant Tumor is a group of cancer cells that can invade surrounding tissues or spread (Metastasize) to distant areas of the body. The actual cause is unknown though several predisposing factors exist. The disease occurs almost entirely in women, but occasionally affects men. Cancer starts when cells begin to grow out of control (Akhtari-Zavare, L, Juni, Md Said, & Ismail, 2015; Suami, Pan, Mann, & Taylor, 2008). Breast cancer is hormone related, and the factors that modify the risk of this cancer when diagnosed pre-menopausal and when diagnosed post-menopausal vary (Stewart & Wild, 2015)

Breast cancer survival rates vary greatly worldwide, ranging from 80% or over in North America, Sweden and Japan to around 60% in middle-income countries and below 40% in low-income countries (Coleman et al., 2008). The low survival rates in less developed countries can be explained mainly by the lack of early detection programs, resulting in a high proportion of women presenting with late-stage disease, as well as by the lack of adequate diagnosis and treatment facilities. Several risk factors for breast cancer have been well documented. However, for most women presenting with breast cancer it is not possible to identify specific risk factors (IARC, 2008; Lacey et al., 2009). They conclude that 21% of all breast cancer deaths worldwide are attributable to alcohol use, overweight and obesity, and physical inactivity. This proportion was higher in high-income countries (27%), and the most important contributor was overweight and obesity. In low- and middle-income countries, the proportion of breast cancers attributable to these risk factors was 18%, and physical inactivity was the most important determinant (10%). Breastfeeding has a protective effect (IARC, 2008, LACEY et al., 2009). Today there are 2.3 maternal deaths for every death from either breast or cervical cancer in women between the ages of 15 and 49 in the developing world. By 2025, we expect maternal deaths to fall and deaths from breast and cervical cancer to rise so that they are nearly equal among of reproductive age. Women diagnosed with early stage of breast cancer disease have an excellent prognosis while those with metastatic disease at diagnosis have a 5-year survival of around 20% (Seneviratne et al., 2014; Wang et al., 2012).

### 2.1 Cost breast cancer

A study conducted in South Korea reveals that breast cancer is a disease which is economically costly. The top three concerns that have the greatest economic impact globally are lung cancer (USD88 billion). It was further observed that the yearly economic burden of breast cancer was increasing. The economic burden of breast cancer was USD668.49 million in 2007 and increased annually until 2010, thus USD773.98 million in 2008, USD777.22 million in 2009, and USD940.75 million in 2010, which was 1.4 times greater than the cost incurred in 2007. This means that the socioeconomic costs incurred by breast cancer increased by approximately 40.7% from

USD668.49 million in 2007 to USD940.75 million in 2010(Kim et al., 2015). A variety of treatment is available for patients with breast cancer, which differ in safety, efficacy and cost. Therapeutic options for a given patient depend on several different factors including age, menopausal status, general health, quality of treatment, tumor location, tumor cell type, and breast size. The most important factor is the stage of cancer since the cost increases if the disease is diagnosed in an advanced stage (Meneses, Azuero, Hassey, McNees, & Pisu, 2012). Developing countries are more vulnerable to this disease due to lack awareness and prevention measures. Therefore, the cost of productivity losses of breast cancer in developing countries will increase. According to the suggestions of WHO and the Breast Health Global Initiative (BHGI), low- and middle-income countries should prioritize the efforts to downstage breast cancer through population awareness and improved equitable access to care (zendehdel 2013).

## **2.2 Literature Review with Reference to Pakistan**

The incidence of breast cancer in Pakistan is one of the highest reported from Asia, accounting for one third of all female cancers. As in other developing countries, the majority of patients with breast cancer presents with advanced disease and have inferior survival. Pakistan is a developing country in which 0.7% of GNP is allocated to health care according to the Economic Survey of Government of Pakistan, 2001. Cancer treatment is confined to major cities only; consequently, patients from rural areas have to travel an average of 300kilometers for treatment. Free hospitalization is available for all patients within Government hospitals. However, all treatment expenses are borne by the patients. Due to the quality of service available, this facility is being availed by patients from low socio-economic status. Women from the affluent class prefer to undergo treatment in private hospitals and clinics where services are much better (Aziz et al 2014) Zaidi et.al (2012) conducted cross sectional study in Agha Khan University Hospital (AKUH) Karachi, Pakistan. Study indicated that the financial burden of cancer was substantial and mostly borne by the patients or the family. Most of the time, the monthly household average cost of the treatment far exceeded the monthly household income and a significant proportion of patient perceived the financial burden as overwhelming.

The financial aspect of the disease is particularly sensitive in countries like Pakistan where almost entire cost of the treatment is borne by the patient and the immediate family with little or no support from state or health insurance policies. Hence, the diagnosis of the cancer could be devastating news not only because of nature of the disease but also because of the continuous financial drain posed by the costs of the treatment.

Aziz et.al 2014 conducted qualitative study use semi structured interviews to explore the views of women in relation to breast cancer in regional cancer hospital in Lahore, Pakistan conclude that in Pakistan, seeking spiritual advice rather than medical advice appears to be unique to Pakistani Muslim women. There is also the dominant issue of maternal responsibility which appears to be an innate characteristic of Pakistani Muslim women and one that led to much worry, depressive reactions, emotional chaos and deep concern in women. Many women's initial thoughts were for their children rather than their own lives or the potential impact of their illness on relationships with their husbands. This innate cultural influence needs to be the focus for additional studies. In Pakistan, many women choose to surrender their careers to become housewives and mothers. Zaidi et.al (2012) conducted observational study in 2013-2014 at the Shaukat

Khanum Memorial Cancer Hospital and Research Center, Lahore and conclude that the female breast cancer patients had a lower mean age (48 years) at presentation compared to what has been reported in the advanced countries of the world, age at menarche was 13.2 years, age at first childbirth was 23.7 years, and the BMI was on the higher side. Family history of breast cancer was positive in less than 1/5th of the patients, majority of the females were parous and had breast-fed their children, and most had not used any OCPs/HRT. The difference in the pre- and postmenopausal status was not significant. Moreover, many women had ductal carcinoma, grade 3 tumor, stage II disease, and ER/PR+, HER2- cancers.

