

Socio-Economic Exclusion of NCDs (Non-Communicable Disease): A Case Study of Cancer

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Abstract

Cancer is identified as an essential health problem in world-wide along with high level of socio-economic burden to individuals along with poverty and vulnerability. The objective of this study was to analyze occurrence of NCDs, particularly cancer along with associated risk factors such as, socio-economic, demographic, lifestyle, and smoking or using several types of drugs, and their effects for the development of cancer and the consequences for creating socio-economic excludability, poverty, and vulnerability to cancer patients. Data was collected from oncology departments of seven different hospitals for thirteen types of cancer for both men and women through questionnaires from Karachi and Quetta. The study explored the factors that leads to social exclusion of cancer treatment as well as those determinants that effect the poor population into impoverishment and vulnerability. The findings from logistic regression indicates most of the independent variables significantly explain log of odds for the respondents (patients) in favor of dependent variables.

Key words: Social exclusion, NCDs, Cancer, socio-economic status

JEL classification: F19, M3

1. Introduction

Social exclusion refers to ways in which individuals may become cut off from full involvement in the wider society. It focuses attention on a broad range of factors that prevent individuals or groups from having opportunities open to most of the population. To live healthy life, individuals must not only be able to feed, clothe and house but should also have access to essential goods and services such as education, health, transportation, insurance, social security, banking and even access to the police or judiciary (Harold et. al, 2004). Social exclusion is not accidental but systematic –it is result of structural features of society. The social exclusion is involuntary –that is in practiced regardless of the wishes of those who are excluded (Frances et. al, 2016). Comprehensively, “Social exclusion” is a broader concept than poverty, encompassing not only low material means but the inability to participate effectively in economic,

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social, political and cultural life and in some characterization's alienation and distance from mainstream society" (Duffy, 1995).

There is no choice left for a person as health care is considered as a basic need. Every individual will have to pay for this basic need as to save his/ her from suffering of any risk factor that cause death stress disability and wage loss (Schulz, et. al, 2004). The health of an individual is considered as basic human right to achieve suitable living standard explain by world declaration of human rights. This right relates to attainment of health standards at individual as well as household level. It means an acceptable threshold level is set among the individuals for the accessibility of health facilities and all the humans are treated equally for the utilization of health services because one of the most promising indicators of discrimination and inequalities in the societies is based on health inequality. That's why these health inequalities within and across the jurisdiction is due to the low capacity to pay which is also known as catastrophic costs, (XU.et al 2003). Based on which they become socio-economically excluded of individual on the basis of health.

The access to the basic health care facility is essential to make a comparison between cost of health facilities and available resources at household level. Sometimes health care expenditures for poor household are very low because they don't have access to the health care facilities. The unaffordable health services with respect to income and availability of resources is used as a proxy of health inequities in a certain country for a specific period in which household would have to face financial burden (Groome, 2006). According to (WHO, 2009)

“Health is not just merely the absence of disease, but it is a complete physical mental and social well-being of an individual”.

It means it's the basic right of every individual to access health provision and it should become mandatory for government to provide health services to its citizens at all levels without discrimination. Those who are socially excluded in the society are vulnerable to financial risk and social status and they are exposed to the risk factors because of challenges faced by health systems, (Santan, 2002).

Generally, there are considered two types of individuals in the society: special and general where special are those who are living in rural areas and includes poor of the

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society, the other category of those who are not disadvantaged in terms of health access because of their location but they are also facing the problem in identification of proper type of care at a time of need. The poor people have less access to the basic needs specially health facilities in comparison to the rich ones. At world level it has been considered that the medical care considered to be special one because it is the dignified right of every individual without any discrimination of income, (Fleubary et. al, 2007 and Victor,2011).

If income disparity persists in the society than only those households can afford health facilities which have sufficient resources and others are socially excluded and economically deprived. To avoid this exclusion there must be health equity across the individuals irrespective of their financial status that would protect people from financial and non-financial risk factor. The financial risk factor considered as medical expenditure that may cause economic exclusion and intensity of non-communicable diseases (NCDs) may push to social exclusion prevalence to individuals.

