

THE HOUSEHOLD ECONOMIC BURDEN OF HEAD AND NECK CANCER PATIENTS IN PESHAWAR, PAKISTAN

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ABSTRACT

Head and Neck cancer is the most common cancer worldwide. The incidence of the disease has a strong positive correlation with the patients' ages. Approximately 85% of the male patients with this illness are older than 45. Smoking, tobacco, and alcohol intake are the primary risk features for head and neck cancer. The purpose of this study is to estimate the economic burden of male head and neck cancer disease. Head and neck cancer places a severe financial impact on households. To examine the impact of head and neck cancer on patients, we got the list of the patients from the territory care hospitals in Peshawar and interviewed 235 patients to estimate the health cost. The study's methodology is divided into two parts: empirical estimations and descriptive statistics. The Ordinary Least Square (OLS) estimate technique was employed in the study to identify the variables affecting the expense of head and neck cancer. According to the analysis, the stage of cancer and the length of the treatment is increasing the cost of head and neck cancer and the number of cancer patients visiting these hospitals from the KPK, Islamabad, etc. The majority of respondents reported significant intangible burdens, such as fear, pain, mental distress, and family management. Patients with head and neck cancer were more likely to face several psychological issues because of their health condition.

Keywords: Head and Neck Cancer, Economic burden, Treatment cost, Cost of illness (COI), OLS, Peshawar.

INTRODUCTION

The economic burden allied with the diagnosis of cancer is occasionally overshadowed by the economic cost sustained by the patient and the family. This is particularly important for a developing nation because there is little government funding available for cancer treatment. Moreover, this makes sense given that cancer treatments are among the priciest and have the greatest out-of-pocket expenses. Most of these expenses are associated with chemotherapy and radiation. According to a WHO survey in 2017, patients are more concerned about financial loss and its effects than they are about developing cancer. Cancer treatment involves physical and psychological demands that may be difficult for the patient to handle emotionally, which could have a detrimental effect on the patient's outcomes. In other words, patients with head and neck cancer in particular had greater medical costs and out-of-pocket costs than those with other cancers.

Furthermore, Patients with head and neck cancer have been shown to be at risk of having their quality of life worsen due to financial burden. There are two out of every three of these patients used cost-coping techniques like selling personal belongings, using personal savings, taking out credit card loans, and asking family members to work more hours to make ends meet. In the last ten years, the price of cancer treatment has likewise doubled; it now accounts for 4.9% of all medical spending and is still rising. More people are becoming aware of the financial hardship that patients, particularly those who

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are facing cancer. Cancer-related out-of-pocket costs frequently account for up to 27% of low-income households and are the most frequent reason for medical bankruptcy (Ing, J. W. (2017).

Galen, a physician in the second century, noted that cancer was a constitutional illness that usually affected those with a miserable position. Financial issues frequently make cancer patients worse. The National Cancer Institute (NCI) broadly defines financial toxicity (FT) as problems a patient has related to the cost of medical care. FT is also referred to as a financial burden, financial distress, economic cost, financial difficulty, and Economical stress. Cancer treatment is an expensive endeavor because it necessitates an intense type of therapeutic treatment, such as chemotherapy, radiation, and surgery, in addition to pricey diagnostics. Therefore, the cost of providing cancer care is a significant financial burden on the payer at the home. Given that the government only covers about 29% of the cost of health care in India, households are responsible for the majority of the remaining costs, which are known as out-of-pocket (OOP) expenses. Bang et al. (2011), NHSRC (2016).

When estimating the economic costs of treatment for the patient in four separate categories; direct medical costs, direct non-medical costs such as daily living expenditures, and transportation. Indirect costs (loss of earnings), and intangible costs, the financial burden could be taken into consideration (pain, uncertainty). Other ways to classify the economic stress on the patient and their family include economic pressure known as subjective or perceived financial hardship. Financial stress is also recognized as an objective or illness-related financial burden.

Beyond the noticeable expenditures of medical care, cancer has enormous indirect costs. About 70% of cancer-related deaths in India included persons between the ages of 30 and 69. Hence, cancer not only costs families a significant portion of their income for treatment but also negatively affects households' financial stability by causing salary or income loss. The seventh most frequent neoplasm worldwide is head and neck cancer with emerging countries bearing around 70% of the overall burden, 32% of incident HNC cases, and 40% of global overall mortality occurring in the South East Asia region (SEAR). Additionally, India accounts for around 3/4 of the SEAR burden of HNCs in terms of incidence (1.45 lakhs) and death (1.05 lakhs) (Ferlay et al, 2015).