Naqvi et.al (2015) conducted descriptive cross-sectional study in Combined Military Hospital (CMH), Rawalpindi from September 2013 to August 2015 and conclude that the majority of patients presented in the later stages of disease with a moderate grade, more common lymph node metastasis and a size larger than 2 cm. Besides social and economic factors, the lack of awareness may also be responsible for fewer turnovers of patients to hospital in the early stages of this disease.

### 3. DATA AND METHODOLOGY

#### 3.1 Sampling framework

Our target population is female breast cancer patients approaching the hospital for treatment. The sample of the study are respondents, female breast cancer patients taking treatment of breast cancer in selected public and private hospitals of Islamabad Rawalpindi. The following hospitals from Islamabad and Rawalpindi were included for the study purpose: Nuclear Medicine, Oncology & Radiotherapy Institute ( $n_1$ ) Surgical center Islamabad ( $n_2$ )

The following formula is used for sample size calculation.

Where:

$n$  = sample size

$Z$  = standard normal deviation at required confidence level of 95%

= expected standard deviation of the outcome variable

$E$  = desired margin of error

#### 3.1.1 Units of data collection 1

The unite of data collection for this study is female patients of breast cancer. Total of 189 respondents were selected from NORI hospital and 36 female patients were selected from surgical center Islamabad. The second unite of data collection for this study is doctors of the breast cancer disease. This study has included two interviews of doctors: Dr. Humaira and Dr. Saliha. The patients of Breast Cancer (BC) visit to Noori Hospital at G8 sector Islamabad from all over the country. This is the main center for the treatment of BC. The cost of illness technique is used to estimate the economic burden of breast cancer in female population. The respondents are taking breast cancer treatment at the concerned facility.

#### 3.2 List of Variables

Table 1 provides the description of the variables. it includes the type of cost and the various categories of cost that were estimated in the study. It also describes the components of the cost incurred by women in seeking treatment for breast cancer.

**Table 3.1: Description of study variables**

Type of cost	Category of cost	Description
Direct cost	Medical cost	Cost of consultation Cost of medication Laboratory/diagnostics Treatment
	Non- medical	Cost of travel Cost of food and drinks for patients

Indirect cost	Cost of productivity	Productivity loss to the patient Travel time Waiting time
Intangible cost	Psychological problems	Fear is scaled = not at all, little moderate a lot extreme Pain is scaled = not at all, little moderate a lot extreme Emotional Suffering is scaled = not at all, little moderate a lot extreme
	Service Satisfaction	Stage after treatment Surgery Surgeon Treatment
	Habits	Food intake Contraceptives Pills Physical Activity
Individual Variables		Age Marital Status Family size Menopause Genetic

### 3.3 Methodology

According to the main objectives Methodology is based on the two sections.

- i. Costing
- ii. Multiple linear regression models.

#### 3.3.1 Costing:

According to first objective separately measure three types of cost (direct cost, indirect cost, intangible cost). Direct cost is sum of medical and non-medical cost. Medical cost involves cost of consultation medication, treatment and non-medical cost involve cost of food and travel.

$$\text{Direct cost} = \text{Medical cost} + \text{Non-medical cost} \quad DC = \sum_{i=1}^k P_i * Q_i \quad \text{Eq ..... (3.1)}$$

Medical cost can be calculated by multiplying price and quantity of surgeries conducted during illness.

$$MC = P_1 * Q_1 + P_2 * Q_2 + P_3 * Q_3 \quad \text{Eq..... (3.2)}$$

Same we can calculate the non-medical cost by price multiply by quantity of each type of treatment service taken by patients

$$NMC = P_4 * Q_4 + P_5 * Q_5 \quad \text{Eq ..... (3.3)}$$

And direct cost is the sum of both medical and non-medical cost

$$DC = MC + NMC = P_1 * Q_1 + P_2 * Q_2 + P_3 * Q_3 + P_4 * Q_4 + P_5 * Q_5 \dots\dots\dots \text{Eq (3.4)}$$

<b>Medical cost</b>	
P1= price of consultation per visit	Q1= No of visits
P2=Per unit cost of medication	Q2= No of units
P3=Price per test	Q3= No of tests
<b>Non-medical cost</b>	
P4= Cost of per travel	Q4= No of visits
P5= Cost of unit food	Q5= No of unit

Indirect cost calculates to measure productivity loss of patient and its attendant.

<b>Indirect cost of patient</b>	
P*=Per day wage	Q*=No of days absent from job
P*=Travel time	Q*= Cost per hour
P*=Waiting time	Q*=Cost per hour

Indirect cost of relative with same variables and same methodology as mentioned above. The indicators of Intangible cost are pain fear and emotional suffering and family management which is constructed by taking simple average. Graphical visualization is used to analyses the tendency of patients towards pain, fear and emotional suffering and family management.

### 3.3.2 Econometric Model

To meet second objective used multiple linear regression model. The multiple linear regressions are used to explain the relationship between one continuous dependent variable and two or more independent variables (continuous variable). There is a separate equation which determines the different factors which cause the different type of costs.

$$DC = \beta_0 + \beta_1 NOV + \beta_2 D_2 + \beta_3 D_3 + \beta_4 D_4 + \beta_5 TD + \beta_6 Dpe + \beta_7 Dg + \beta_8 Age + \beta_9 Dbf + \mu \dots\dots\dots (3.5)$$

- Where *NOV* Number of visits  
*D<sub>2</sub>* Dummy of stage 2  
*D<sub>3</sub>* Dummy of stage 3  
*D<sub>4</sub>* Dummy of stage 4  
*TD* Treatment Duration  
*Dpe* Dummy of Physical exercise  
*Dg* Dummy of Genetic abnormality  
*Dbf* Dummy of breast feed

Equation (1) will be estimated using OLS (ordinary least square).