Overview of Non-communicable Disease

Noncommunicable diseases (NCDs), also known as chronic diseases that based on long duration medical care and influenced by genetic, physiological, environmental, and behavioral factors. The major types of NCDs are cardiovascular diseases (heart attacks and stroke), cancers, chronic respiratory diseases (such as chronic obstructive pulmonary disease and asthma) and diabetes. NCDs disproportionately affect people in low- and middle-income countries where 32 million of deaths occurs by NCDs (WHO, 2015). So the NCDs become the leading cause of death in world.

Since few decades the developed and the developing states experienced fast variations in epidemiological and demographic change, which led to a rise in chronic non-communicable diseases along with economic burden in developed and particularly in developing countries of the globe. (Engelgau et.al, 2011). Generally, the word “chronic disease” and “non-communicable disease” are used as synonymous. CVD, Cancer, Chronic respiratory diseases, Diabetes and mental illness (anxiety, depression, hyper tensions) are affecting world seriously with upward trend. NCD’s are also consist of

chronic kidney problems, arthritis, bronchitis, musculoskeletal, neurological, breast cancer, osteoporosis etc. (Boutayeb,2010 and WHO, 2013).

The world-wide burden and risk of noncommunicable diseases found to be a great challenge for development in the twenty-first century, through undermining social and economic development at world level and it threatens the accomplishment of internationally agreed development goals in low-income and middle-income countries. An estimated 36 million deaths, or 63 percent of the 57 million deaths that occurred globally in 2008, were due to noncommunicable diseases, comprising mainly cardiovascular diseases 48 percent, cancers 21 percent, chronic respiratory diseases 12 percent and diabetes 3.5 percent. (WHO, 2012). In 2008, around 80 percent of all deaths (29 million) from noncommunicable diseases occurred in low-income and middle-income countries, and a higher proportion 48 percent of the deaths in the latter countries are premature (under the age of 70) compared to high-income countries 26 percent, (Boutayeb, 2010).

It has been observed that there was a 15 percent global perk up of NCD's between 2010-2020, particularly in South East Asia and East Mediterranean Regions which raised by 20 percent. The finding showed that approximately 80 percent NCD's deaths occur in Less Developed countries (LDC) among this 29 percent NCD's deaths are untimely deaths that occurs earlier then the age of 60 or 70. (GBD, 2010 and WHO, 2015).

Noncommunicable diseases (NCDs) are the leading cause of death in the WHO South-East Asia Region. Each year, an estimated 7.9 million lives are lost due to NCDs, accounting for 55 percent of all deaths. Furthermore, NCDs claim lives at a younger age in the South-East Asia Region compared to the other WHO regions. In 2008, the proportion of NCD deaths occurring among people under the age of 60 was 34 percent, compared to 23 percent in the rest of the world. Cardiovascular diseases are the most frequent cause of NCD deaths, followed by chronic respiratory diseases, cancers, and diabetes. (WHO, 2013). However, the world-wide burden of non-communicable diseases (NCDs) keep excessively rising and accounted for 57 million losses about 71 percent of all deaths in the world. Among the total deaths 15 million were between (30-70) years old. Similarly, the NCDs burden were unacceptably in rising trend among the low and middle income countries, accounting approximately 78 percent of all deaths and 85 percent of pre-matured mortality in the world, (WHO, 2018).

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The long-term treatment cost and high out-of-pocket payments, NCDs may result into catastrophic health expenditures and impoverishment. (WHO, 2013). In India, the share of out-of-pocket expenditure due to NCDs increased from 32 percent in 1995 to 47 percent in 2004 and these expenditures were 40 percent financed through household borrowing and sale of assets, (Mahal, et. al, 2010). In addition to exacerbating household poverty, NCDs and their risk factors exact a huge toll on national economies.