In clinical practice, treatment choices are influenced by the site and stage of the disease as well as pathological results. On average, radiotherapy or surgery is the only treatment option given to individuals who are diagnosed with an early-stage condition. People who have more advanced stages of (HNC) are often treated with concomitant radiation and chemotherapy as part of a combined modality approach. Chemotherapy is given to patients with metastatic or recurrent (HNC) in an effort to prolong overall survival or provide pain relief. Patients with advanced-stage illness typically have a bad prognosis. Households have a heavy financial burden because of head and neck cancer. The cost of illness must be understood by policymakers and health planners in order to determine how to allocate resources inside cancer centers and hospitals, including how to distribute nuclear drugs according to disease classifications. Additionally, comparing the cost of the head and neck to the patient's age and disease stage is a logical investigation. All patients are prevented from getting treatment for (HNC) due to the high cost of treatment. (Cordero & Dundar, 2020).

When head and neck cancer is diagnosed, numerous economic consequences demonstrate how expensive this particular type of cancer is. The treatments can include surgery, chemotherapy, and radiotherapy, among other pricy operations. Only a few government hospitals offer radiotherapy and chemotherapy, which are both very expensive treatments. The high price puts pressure on the family's finances and necessitates the sale of possessions in order to pay for the cancer treatment. When treatment-related problems occur, the financial burden gets worse. This study examines several methods for disease control, prevention, and cost assessment in relation to the disease stage. To assist the government and politicians manage resources effectively, this study will provide a comprehensive understanding of the financial burden of head and neck cancer on the patient and his family.

The determination of this research was to estimate the health cost of head and neck cancer patients in Peshawar. However, the objective of the study is to examine the determinants of Head and Neck cancer economic costs and intangible costs such as emotional suffering, family management, pain, and fear of HNC patients.

REVIEW OF LITERATURE

Cancer is a serious health problem globally and the US ranks second in the world for the number of cancer victims. Patients who have cancer and their therapies frequently experience physical and

emotional illnesses. The stress and anxiety brought on by the disease is the biggest issue for cancer patients. According to statistics, one in three cancer patients experiences serious psychological illnesses, which compromise the effectiveness of their care and their recovery. The stress of dealing with the illness is one of the issues that cancer patients face. Cancer diagnosis, treatment, and daily living can all be quite stressful (K. D. Miller, 2019).

Cost of head and neck cancer

The majority of the literature that is currently available on (HNC) costs is restricted to subpopulations that are determined by the treating institution, payer, age, place, or treatment method. A 2014 systematic review found that no studies had evaluated the societal burden of HNC medical bills up to that point. The largest study which employed a national sample determined that the median cost of treatment was \$79 151, with variations due to the payer, treatment method, and patient's condition. However, the study was limited to patients with insurance and omitted income information to contextualize out-of-pocket costs. Only two studies both of which examined costs associated with HNC observed a nationally representative sample. As far as we are aware, no prior study has explicitly contrasted (HNC) finances and costs with those of other patient populations (Osazuwa-Peters, 2019).

After radiotherapy, socioeconomic characteristics such as social security status, perceived economic status, and educational level had a substantial impact on the value of life for head and neck cancer patients. It has been determined that radiotherapy to the head and neck causes more fatigue than it does to other sections of the body. Similarly, it has been demonstrated that side effects such as weariness enhance the risk that patients would alter their job status. It is crucial to recognize that direct non-medical expenditures also include those associated with a specific side effect, which can include weariness, microsites, osteoradionecrosis, and xerostomia, among many others. Costs place a financial strain on family members and professionals who care for patients. The head and neck Patient concerns inventory identifies financial issues as well as needs that may not be satisfied in the usual treatment context (Harvey-Woodworth, (2012).

Review of literature concerning Pakistan

There is no recent data on Pakistan's national incidence of cancer for the previous 64 years. The only information that is tracked down is based on hospital registries; no population-based studies have been carried out. Nearly 80 million individuals (or roughly 50% of the population) in Pakistan, the sixth most populated nation in the world, suffer from one of these chronic illnesses. Given the speed at which the disease burden is rising in the nation, a close watch must be kept on cancer. According to a 2012 study on cancer prevalence in Pakistan, over 63,415 men and 85,590 women had the disease at that time. The most common type of cancer that results in mortality worldwide is lung cancer, whereas Pakistan continues to have the highest recorded death rate from breast cancer (Saeed, Khan, (2019).