## 4. RESULT AND DISCUSSION

### 4.1 Descriptive results

Histograms and descriptive statistics have been used to present the results of direct and indirect cost of the diseases. The results in table 4.1 of the study show that, the respondents of the study are from different locations background in Pakistan. Specifically, from Punjab province, 65 percent of total respondents are women with Breast Cancer (BC), who were included for purpose of information source in this study. Only 18 percent of total women with BC disease were from Islamabad in total respondents of current study. Out of the total sample there are 11 percent respondents included from AJK and GB. Out of total respondent's 4 percent respondents are from KPK and only 1% respondents are from Sindh and 1 percent respondents are from Baluchistan. With respect to age only 11.6% of the women with BC disease in the study were below the age of 30 years. Out of total 21.8 percent respondents were of age between 30 to 40 years. Most of the respondents were above 40 years of age, which are 65.8% in total. This is the main issue that most the women are taken into trouble at the most beautiful time of her life. with respect to marital status, the results of our study show that about 79.6% of the respondents are married and only 7.6% Breast patients are unmarried. More specifically 12.9% BC patients are widowed women in the selected sample of this study. This indicates that not only married women can be taken by this disease, but also unmarried girls can go through the same sufferings if they don't prevent. The education backgrounds showed, that 42.67% respondents were illiterate. 12.89% respondents were with primary education level and 16.89% respondents have middle level education. 17.78% respondents have studied intermediate and 9.78% respondents have achieved higher education. But unfortunately, education doesn't have positive impact (awareness about self-examination) on women all over or as well as respondents of the study.

**Table No 4.1 Demographic Characteristics of Respondents**

	Category	Percentage
<b>Region</b>	Punjab	65%
	KPK	4%
	Sindh	1%
	Baluchistan	1%
	AJK, GB	11%
	Islamabad	18%
<b>Age Group</b>	less than 30	11.6
	30-40	21.8
	Above 40	65.8
<b>Marital Status</b>	Married	79.6
	Single	7.6
	Widow	12.9
<b>Education</b>	Illiterate	42.67%
	Primary	12.89%
	Middle	16.89%
	Intermediate	17.78%
	Higher	9.78%

## 4.2 Demographic background of respondents

The results in table 4.2 show that there are patients, with maximum number of 9 kids, which makes it more challenging for the survival and feeding of kids. However, the average number of kids across the BC patients is 3 kids per patient. The link between breast cancer and having children is complex in terms of management and care. These factors include income of the family, education and family size. The family size is important in terms of support behind kids of a patient and help during illness. The study results show that on average the respondent has 33435.5 rupees income on monthly bases the maximum monthly income of RS 150000.00 is reported by the respondents. The study estimates that only 11000 rupees, is the minimum monthly income of BC patients.

**Table 4.2 Demographic characteristics of Respondents**

	<b>Mean</b>	<b>Maximum</b>	<b>Minimum</b>
<b>No of kids</b>	3	9	0
<b>Age of the patient</b>	44.4356	70.00	21.00
<b>Family income</b>	33435.50	150000.00	11500.00
<b>Education</b>	2.00 <sup>8</sup>	5.00 <sup>9</sup>	0.00

## 4.3 Health status of patients

### 4.3.1 Stages of disease

The patients are diagnosed with BC disease at the different stages. 18.1 percent respondents were at “stage 0” which means that these 18.1 percent patients have minor lymph and are easily recoverable after minor surgery. Stage zero indicates that the person is diagnosed, and this stage is not dangerous as compared to the stage four. Only 5% respondents are at stage 1, which indicates these respondents have realized a bit late that they are diagnosed with Breast Cancer. The result shows that a major portion of respondents comprised of 38.5% respondents are at stage 2, these respondents are comparatively more intensive. At stage four most of the small health care unite do not even keep the patients, they directly refer it to better health care centers for surgery, where it depends upon the damages made by the issue to the patients, weather to conduct the surgery or it might not be treatable in some case with single surgery.

### 4.3.2 Breast feed and Menopause

The results for this study show that, most of the respondents are married at age below 25, which comprise of 75 percent of the total sample size. Only 12 percent of the respondents are married ta age of 25-30 years. Only 3 percent of the study respondents are married ta age of above 30 years. The results show that 28.0 percent of the respondents do feed their kids. 68.9 percent of the respondents feed their kids and practice the breast-feeding activity, which reduces the risk for increasing breast cancer. The studies have shown in past literature that breast feeding reduces the risk of BC.

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<sup>8</sup> 2 = primary education

<sup>9</sup> 5 = Higher education

However, minor numbers of respondents with such cancer care activities are reported in our study. The results show that the reproductive system of 17.3 patient's women is not affected due to chemotherapy. 82.7 percent respondents have lost their reproductive system after chemotherapy.

**Table 4.3 Breast feed and Menopause**

<b>Status indicators</b>	<b>Category</b>	<b>Percentage</b>
<b>Age of Marriage</b>	Below 25	75%
	25-30	12%
	30 Above	3%
<b>Breast Feed</b>	No breast feed	28.0
	Yes	68.9
<b>Menopause</b>	No	17.3
	Yes	82.7

#### **4.3.3 Satisfaction with own condition**

The results indicate that, 168 respondents argued that, their health condition is getting better day by day. Only 8.9 percent of total respondents are strongly agreed with the improvement in their condition. This indicates that their health is getting better, and the disease stage is declining towards zero stage from maximum stage. The result shows that 12.0 percent of the respondents are uncertain of their health condition, whether it is improved or not. Only 4.4 percent of the respondents argued that they do not agree that their health condition has become better and improved due to the treatment.