NCDs in Pakistan are on the rise when compared to other Asian countries, about 52.1 percent males and 53 percent females died of NCDs in Pakistan under the age of 70, (WHO, 2014). Compared to other countries, the death ratio of male to female in India was 62 percent and 52.2 percent, in China it was 39.7 percent and 31.9 percent, in Bangladesh 49 percent and 49.6 percent, in Sri Lanka 48.8 percent and 35.8 percent and in Thailand it was 45.5 percent and 38.7 percent, respectively, (Engelgau, et. al, 2011). These figures indicate that Pakistan has a greater percentage of deaths due to NCDs. It is alarming because there is limited awareness and almost no efforts are made to prevent such diseases. Pakistan is ranked in the top 10 countries globally for people with diabetes aged 20 to 79 years with high prevalence of diabetes in Pakistan and almost 50 percent undiagnosed individuals. In case of Pakistan NCDs is becoming the leading cause of mortality and accounted responsible for 58 percent of all deaths in the country, among which CVDs related deaths were the highest proportion almost covering 29 percent of all losses and about 8 percent of total mortality were occurred due to cancer in the region. Comparing with neighboring countries Pakistan and Afghanistan share the same rate of cancer, for both of the regions the ratio of cancer related deaths are 8 percent, while deaths due to CVDs are 21 percent in Afghanistan and higher in Pakistan. Furthermore, about 63 percent of all deaths in India are occurred due to non-communicable diseases and 27 percent of them are due to CVDs and 9 percent of the deaths are owing to cancer in India, (WHO, 2018).

2. Economic Consequences of NCDs (Cancer)

Non-communicable diseases are not only the cause of premature mortality and morbidity, but it decreases the quality of life of the effected individuals (Suhrcke et.al, 2005). Non-communicable diseases have social and health care consequences at a large

level along with adverse economic impacts on individuals, families, health system and society as well, (Boutayeb, 2010). Individuals have to bear high economic costs in terms of direct (out of pocket expenditure) and indirect (loss of productivity) also by pushing them into the poverty trap because the individuals with NCD's have to spend higher proportion of their income on its treatment, (Parta et.al, 2007). Non-communicable diseases have serious impact on health and wealth of the people of low-middle income countries, (Strong, 2005). Reduction in their productivity that leads to loss in potential earning because a chronic condition effects the people of the younger and productive ages of the low-middle countries, and about 80 % of deaths are due to chronic conditions in productive ages, (Miranda et.al, 2008; and McLennan and Jayaweera, 2014). All this revealed that the occurrence and incidence of chronic non-communicable diseases make then burden for economies which need the urgent action to avoid adverse impact on national socio-economic development of any nation of the world.

2.1 Rational of the Study

According to the International agency for research on cancer (IARC) 14.1 million cases papered in 2012 world-wide among which majority of the cases 8 million have been recorded in less develop countries, which is surrounding 82 percent population of universe. (Torre *et al.*, 2015). NCDs in Pakistan are on the rise when compared to other Asian countries. 52.1% males and 53% females die of NCDs in Pakistan under the age of 70 as per research conducted by WHO in 2014. There are number of risk factors that seem to have countless effects for developing cancer such that using drugs, smoking, exposure of work, stress and these are also incorporated in the data set, but limitation is that “eating out” is not included in the data set. Accurate measure to measure physical activity variable is not present like walking, exercise etc. that's why we take work status and occupation variable in terms of to measure physical activity. Finally, we cannot measure the intermediate risk factors like (Raised blood pressure, pain, weight and raised blood glucose) also there is no such type of question in this data set. Regardless of these certain data limitations, present study tries to capture all possible indicators and make best utilization of them to study socio-economic exclusion due to cancer. So, increase in prevalence of chronic non-communicable diseases (NCDs) has turned into