Like many other developing nations, Pakistan offers little in the way of government aid and frequently the patient and his or her family must cover all expenses direct and indirect alike. To our knowledge, Pakistan has not had any research done on this significant topic. There is also very little information from other emerging nations dealing with a comparable scenario. Any person and their family are shocked to learn that they have cancer. Cancer is a chronic illness and the financial stress placed on the family can occasionally eclipse the physical and emotional toll. A sizable portion of this cost is absorbed by the state in industrialized nations and more affluent cultures around the globe. However, despite the fact that there are numerous governmental strategies in place to address the issue, research from affluent nations like Canada has revealed that patients and their families still face enormous hardships (Zaidi, Khan, (2012).

Stress with head and neck cancer

The most crucial and essential quality for people who are skilled, motivated, and free from stress in order to build a sustainable society is good health. As discussed earlier, if there is an (HNC) patient in the family, head and neck cancer has become a major source of stress for all family members. Even though they possess traits like skillfulness, hard work, and cooperation, such family members are unable to put in the effort necessary to build a sustainable civilization. Therefore, early treatment by every hospital for better care of cancer patients is needed, especially in undeveloped nations like Pakistan to overcome or decrease this stress on the family (M. Walsh, Morrison, 2018).

Numerous studies have examined the benefits of mindfulness in a variety of contexts including the treatment of cancer. According to a review of the literature, only a small number of research have looked at the relationship between stress with cancer, quality of life, and mindfulness as well as the

mediating role of mindfulness in this relationship. Hence, (HNC) has grown to be a significant burden for long-term public health. If there is a cancer patient in the family, it has become a major source of stress for all of the family members. Few studies investigated the impact on head and neck cancer patients and there is less literature available in Pakistan.

RESEARCH DESIGN AND METHODOLOGY

Research Design

Male head and neck cancer patients that visit the hospital for treatment constitute the target population. Male (HNC) patients receiving treatment for head and neck cancer in particularly private and public hospitals in Peshawar, KPK, was the study's sample. The following hospitals from Peshawar were included for the study purpose: Shaukat Khanum Memorial Cancer Hospital & Research Centre Peshawar (n1), and Institute of Radiotherapy and Nuclear Medicine Peshawar (n2). The following formula is used for the calculation of sample size.

Where; n= sample size

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

= predicted outcome variable standard deviation

E = the desired margin of error

Data Collection Units

The component of data collection for this study is male patients with head and neck cancer. Furthermore, 190 respondents were selected from (IRNM) hospitals, and 45 male patients were selected from Shaukat Khanum Cancer hospital Peshawar. The second element of data collection for this study is the specialist doctors of head and neck cancer disease. The specialists in head and neck cancer disease are the second source of information for this research. Two interviews with physicians; Dr. Fawad ul Qamar and Dr. Irfan Haider have been included in this study. Head and neck cancer patients travel to (SKM-Pesh) from all around the nation, including Afghanistan, which is the primary facility for the treatment of (HNC). The economic impact of male head and neck cancer is estimated using the cost of illness (COI) method (Aymen Saeed, Fazli Hakim, 2019).

List of Variables

The description of the variables includes the type of cost and the different categories of cost that were estimated in the study. Specifically, it also describes the elements of the cost sustained by males in seeking treatment for head and neck cancer.

Type of Cost	Category of Cost	Description
Direct Cost	Medical cost	Medication cost Treatment cost Laboratory /diagnostics Consultation fee
	Non-Medical	Cost of drinks and food for patients Traveling cost
Indirect Cost	Productivity cost	Waiting time Travel time Productivity loss to the patients
Intangible Cost	Psychological issues	As measured by emotional distress: not at all, moderately extreme, and very modest. Scales of fear are not at all, extreme, and very modest. Scales of pain are not at all, moderately extreme, and very modest.
		Hospital services satisfaction
	Behavioral habits	Physical activity Food intake Contraceptives pills

Individuals	Age
Variables	Family income
	Marital Status
	Smoking

METHODOLOGY

According to the main objectives of the study, the methodology is based on the two sections, which are as follows:

1. Cost of illness (COI)
2. Multiple linear regressions models

Costing

Three different cost categories are measured individually by the first objective (direct cost, indirect cost, and intangible cost). The total of the medical and non-medical costs is the direct cost. Non-medical costs like food and transportation are separate from medical costs like prescription drugs, consultation fees, and treatment.