#### **4.4 Treatment**

##### **4.4.1 Source of treatment**

Only 40 respondents out of 225 respondents visited only public health care facility. 70 respondents went to private health care centers and hospitals to access the health facility. The results also show that, majority of the respondents went to both the facilities at different times for health care. The respondents, who used both facilities, are 51 percent of total selected sample of this study. This indicates that majority of the respondents has tried both the facilities for access better health care.

#### **4.4.2 Age of disease and duration of Treatment**

The results show that, Minimum duration of treatment that patients have taken is only one month. One-month treatment duration is minimum time treatment recorded in our data. This is the shortest treatment, which was taken by the stage zero patients. On average the treatment duration is 11.2 months across respondents of this study, which means that, at least one-year treatment is taken on average by the respondents of the study. However, there are some respondents with 72 months of treatment duration for the same disease. Longest treatment of 6 years is taken by the patients of higher stages. The study results show that, the disease is diagnosed at minimum age of 21 years, while on average the patients were of 44 years of age, when they got diagnosed with breast cancer. This disease is highly associated with age factor, as the studies of eminent researchers have shown that increasing age lead to higher risk factor for occurrence of this disease or the probability of this disease increases with increasing age of the person.

#### **4.4.3 Satisfaction with Treatment**

The result of the study indicates that majority of the patients are satisfied with the treatment of doctors and these patients argued that their health condition is getting better. Some of these patients argued that they do know what is happening to their health status with this treatment. Only 4 persons argued that they do not agree that their health is getting better but in fact they feel that their health is getting into worst condition with the treatment provided by hospital.

#### **4.5 Cost of Cancer**

##### **4.5.1 Direct cost of treatment**

The results are table 4.4 indicates the direct medical cost of cancer, where the consultation cost represents the doctor fee of private clinics for the person because the Noor i hospital has zero consultation fee for patients. It is totally free. The average cost of the consultation on per person is 3081 PKR, which depends upon the visits of the person to the private clinic. Otherwise the consultation fee is 2000 PKR per person on each visit. So calculating it for all the patients makes it 3081PKR on average. The maximum cost paid by patients for the consultation is 7200, which is also combined calculated cost because on per person one visit cost is 2000 PKR. Per person Lab investigation cost is 46171.36 PKR on average basis. This cost varies across respondents, where minimum cost of lab investigation is zero and maximum cost for patients on lab investigation cost is 200 thousand (2 Lacks). Higher lab cost means high number of tests conducted on patients or recommended by doctors. If the patients know that the cancer has many stages, (0,4), at stages zero or One, if the person did self-examination every month, the cost on lab investigation can be easily reduced minimum amount per person.

As it is commonly understood that cancer has very high treatment cost, the study results show that per person treatment cost on average basis is above 3 lacks, which is 374124.44 PKR, while maximum treatment cost is 31,25000 PKR on per person basis. Per patient Average Medication cost is 7792.08 PKR in Noor i hospital Rawalpindi, despite of the fact that drugs are free in most of the cases in Noor i hospital Rawalpindi. The maximum cost for the medication is 40,000 PKR for the patients of Cancer at Noori hospital Rawalpindi. Non-medical cost is represented by the cost of travel and transport, which is direct cost paid by patients during the illness. The study found that 59593 PKR

is the transportation cost on average, which is calculated across all the respondents, whether they are coming from Bahawal Nagar or Mandi Bahaudin. The travel cost is the combine cost of all the visits of the person made during illness. Maximum travel cost for the cancer patients is 0.048 million PKR.

**Table No. 4.4 Direct cost of treatment**

<b>Statistics</b>	<b>Mean</b>	<b>Maximum</b>	<b>Minimum</b>
<b>Direct medical cost</b>			
<b>Consultation</b>	3081.67	7200	0
<b>Lab investigation</b>	46171.36	200,000	0
<b>Treatment</b>	374124.44	31,25000	0
<b>Medication</b>	7792.08	40,000	0
<b>Non-medical cost</b>			
<b>Travel cost</b>	59593.33	480,000	400

#### **4.5.2 Laboratory Investigation Cost with respect to Stage of Disease and Age Patient**

The results show that, the patients of breast cancer below 25 years of age are facing 14833.33 PKRs at zero stage of illness. The patients of breast cancer with in the age limit of thirty to forty years are facing higher cost of 18923.08 PKRs at zero stage of the illness across all the age groups. The expenses of patients with in the same age limit of 30-40 years are facing highest cost at zero stage of illness comparatively to the cost faced by other age groups at same stage of illness. The study results indicate that the average cost at zero stage of cancer is 15761.90 PKRs for the age group of above forty years.

The lowest cost for the age group of below 25 years is zero at stage first<sup>10</sup>, while the highest cost for the same age group patients is 96666.67PKRs at fourth stage of illness, which is also the highest cost across all stages and all age groups patients. This is almost close to 0.10 million per patient at the age group of below 25 years. This group faces the highest cost among all the groups at stage first. This stage is the most expensive stage for the patients below 25 years of age, which can also reduce the productivity of person in long run if the illness stays for long time. The patients of breast cancer below age of 25 years are paying highest average expenses as compare to other groups. This

<sup>10</sup> Because the patients of breast cancer below 25 years of age are supported by different organizations working the eradication of this disease. The collected data shows that the respondents below the age of 25 years were sponsored by Nori welfare society and Baitul mall. They support all the age groups for this disease but in our data below 25 years of patients at stage one was fully sponsored.

group is most vulnerable group with respect to cost of illness. On one hand, the highest cost for patients of breast cancer with-in the age limit of 30-40 years is 80,000PKRs at first stage of illness at once and on the other hand, the same (30-40) years of patients are facing the lowest average cost at fourth stage of illness and also the lowest average cost across all the stages. This group is not highly vulnerable to the illness in terms of cost incurred for the illness. The patients above the age limit of 40 years are facing 15761.90 PKRs at zero stage, which is the lowest among all the groups in zero stage. The average cost across all the age groups of the breast cancer patients is 16650.00 PKRs at zero stage. However, grand average laboratory investigation cost across all stages for age the group is above 40 is the highest among all groups.