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a worldwide threat that causing great number of deaths and disabilities among individuals. Pakistan being a developing country is going through an epidemiological and demographic transition. It also faces double burden of diseases based upon communicable and non-communicable diseases (Afzal and Yusuf, 2013). Due to the gradual shift from communicable to non-communicable diseases (NCD's): like cardiovascular disease, Cancer, Respiratory problems, Diabetes, Mental problems, Renal/Kidney problems which become the major cause of mortality and morbidity in Pakistan. Around 5% of the population of Pakistan is suffering from NCD's, and these are highly dominant in Middle Ages (Wasay et.al, 2014). Literature reveals that risk factors like unhealthy diet, obesity, sedentary life, smoking, use of Alcohol, physical activity all leads to chronic non communicable diseases and individuals must bear illness cost both through direct medical expenses and indirect in terms of loss of productivity. Chronic illness cost not only burden on individual but also on households and ultimately on society. It also decreases quality of life and lowers life expectancy by increasing mortality, (Adeyi et.al, 2008). According to Jafar et.al, (2013), between 2010 to 2025 there will be around 3.87 million deaths in Pakistan were due to the non-communicable diseases among people of ages 30-65.

2.2 Gap

There is a need of serious analysis due to the emerging risk of the non-communicable diseases and all the above stated reasons. With best of our knowledge these risk factor along either economic and/or social perspectives are never being address earlier in case of Pakistan specifically. The present study tried to identify the possible determinants regarding the socio-economic exclusion of non-communicable diseases by taking cancer as the case study. The researcher investigates the impact of different type of cancers along with their socio-economic impacts on individuals living in Baluchistan and Sindh provinces. This study also creates evidence on the prevalence, causes and possible cost and consequences that will aid the policy makers for priorities settings in health sector.

3. Data and Empirical Analysis

In accordance with the objective for this study primary data has been collected from the cancer patients who are being diagnosed from the different hospitals located in Karachi (Sindh) and Quetta (Baluchistan). The data set has been composed information to the respondents through questioners by asking them about the household members, their socio-economic, demographic information along with behavioral risks and the risk factors associated to cancer, in order to search out the determining factors of cancer along with different socio-economic burden of cancer. Where N is the total sample size or the addition of $n_1+n_2+n_3+n_4+\dots+n_7$, collected from the population of cancer patients. To clarify here, $n_1\dots n_7$ are the oncology department of seven different hospitals in Sindh (Karachi) and Baluchistan (Quetta) and elaborated in detail in table 1. The table.1 represents data on cancer patient are collected from the seven different hospital in Sindh (Karachi) and Baluchistan (Quetta), among the total sample size of 500 cancer respondents (patients) 350 are interviewed from six different hospitals in Karachi, from them 150 respondents (patients) were interviewed from the oncology department of Jinnah Postgraduate Medical Center only.

3.1 Theoretical background and Conceptual framework of the study

The study is conducted with the objective to investigate the individuals who are socially and economically excluded from the society due to the incidence of cancer from Baluchistan and Sindh. Socio-economic exclusion prevailed among the individuals who can't wholly contribute to society because of, "*the denial of civil, political, social, economic and cultural rights.*" Therefore, "*a combination of linked problems such as unemployment, poor skills, low incomes, poor housing, bad health and family breakdown.*" (EU, 2015). The highlighted reason will become the further consequences for the incidence of chronic diseases like cancer will create poverty, double the financial burden, along with deprivation & vulnerability among the individuals. Fatemeh et.al, (2015). The socio-economic exclusion has several types of dimensions along with different types of determinants. However, in this case we have chosen the distributional dimensions or known as the economic exclusion. Which refers to the unavailability of basic need and materials goods, lifestyle deprivation, problematic debts, and catastrophic health care costs due to chronic diseases.

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Table 1: Stratification of Data

S.NO	Name of Hospital	Male%	Female%	Total
1	Jinnah Postgraduate Medical Center Karachi	53	47	150
2	Bait-ul-Sukoon Cancer Hospital	54	46	50
3	Indus Hospital Karachi	70	30	50
4	Aga Khan University, Hospital Karachi	68	32	50
5	Cancer Foundation Hospital Karachi	44	56	25
6	Civil Hospital Karachi	56	44	25
7	Bolan Medical Complex Hospital Quetta	51	49	150
Total	Seven Hospital	54	46	500