Direct cost = Medical cost + non-medical cost

$$DC = \sum_{i=1}^k P_i * Q_i \dots\dots (1)$$

The medical cost can be calculated by multiplying the price and quantity of surgeries conducted during illness:

$$MC = P_1 * Q_1 + P_2 * Q_2 + P_3 * Q_3 \dots\dots (2)$$

Similarly, we can calculate the non-medical cost by price multiplied by the quantity of each type of treatment service taken by patients.

$$NMC = P_4 * Q_4 + P_5 * Q_5 \dots\dots (3)$$

The direct cost is the sum of medical and non-medical costs.

$$DC = MC + NMC = P_1 * Q_1 + P_2 * Q_2 + P_3 * Q_3 + P_4 * Q_4 + P_5 * Q_5 \dots\dots (4)$$

Medical Cost

Price

- P1= Price of consultation fee per visit
- P2= per unit cost of medication
- P3= price for the per test

Quantity

- Q1= no of patients visits
- Q2= no of units
- Q3= no of tests

Non-Medical Cost

- P4= traveling cost per visit
- P5= food cost per unit

- Q4= no of patients visits
- Q5= no of units

Indirect cost calculates to measure the productivity loss of patients and their attendants.

Indirect Cost of patients

- P*= Wage rate per day
- P*= Traveling time
- P*= Waiting time

- Q*= No of days absent from the job
- Q*= Cost per hour
- Q*= Cost per hour

The indirect cost of a family member using the same variables and methods as previously mentioned. Pain, fear, emotional suffering, the family management are the elements of intangible cost, which is created by taking the basic average. The predisposition of patients toward pain, fear, emotional suffering, and family management are examined through realistic illustration.

Econometric Model

For the study's second objective, we applied the multiple linear regression model. Finding the correlation between one continuous dependent variable and two or more independent variables is done using the multiple regression model. Additionally, a single equation can be used to determine the various elements that lead to the different kinds of expenses.

$$DC = \beta_0 + \beta_1 NOV + \beta_2 D_2 + \beta_3 D_3 + \beta_4 D_4 + \beta_5 TD + \beta_6 DPE + \beta_7 DSM + \beta_8 Age + \beta_9 HNP + \mu$$

Where the number of visits showed: a D_2 Dummy at stage 2, a D_3 Dummy at stage 3, a D_4 Dummy at stage 4, a Treatment duration (TD), a Dummy of physical exercise (DPE), and a Dummy of smoking (SM), Dummy of the head and neck patients (DHN).

RESULTS AND DISCUSSION

The descriptive statistics and the demographic characteristics of the respondents are shown in the below table.

Table No. 1 Demographic Characteristics of Respondents

Variables	Category	Percentage
Region	KPK	70%
	Punjab	5%
	AJK, GB	8%
	Islamabad	11%
	Sindh	3%
	Balochistan	3%
Education	Higher	11.89%
	Intermediate	19.67%
	Middle	17.78%
	Primary	13.89%
	Illiterate	36.77%
Marital Status	Single	9.3%
	Married	76.8%
	Transgender	13.9%
Age	Above 40	68.9
	30-40	19.5
	Less than 30	11.6

Descriptive Results

The results of the direct and indirect expenses of the diseases have been presented using histograms and descriptive statistics. The study's findings, which are presented in table 1, indicate that the respondents come from a variety of ethnic backgrounds in Pakistan. Men with Head and Neck Cancer (HNC) make up about 70% of all respondents from the KPK province, which was included in the study as a source of data. Only 11% of the men with HNC illness in the study's overall sample were from Islamabad. Eight percent of respondents from the entire sample are found in AJK and GB. Only 3% of respondents are from Sindh and 3 % from Balochistan, while 5% of respondents overall are from Punjab. As far as age is concerned, only 11.6% of the study's male (HNC) patients were younger than 30 years old. 19.5 percent of respondents overall were between the ages of 30 and 40. 68.9% of the respondents or those who responded were above the age of 40. This is the major reason why most men get into trouble during their most joyous moments. According to the findings of our survey, 76.8% of respondents are married and only 9.3% of patients with head and neck conditions are single. In the study's sample selected, 13.9% of HNC patients identify as transgender. This shows that if they do not take precautions, not just married people but even single men may contract this illness and suffer similarly. According to their educational backgrounds, 36.77% of the respondents were illiterate. 17.78 % of respondents had a college education, and 13.89% had only elementary schooling. 11.89 % of respondents have earned a higher degree, while 19.67% of respondents have completed intermediate-level coursework. Unfortunately, education has no positive effect on males globally or study participants in terms of awareness of self-examination.