**Table No. 4.5 Laboratory investigation average cost, stage of disease and age**

	<25	25-40	Above 40
<b>Stage 0</b>	14833.33	18923.08	15761.90
<b>Stage 1</b>	0.00	80000.00	42333.33
<b>Stage2</b>	48750.00	35733.33	55892.06
<b>Stage 3</b>	38125.00	45307.69	55878.05
<b>Stage 4</b>	96666.67	35166.67	46045.45

After the analysis of whole picture, the study found that the age group below 25 years and above 40 years are more vulnerable in terms of laboratory investigation cost at different stages of disease. The patients of 30-40 years age group face highest cost of laboratory investigation at first stage of illness. The study results show, that cost of illness for breast cancer patients sensitively varies across different age groups. At stage 3 the patients of all age groups face identical costs for laboratory investigation.

#### **4.5.3 Cost of chemotherapy at different stages of breast cancer across different age groups**

The study results indicate that the patients of stage zero and stage one, do not face any cost of Chemotherapy, excluding the patients above age limits 40 years at stage one, where the patients of same age group spend PKRs 29875 at once for Chemotherapy. For the zero-stage patient's chemotherapy is not required that's why the cost is zero at zero stage.

The average cost of illness for across all the groups for stage one is 21727 PKRs at once for Chemotherapy. However, the patients, below the age of 40 years do not need chemotherapy and thus the cost is zero at even stage first. Because the patients below 40 years of age, recover soon without the chemotherapy. The highest cost at stage second is faced by the patients of above 40 years, which indicates that at first stage the rate of recovery for the patients above age limit of 40 years is very low and the cost of second stage is thus the highest among all.

**Table no 4.6: average cost of chemotherapy at different stages of breast cancer across different age groups**

Stage of illness	Less than 25	25-40	Above 40
0	0.00	0.00	0.00
1	0.00	0.00	29875
2	10000	28666.66667	100102.0408
3	44571.42857	65750	62642.85714
4	37500	170000	55833.33333

#### 4.5.4 Surgery cost with respect to age group at different stage

The results show that highest surgery cost at stage first is faced by the patients of highest age group, which is above 40 years. The patients of lower age group are also facing significant cost for surgery at zero stage of illness.

The cost of surgery at first stage of breast cancer is zero for both the age groups of below 25 and between 25 to 40 years of age. Only the patients of above 40 years age group are facing 16666PKRs for surgery at stage one. Some patients do not need surgery because of minor illness and the cost is connected to time period of illness. The patients below the age of 25 years are facing highest surgery cost at stage 2 and only 5000PKRs at stage 4. The grand total average cost of surgery for the patients of breast cancer, below the age of 25 years is 47115 PKRs only at once, which is second highest grand total cost for all the stages. The highest total grand cost surgery for all the stages is faced by the patients in the age group of 30-40 years

**Table 4.7 Surgery cost with respect to age group at different stage**

Stages of illness	≤25	25-40	≥40
0	76666.66667	68461.53846	86904.7619
1	0.00	0.00	16666.66667
2	96250	53933.33333	39079.36508
3	43750	40833.33333	43512.19512
4	5000	0.00	20909.09091

#### 4.5.6 Radiotherapy cost with respect to age group at different stage

The study results indicate that the patients of stage zero and stage one, do not face any cost of radio Therapy, excluding the patients above age limits 40 years at stage one, where the patients of same age group spend PKRs 24000 at once for Radio therapy.

The patients of same age group faced 253515.623PKRs at stage 2 ,444756PKRs for stage 3 and the highest cost paid for the same age group is 950000 at stage 4. For the zero-stage patient's radio therapy is not required. The patients lie between the age group of 25-40 years are facing 165000 cost at stage 2 ,270000PKRs at stage 3 and 1286666 at stage

#### 4.8 Radiotherapy cost with respect to age group at different stage

Stages of illness	≤25	25-40	≥40
0	0	0	0
1	0	0	24000
2	0	165000	253515.625
3	0	270000	444756.0976
4	366666.6667	1286666.667	950000

#### 4.5.5 Indirect cost

The indirect cost was calculated, through number of days missed by the working person multiplied wage rate and then we converted it to monthly cost. This also the opportunity cost of the person. The study results show that, minimum cost was zero because there are few patients, who are not yet employed but on average per month opportunity cost is 2772.15 PKR and average monthly cost was 46000 PKR for employed patients.

#### 4.6 Intangible Cost

Here Intangible cost is a combination of fear, physical pain, emotional suffering and family management. Moreover, fear is calculated through five indicators

##### 4.6.1 My Future Is One of My Concern

The result at table 4.10 shows that most of the patients were extremely upset about their future due to cancer, because this disease is can destroy the future life. Few of the respondents were not worried about their future due to illness because these patients were at the very initial stages and hopeful for better health in future after the treatment.