Table No. 2 Demographic Characteristics of Respondents

Variables	Mean	Maximum	Minimum
Education	3.00	6.00	0.00
Family Income	37480.50	120000.00	12500.00
No of Kids	4	8	0
Age of the patient	45.3245	75.0	25.0

According to the findings in table 2, some patients have up to eight children, which makes it harder for them to maintain their families to survive. The average number of children per patient with HNC is four children. In terms of treatment and management, there is a complicated relationship between head and neck cancer and having children. These elements include the family's income, level of education, and size of the family. The size of the family matters when it comes to caring for sick children and

supporting the patient. The study's findings indicate that respondents earn an average of Rs 37480.50 per month, with a maximum monthly income of Rs 120000.00 stated by respondents. According to the report, (HNC) patients' minimum monthly income is only 12500 rupees.

Treatment

Source of treatment

Out of 235 survey participants, 46 attended only public healthcare institutions. 71 respondents used private hospitals and healthcare facilities to access the health facility. The findings also indicate that the majority of respondents sought medical attention at various times from both facilities. 54 percent of the respondents in the study's overall selected sample used both facilities. This shows that most of the respondents had used both facilities in an effort to seek better medical treatment.

Satiation with treatment

According to the study's findings, the majority of patients are happy with the care they receive from their doctors and these individuals claim that their health is improving. Some of these individuals stated that they are aware of how this medication is affecting their health. Only six people claimed that they did not agree that their health was improving. In fact, believed the treatment they were receiving from both public and private hospitals was making their health worse.

Duration of treatment and age of disease

The findings indicate that patients only received two months' worth of treatment at the most. The shortest treatment period ever documented in our data was two months. Patients in stage zero received this treatment, which is the quickest. The study's respondents received treatment for an average of 10.4 months, which indicates that they typically received at least one year of treatment. However, some individuals have received the same disease treatment for 48 months. Patients with advanced stages receive the longest treatment, which lasts six years.

The study's findings indicate that the disease must be at least 27 years old to be diagnosed, but on average, patients were 45 years old when they received a head and neck cancer diagnosis. According to studies by renowned researchers, growing older increases a person's risk of developing this disease or their likelihood of developing it. Therefore, smoking and age are major risk factors for the development of this condition.

Cost of Head and Neck Cancer

The below table showed the direct medical cost and non-medical costs.

Direct cost of treatment

Direct Medical Cost			
Statistics	Mean	Maximum	Minimum
Medication	8896.09	52,000	0
Treatment	394326.77	2,52,6000	0
Lab investigation	49392.56	3,00,000	0
Consultation	4082.89	8400	0
Non-Medical Cost			
Traveling Cost	62695.44	3,80,000	500

Direct cost of treatment

The findings show the direct medical cost of head and neck cancer with consultation fees reflecting what a patient would pay for a private clinic since the HMC hospital does not charge patients for consultations. It is completely free. The average fee for a consultation is 4082 Pakistani Rupees (PKR), and it is dependent on how often the patient attends a private clinic. In all other cases, each visit's consultation fee is 3000 PKR per person. Therefore, the average number after accounting for all the patients is 4082 PKR. The maximum consultation fee that patients must pay is 8400 PKR, which is also the total calculated fee because each individual appointment costs 3000 PKR. On average, a lab investigation costs 49392.56 PKR per individual.

The cost varies depending on the respondent, with the lowest lab investigation cost being zero and the highest patient lab investigation cost being (3 Lacks). A higher lab bill interprets into more patient testing or medical recommendations. Patients can easily cut the expense of lab testing by at least one person if they are aware that cancer has multiple stages (0,4) and perform a self-examination once a month at stage 0 or 1. It is well known that cancer treatments are quite expensive; the study's findings indicate that the average cost of a cancer patient's care is above 5 lacks, or 394326.77 PKR, with a

maximum cost of 2526000 PKR. Despite the fact that most of the time medications are free in all other MTI hospitals, Hayatabad Medical Complex in Peshawar charges an average of 8896.09 PKR for each patient.