**Table no 4.9 Due to sickness my future is one of my concern**

Scale it on	Frequency	Valid Percent	Cumulative Percent
Not At all	14	7.4	7.4
Little	12	6.3	13.8
Moderate	2	1.1	14.8
A lot	16	8.5	23.3
Extremely	145	76.7	100.0
<b>Total</b>	<b>189</b>	<b>100.0</b>	

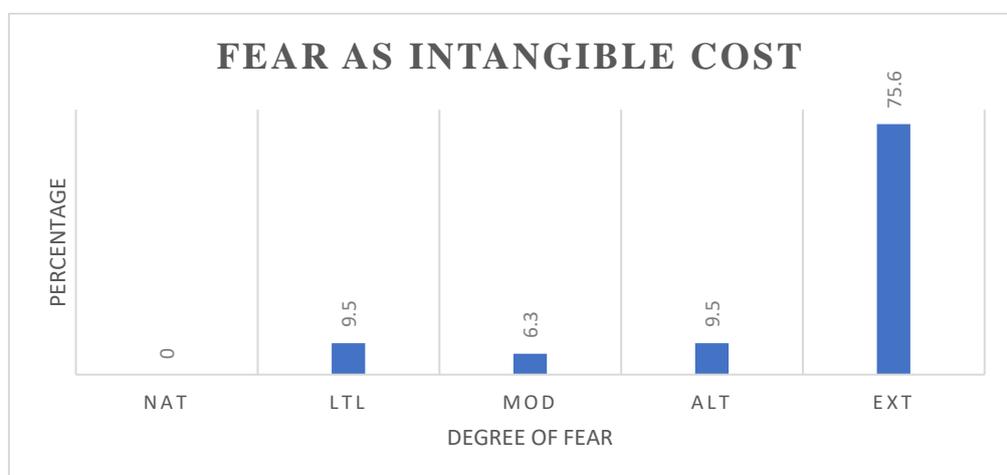
#### 4.6.2 Uncertainty of illness

120 out of total patients are extremely bothered due to uncertainty of cancer disease, which is 55.8 percent represented by the top lines of figure 4.6 The results also reveal that 6.2 percent respondents argued that they are not bothered by this disease; the patients argued that one day we have to die so it is ok if this is in my luck and 6.2 percent argued that they are bothered a little bit because they are disturbed due to the behavior

#### 4.6.3 Fear of cancer spreading, dying and Future

The figure no 4.7 shows that 75.6 % of the patients confessed that they feel extreme fear of spreading the cancer in their body and are afraid of dying. Only 9.5 percent patients were at normal condition, who were not afraid at all. On the other-hand 6.3 percent of patients were little bid afraid of these uncertainties. The results shown in figure 4.7 revealed that 9.5 percent patients expressed the feeling of fear for being in uncertain condition for the future and death due to this disease is lot. However maximum patients are extremely afraid of death and uncertainty, which indicates higher number of patients are facing intangible cost with higher intensity.

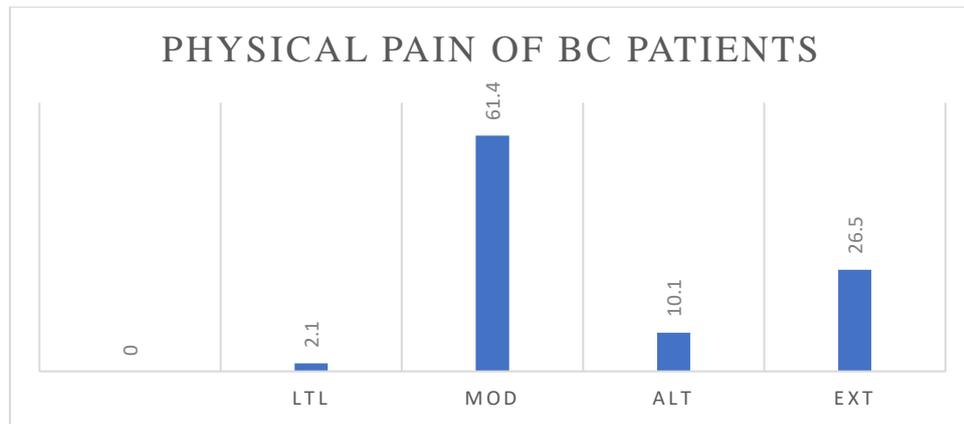
**Figure no 4.7 Fear as intangible cost**



#### 4.6.4 BC patients suffering the Physical pain

The results in figure 4.8 indicate that most of the respondents go through the moderate pain. The moderate pain is defined as bearable pain. Very few argued that feel little bit pain. A significant percentage of respondents expressed, that victims are going through extreme pain. The indirect and intangible cost of disease is the bad feeling or suffering from pain in breast cancer, which is significantly evident from the collected data.

**Figure 4.8 Physical Pain OF Breast Cancer Patients**

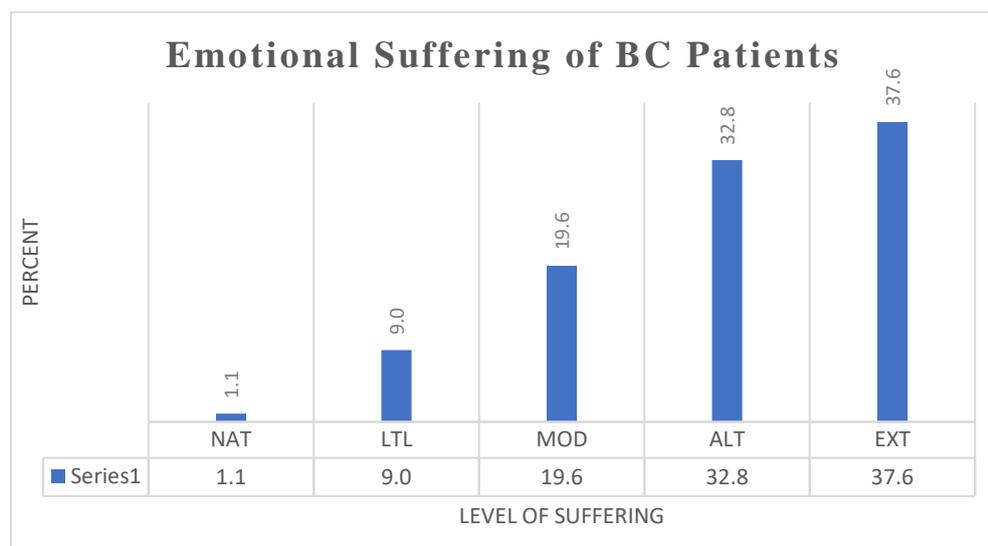


(NAT) = Not at all (LTL)= Little MOD = Moderate (ATL) = A lot (EXT) = Extreme

#### 4.6.5 Emotional suffering of breast cancer patients

The results of the study shown in figure no Reveal the status of emotional suffering of breast cancer patients. Only 1.1 percent patients were not affected emotionally. 9 percent ladies argued that the disease has affected them emotionally but little bit. 19.6 percent patients have replied that the emotional suffering is moderate like other disease. 37.6 percent of the patients extremely suffered emotionally due to illness and the fear of many uncertainties. 32.8 percent suffering a lot due to the illness. This result indicate that this illness has serious emotional implications for the sociality and families suffering from breast cancers disease. This is the indirect cost faced by patients.

**Figure no 4.9 Emotional suffering due to breast cancer**



(NAT) = Not at all (LTL)= Little MOD = Moderate (ATL) = A lot (EXT) = Extreme

#### 4.6.6 Effect on family management

The results shown in the figure no, show that more than 30 percent of the patient's family life management has extremely affected due to the illness. The logic behind, this disturbance is the hospital visits, which do not allow the patients to given proper time

to kids. The problems of weakness in the body, weak immunity also stops the patient from his/her social circle. Some patients face the surgery treatment stages and these patients are mostly isolated due to extreme illness conditions, which reduces their interactions with family and relatives. Around 30 % patients argued that their family life is affected a lot. Less than one percent of the patients responded that this disease hasn't affected their family lives. 19.6 percent patients have managed the family life and disease together and the affect is moderate like a normal disease.

#### **4.7 Determinants of health cost for BC patients**

The empirical results of the study show that age of the patients is positively associated with health cost, but it is statistically not significant for the patients of breast cancer. This can be also verified from descriptive statistics, where the results indicate at first stage for lower age group the cost is high while for the higher age group the cost is lower and for further higher stages of illness the cost for higher group is very volatile across all the age groups. So, there doesn't exist any relationship between age of the patient and health cost. This also means that the cost for lower age patients can be greater than the cost of illness for higher age patients. As a common logic if the patients of the lower age are at higher stage of illness, they must be very critical, and cost of illness will get higher due to surgeries and other care. The relationship of age is not clearly correlated with patient's health cost in this type of illness because it can take over the patients of any age very soon to limits of life and death situation. The other important reason of this insignificant relationship is the age of illness. On one side some patients get diagnosed in very early 20s and on the other side age 70 is also not immune against Breast Cancer. Consistently insignificant in two models has allowed the author to drop the variable age from the third model. The sign of coefficient shows that Breast feeding is positively associated with health cost of breast cancer but statistically the association is not significant in three of the models. The reason for the insignificant relationship is that, this disease is not only associated with married or a woman with feeding kid, but the patients without kids are sometimes facing the highest cost comparatively. To understand the logic behind the insignificance of this association, the nature of this disease should be always in mind as the stages increase the illness gets more intense and the cost of illness for the treatment is pulled up, where it doesn't matter that the patient is married or not, feeding or not and young or old, the thing which matters is stage of illness and situation of patient. Breast feeding variable is also dropped after consistently insignificant association with health cost of illness.

The results showed that, increase in household monthly income across patients leads to increase in health cost of breast cancer. The rationale behind the positive and significant relationship between income and health cost is, that higher income families spend more money on their health comparatively. The lower percentage of income spent on health cost of a rich family is some time greater than the income of the poor person. Higher income people are expected to spend more on health and that's the common logic behind the association between income and health cost. The statistical relationship between income and health cost is significant throughout four models of the study, which confirms the relationship exists between health cost and income. The treatment duration breast cancer increases the cost of breast cancer, which requires different treatments and therapies over the time, which are very costly. The results are statistically significant, which indicates that through the sample most of the patients with long duration of treatment have faced huge cost of illness. Treatment duration is

highly significant throughout all the estimated models with every combination of variables. Genetic abnormality is also positively associated with health cost of breast cancer patients. The reason of consistently significant relationship between genetic abnormality and cost of illness might be the immunity problem of the patient, which doesn't resist against the illness like a normal person's body.

Spending on health of the patient will increase the health cost and healthy diet provision is one of important part of cost for breast cancer patients. The association is significant and positive in all the estimated models of the study. Physical exercise of the patients is not associated with health cost. It doesn't matter for the cost of a breast cancer patient treatment to carry on physical exercise or not. Even people with zero exercise have faced lower cost of health because of stage and illness short duration. The variable physical exercise is removed from the second 3<sup>rd</sup> and 4<sup>th</sup> model of the study. The results indicate that high number of visits have negative association with cost of illness because the follow up saves the patient from cost of surgery or chemo therapy, which are required at higher stages of breast cancer and high number of visits means more frequent checkup, which is safer and economical in this type of intense illness.

The study results showed that stages of breast cancer and health cost of breast cancer is positively associated, which indicates that higher stages will lead higher health cost for better and critical treatment. This means, that the patients of breast cancer at higher stage of illness are facing greater cost of health treatment. The results are statistically significant with p value lower than 0.05, which allow us to accept alternative hypothesis that there is an association between stage of illness and Health cost of breast cancer.