Patients with cancer at the Hayatabad Medical Complex in Peshawar can purchase medications for a maximum of 52,000 Pakistani rupees (PKR). The direct expense incurred by patients during their illness, the cost of travel and transportation, is a good example of a non-medical cost. According to the study, the average transportation expense for all respondents, regardless of where they are traveling from within Pakistan, is 62695 PKR. The total cost of all the trips the patient made while ill constitutes the travel expense. For cancer patients, the maximum travel expense is 1.023 million PKR.

Chemotherapy cost of head and neck cancer patients

The chemo cost of head and neck cancer patients at different stages is as follows

Average cost of chemotherapy at different age groups

Stage of disease	Above 40	25-40	Less than 25
0	0.00	0.00	0.00
1	48790	0.00	0.00
2	200345.09	31777.95	26000
3	65832.96	75880	49372.39
4	57944.66	230000	44900

The study's findings show that with the exception of patients older than 40 at stage one, who must pay PKR 48790 all at once for chemotherapy, stage zero and stage one patients do not incur any costs for chemotherapy. Chemotherapy is not necessary for patients in the zero stage. Hence, there is no cost at this level. The average cost of treatment for stage one through all groups is 25626 PKR all at once for chemotherapy. Patients under the age of 40 do not require chemotherapy; hence, there is no charge at any point. Patients under 40 recover quickly without chemotherapy because of this. Patients over 40 years old pay the most at stage two, indicating that the frequency of recovery for patients over that age limit at stage one is quite low and that stage two's cost is therefore the greatest of all.

Surgery Cost at different stages

The below table shows the results of the highest surgery cost at various stages of each age group.

Surgery Cost at different stages

Stage of disease	Above 40	25-40	Less than 25
0	97105.87	69572.64	83333.33
1	27777.67	0.00	0.00
2	41080.59	54822.11	97361
3	44613.21	42944.55	47950
4	22110.09	0.00	10000

The findings indicate that patients in the oldest age group those over 40 years old face the stage one surgical costs that are greatest. Patients who are younger in age must also consider the high cost of surgery at the beginning of their sickness. For both age groups under 25 and between 25 and 40, the cost of surgery for head and neck cancer in its early stages is nothing. Only patients older than 40 years old must pay 27,777 PKR for stage-one surgery. Due to small ailments, some people do not require surgery, and the cost is correlated with the length of the illness. The most expensive step of surgery for patients under the age of 25 is stage 2, whereas stage 4 only costs 10,000 PKR. The average one-time cost of surgery for (HNC) patients under the age of 25 is 55,050 PKR, which ranks as the second-highest total cost for surgery among all patients.

Radiotherapy cost

Radiotherapy cost with different stages

Stage of disease	Above 40	25-40	Less than 25
0	0	0	0
1	28000	0	0
2	264621.23	185000	0
3	555842.09	290000	0
4	1050000	139777.23	422221.31

The study findings show that with the exception of individuals older than 40 at stage one, who must pay PKR 28000 in full for radiotherapy, stage zero and stage one patients do not incur any costs

for radiotherapy. The cost for patients in the same age group at stage 2 was 264621.23 PKR, stage 3 was 555842.09 PKR, and stage 4 was the most expensive. Radiotherapy is not necessary for patients who are in the zero stage. Patients between the ages of 25 and 40 must pay 185,000 at stage 2, 290000 PKR at stage 3, and 139777 at stage 4.

Indirect Cost

The number of working days lost by the employee multiplied by the wage rate was used to compute the indirect cost, which was then converted to a monthly cost. This is also the person's opportunity cost. Since there are few patients who are unemployed, the study's findings indicate that the minimal cost was zero. However, the average opportunity cost per month for patients who are not employed is 4883.26 PKR, while the average monthly cost for employed patients was 57,000 PKR.

Intangible Cost

In essence, the term "intangible cost" describes a combination of anxiety, discomfort, psychological suffering, and taking care of one's family. Additionally, fear is measured using five signs.

Fear of head and neck cancer

According to the survey, 85.4% of the patients admitted that they are terrified of dying and of their illness spreading throughout their bodies. Only 10.8% of patients were in normal health and showed no signs of fear. However, 7.4% of patients said they had a small amount of anxiety about this uncertainty. The findings showed that 13.6% of patients indicated anxiety about having an uncertain future and of dying from this disease, which is a significant amount.