**Table No 4.10 Determinants of health cost for BC patients.**

<b>Variables</b>	<b>Model I</b>	<b>Model II</b>	<b>Model III</b>	<b>Model IV</b>
<b>Constant</b>	-402336.959 (.048)	-397292.545 (.045)	-357870.365 (.023)	-319662.209 (.031)
<b>Age</b>	1175.099 (.730)	1084.279 (.743)		
<b>Brest Feed</b>	50489.401 (.508)	50180.301 (.510)	54609.738 (.465)	
<b>Monthly Income</b>	3.016 (.051)	2.995 (.050)	3.014 (.048)	2.962 (.052)
<b>Treatment Duration</b>	35928.825 (0.000)	35987.012 (0.000)	36124.777 (0.000)	36157.988 (0.000)
<b>Genetic Abnormality</b>	255864.428 (.002)	257655.890 (.002)	258193.370 (.002)	258153.674 (.002)
<b>Healthy Diet</b>	170088.531 (.045)	170769.455 (.043)	171089.432 (.043)	176343.229 (.036)
<b>Physical Exercise</b>	18113.873 (.907)			
<b>Number of visit</b>	-9068.347 (0.000)	-9115.524 (0.000)	-9155.526 (0.000)	-9325.525 (0.000)
<b>Dummy for stage 1</b>	291148.443 (.030)	292327.689 (.029)	297927.512 (.024)	311362.980 (.017)
<b>Dummy for stage 2</b>	384335.441 (.054)	388056.976 (.048)	398166.132 (.039)	400920.975 (.038)
<b>Dummy for stage 3</b>	285769.847	286480.982	290052.790	292603.613

	(.036)	(.035)	(.032)	(.030)
<b>Dummy for stage 4</b>	936865.768 (.000)	936991.077 (.000)	940670.403 (.000)	940158.010 (.000)
<b>R<sup>2</sup></b>	.425	.425	.425	.423
P vales are in parenthesis				

#### 4.8 Major findings

Fear and lack of knowledge caused women to hide the breast lump from their husbands and families. On disclosure of breast cancer is potentially life threatening but may be a reflection of the social stigma that is associated with a diagnosis of breast cancer. There is a social stigma of having a mastectomy in Pakistani culture. The breast cancer is viewed as a proscribed condition, which reduces the opportunities for unmarried women with breast cancer to later get married. In Pakistani society breast cancer is treated as a gender specific symbol of deprivation. Because of the awareness western societies do not face such kind of stigmatizing issues.

In Pakistan depression is viewed as a common psychological reaction to the illness. The level of depression varies from moderate to severe, and the severity is correlated with the stage of the disease at diagnosis. On realization of disease at first, most of women argued that the initial thoughts, which depress them were of their children future without her rather than their own lives or the potential impact of the illness on their relationship with her husbands. Coping strategies also play important role in reducing the stress of patients temporarily but it is very dangerous for the health of patients. These types of cultural based treatments are very rarely effective. Most of the time, it increases the cost of health for patients. This study concluded that some of financial challenges women faced during treatment and care, like high cost of laboratory investigations, fees for treatment and cost of travel from far-flung areas. Funding the cost of treatment and care for breast cancer can stretch people's budget to breaking point. Many of the hidden cost of breast cancer are intangible and important. A woman who is diagnosed with breast cancer at a younger age (before she has started menopause) may face additional financial pressure. While women with early stage cancer will most likely know at the start of their treatment how long they will be of their treatment (surgery, chemotherapy, radiotherapy) but women with last stages especially women with metastatic breast cancer don't have an "end point" to their treatment.

Depending how their cancer responds to treatment, women with metastatic disease may have several "lines" of treatment, when one line of treatment stop working another treatment is tried. it is difficult to predict how long each line of treatment may be given. What each line of treatment will be and how much it cost will be. All of these can tighten the household budget. Paying for cancer treatment and its associated costs pushes them to the brink. They are forced to rely on government benefits, charity, borrow and sell off assets, which is pushing middle income holders back to poverty line.

## 5. CONCLUSION AND RECOMMENDATIONS

### 5.1 Conclusion

The evidences of Breast cancer are more visible in Panjab and Islamabad as compared to other regions of Pakistan. This disease is more sensitive to the age of Patients. The study concluded that most of the patients realize Breast cancer in second stage of disease. Direct cost is the major cost faced by breast cancer patients. The lack of awareness and prevention measures lead to increase the economic cost of BC patients. The promotive measures in Pakistan are negligible and thus it adds up to the cost of BC for a common man.

The empirical results of the study indicate, that the duration of treatment is positively and significantly increasing the cost of breast cancer. Likewise, the stage of the illness is increasing the illness cost, higher stage patients are facing huge cost, which is also causing the intangible cost to patients. The study indicates that, most of the patients were Punjab region and out of total sample 65% patients of breast cancer are from Punjab, followed by capital territory of Pakistan with 18 % patients out of total sample of the study. This disease is more frequently found in the age group of above 40 years. The patients of this disease are mostly married in collected data sample for the study.

Most of the Breast cancer patients are at stage two, which are 39 percent followed by the 28 percent patients at stage three. This is a critically important issue that most of the patients are facing huge cost both economically and socially. The treatment is highly expensive for higher stage patients. Only 10 percent of patients are at stage 4, which is the most dangerous stage of this illness. The cost of treatment and care for breast cancer can stretch people's budget to breaking point. The study found that breast cancer patients incur huge direct cost in seeking treatment. Most of the respondents reported high intangible burdens owing to breast cancer disease patients indicating that majority of the study participants experience a lot of psychological problems due to their illness condition. The major source of this psychological burden is as a result of the stigmatization associated with breast cancer. In general, the direct cost of treatment, for breast cancer patients is a major challenge confronting breast cancer patient.

## **5.2 Recommendation**

The awareness programs shall be started by government for prevention and treatment of cancer. This will reduce the treatment and lab investigation cost of the patients. Most of the expenses can be cut down due to prevention through screening.

Direct cost the major cost faced by breast cancer patients. There is demand for a rational policy on breast cancer, treatment with the intention of backing the direct cost components of breast cancer treatment. This could be done through effective advocacy and collaboration with interest group to raise the required resources for reducing the direct treatment cost.

The study recommends the awareness programs, which shall focus on prevention of disease with parallel focus on interaction with patients for reduction of psychological issues, which will help in reduction of intangible cost of breast cancers patients.

In addition ,the establishment of cancer hospitals and increasing the number of beds in the existing cancer treatment Centers across the country is important.

The government budget should also include and focus on investment for diagnostic hospitals and BC treatment center.



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