HNC patient suffering the physical pain

The findings show that the majority of responders experience moderate discomfort. Tolerable pain is referred to as moderate pain. Few people argued that they experience some minor pain. A sizable portion of responders stated that sufferers are in excruciating discomfort. The poor sensation or pain experienced by head and neck cancer patients represents the disease's indirect and intangible cost, which is clearly noticeable from the information collected.

Emotional Suffering

The study's findings shed light on the mental state of people with head and neck conditions. Only 2.2% of patients did not experience emotional distress. 13 percent of men claimed that the illness has just slightly damaged their emotional state. According to 21.6 percent of patients, emotional suffering is on a level with that of other diseases. 39.4% of the patients had severe emotional distress because of their sickness and their anxiety about several unknowns. Due to illness, 34.9 percent endure severe suffering. This finding suggests that the social environment and families affected by HNC sickness are severely impacted emotionally by this illness. Patients and their families must pay this indirect cost.

Effect on Family Management

The findings indicate that more than 40% of patients' family life management has been severely impacted by their disease. This disruption is caused by hospital visits, which prevent patients from receiving adequate time with their children. The patient is also excluded from his social group due to physical and immune system issues. Some patients must undergo surgery as part of their treatment and because of their severe medical conditions; these individuals spend more time alone and contact fewer family members.

A little over 40% of patients claimed that their family life was significantly impacted. Fewer than 2% of the patients said that their family lives had not been impacted by the sickness. 21.6 percent of patients successfully managed their illness and family obligations and the effects were mild like those of a typical illness.

Determinants of health cost for HNC patients

Variables	Model 1	Model 2	Model 3	Model 4
Constant	-503447.848 (.059)	-402392.95 (.085)	-326780.41 (.054)	-299662.21 (.041)
Age	2264.09 (.840)	1184.20 (.812)		
Education	61578.30 (.607)	40190.20 (.321)	37170.73 (.345)	
Monthly Income	4.127 (.091)	3.995 (.061)	4.016 (.051)	3.019 (.063)

Treatment duration	56817.93 (0.000)	56916.21 (0.000)	57214.66 (0.000)	57134.98 (0.000)
Smoking	276975.12 (.003)	272814.90 (.003)	278193.37 (.003)	275859.46 (.004)
Physical Exercise	19224.96 (.033)			
Healthy Diet	180099.43 (.042)	180910.54 (.041)	181089.43 (.066)	180015.22 (.047)
Number of Visits	-1078.31 (0.000)	-1114.42 (0.000)	-1034.52 (0.000)	-9436.52 (0.000)
Dummy for stage 1	301249.21 (.020)	302327.41 (.049)	304144.51 (.024)	311463.98 (.028)
Dummy for stage 2	395436.33 (0.64)	393757.97 (.038)	397921.10 (.040)	400820.17 (0.13)
Dummy for stage 3	296870.91 (.077)	294163.60 (.034)	296480.82 (.034)	303121.79 (.018)
Dummy for stage 4	945961.78 (0.00)	942123.61 (.000)	946865.40 (0.000)	956421.45 (0.000)
R2	.514	.514	.514	.512

P values are in asides

Determinants of health cost for HNC patients

The study's empirical findings indicate a positive correlation between patient age and medical expenses. However, for patients with head and neck cancer, this correlation is statistically insignificant. This can be supported by descriptive statistics, which show that costs are higher for older age groups initially but lower for younger ones, and for later, more advanced stages of sickness, higher age groups' costs are highly variable across all age groups. Therefore, there is no relation between a patient's age and the expense of their medical care. This also implies that the expense for younger individuals may exceed the expense of illness for older ones. As a matter of common sense, patients of lower ages who are in a more advanced stage of illness must be in a very serious condition, and the expense of their illness will increase because of operations and other health costs. While this sort of illness can affect patients of any age extremely quickly and push them to the point of death, there is no apparent correlation between age and the patient's health costs.

The results indicated that the expense of treating head and neck cancer grows as family monthly income among patients rises. Higher-income households spend more money on their health relative to lower-income families, which is the justification for the positive and strong link between income and health costs. A wealthy family's lower share of income going toward medical expenses can occasionally be higher than a poor person's income. The idea behind the correlation between income and health expenditures is that those with higher incomes should expect to spend more on their health. In all four of the study's models, the statistical relationship between income and health costs is substantial, confirming the existence of such a connection. The length of head and neck cancer therapy raises the expense of head and neck cancer, which over time necessitates numerous expensive treatments and therapies. The results are statistically significant, which suggests that the majority of patients with lengthy treatments have had to deal with the high expense of disease in the sample.

In every estimated model with each possible combination of variables, the length of the treatment is highly significant. The expense of treating head and neck cancer patients' health is also positively correlated with smoking. The patient's immune issue, which prevents them from fighting off the sickness way a healthy person's body would, maybe the cause of the consistently strong association between smoking and the cost of illness.

A healthy diet is one of the most significant costs for patients with head and neck cancer, and spending on the patient's health will drive up overall healthcare costs. In all of the study's calculated models, the connection is both significant and favorable. Patients' health costs are unrelated to physical activity. Whether a patient with an HNC continues to exercise or not has no bearing on how much their therapy will cost. Due to the early onset and brief duration of the sickness, even those who do not exercise have had lower health costs. The second, third, and fourth models of the study do not include

the variable physical activity. The results reveal a negative relationship between a high number of visits and the expense of the illness since follow-up prevents the patient from having to pay for advanced head and neck cancer treatments like chemotherapy or surgery. In addition, regular checkups are safer and more cost-effective for this kind of severe disease when there are many visits.

The study's findings indicated a relationship between the head and neck cancer (HNC) stage and medical expense, suggesting that higher stages will incur more medical costs for better and more urgent care. This implies that the cost of medical care will be higher for those who have this type of cancer and are in a more advanced stage of the disease. The results are statistically significant with a p-value of less than 0.05, allowing us to accept the alternative hypothesis that there is a correlation between the stage of the illness and the societal cost of treating head and neck cancer.

CONCLUSION AND RECOMMENDATIONS

Conclusion

In comparison to other parts of Pakistan, KPK and Punjab have more obvious signs of head and neck cancer. This condition is more sensitive to the patients' ages. According to the study's findings, the majority of people discover they have head and neck cancer when it is already advanced. The primary expense incurred by these patients is a direct cost. The financial cost of HNC patients rises because of a lack of education and prevention strategies. Due to Pakistan's minimal promotional efforts, the cost of HNC for the average person has increased.

The study's empirical findings show that the length of treatments has a large and positive impact on the cost of head and neck cancer. Similar to how the severity of the sickness affects prices, patients with more advanced illnesses must pay enormous sums of money, which also has an impact on patients' intangible costs. According to the study, the majority of the patients were from the KPK region, which accounted for 70% of the whole sample's HNC patients. The capital region of Pakistan came in second with 11% of the study's patients. The age range above 40 years old is where this condition is usually found. In the sample of data for the study that was collected, most of the patients with this condition are married.

According to the study, 43 percent of patients with head and neck cancer are in stage two, while 34 percent are in stage three. The majority of patients are paying enormous costs for this problem, both economically and socially. For individuals in a more advanced stage, the treatment is very expensive. The most deadly stage of this condition, stage 4, is only present in 14% of patients. People's budgets may be completely strained by the cost of head and neck cancer care and treatment. The study discovered that these patients pay significant direct fees for their medical care.

According to the majority of respondents, patients with head and neck cancer face significant intangible burdens. This finding suggests that the majority of study participants have many psychological issues because of their illnesses. The despair brought on by head and neck cancer is the main cause of this psychological burden. In general, the immediate cost of treatment for patients with head and neck cancer (HNC) is a significant hurdle they must overcome.

Recommendation

The government must launch awareness campaigns for cancer prevention and treatment. Patients will pay less for treatment and lab testing. The majority of costs can be decreased by screening-based prevention. Patients with head and neck cancer pay the majority of their expenses directly. In order to support the direct cost components of treating head and neck cancer, there is a necessity for a rational policy on the subject. Effective advocacy and cooperation with interest groups could accomplish this by raising the necessary funds to lower the cost of direct treatment.

The study suggests awareness campaigns that will concentrate on disease prevention while also emphasizing patient engagement to lessen psychological problems, which will assist lower the intangible expenses, associated with head and neck cancer patients. Additionally, it is critical to build new cancer hospitals in KPK and expand the nation's existing cancer treatment facilities by adding beds. Investment in diagnostic hospitals and HNC treatment facilities should also be a priority in the government budget.

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