For the development of conceptual model, it has been observed that numerous natures of risk factors are seemed to increase the likelihood of being socio-economically excluded. For instance, either being socially excluded can be due to ill health or chronic disease (cancer) and then poverty and vulnerability or illness become the reason to exclude an individual from distributional perspective. Such that an individual with chronic diseases like cancer must bear high level of costs, borrowing, and selling out the assets to cover the disastrous costs of treatment. Whereas the illness such as cancer put the individual at the higher risk of mortality and morbidity, in case of morbidity the probability of market excludability along with less efficiency and low wage may generate poverty, exclusion, deprivation and vulnerability. Consequently, such population witnessed to have cancer with higher rate of diagnosed at their radical stages, Megan et.al, (2017). A strong association has been observed between several types of cancer and poverty with lower survival rate. Almost the ratio of two out of three cancer related mortality occurred among the socio-economically lower class due to smoking, poor diet, exposure with cancerous related work such that (coal workers) with higher rate of lung cancer. However, poor lifestyle, and lack of access to avail screening test due to high costs in private sector in developed region whereas in developing region the public sector is reasonably not well-organized to deliver efficiently, Francis et.al, (2016). There are different risk factors which are known the

responsible for the development of different types of chronic diseases. “A *risk factor to any attributes, characteristics, or exposure of an individual will increase the likelihood of developing non-communicable diseases.*” (WHO, 2001).

Moreover, the burden will prevail from the individual to society and country level along with disturbance of different indicators. Various studies suggest that cancer disparities are driven by a complex set of social, economic, cultural, and health system factors, Harold et.al, (2004). Such factors finally create economic deficiency and material deprivation (goods & services) and become worse due to chronic illness with unaffordable economic costs and double burden in case of poor and lower socio-economically lower class. Because of such diseases people with lower class become more vulnerable, impoverished, accompanied with poverty and deprivation, and finally become the part of distributional exclusion. The cycle is swinging from poverty to chronic diseases (as poverty itself considered one of the risk factors for the development of several diseases) to vulnerability, impoverished, and socio-economic exclusion.

Rapid increase and development in modernization and urbanization along with rural-urban migration seem to have inverse impact on health-related risk factors which can be considered the main causes for the development of diseases like cancer (Oyebode *et al.*, 2015). Cancer is rising in urban and rural population, but the intensity is higher in urban population due to number of exposures (Tchengui and Kengne, 2011). Therefore region and province of respondents and individuals from different household are taken as place of the resident in this study. For this reason, both variable (urban and rural) is used as independent variable, for region: 1=urban and 0=rural, while for provinces, 1=Balochistan, 2=Sindh, 3=KPK, 4= Punjab, 5=GB. Among the demographic factors age is an important variable which plays a vital role in individuals' life. Age is taken as independent variable and comprised of, 1=Less than 18-year, 2= Between 18-54 years, and 3=55 years and above.

A significance role of gender can be observed among the individuals who are caused by cancer. Stevns.et.al (2012) believed that the risk of being a cancer patient is higher among the men compare to women. The individual gender is considered as explanatory variable to find out the gender base difference. This variable is defined in binary form as: 1 = Male and 2= Female.

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Literature shows that being married is highly associated with chronic diseases (Druss *et al.*, 2001), a married person is at high risk to have heart problem, mood disorder, hypertension, and cancer (Mafuya *et al.*, 2013), similarly a married individual likely to be vulnerable modifiable risk that increase the risk of chronic disease such that cancer later. In order to check this deferential, we take marital status as: 1=married, 2= Unmarried, 3= Others means that (widow and divorced).

Education is used as a proxy variable for an individual's socioeconomic status in a society. It has been observed that low socio-economic position is based on education, which increase the risk of different diseases like cancer without early diagnosed (Nawi *et al.*, 2006). To measure the relationship, individual's education is taken as explanatory variable and converted into eight groups: 1= no education, 2=primary education (1-5 classes), 3=middle classes (6-8 classes), 4=secondary education (9-10 classes), 5= intermediate (11-12 classes), 6= bachelor education (13-14), 7= graduation (15-16).

The cost of treatment consists of those born due to cancer such as, check-up costs, medicines expenses, injections, laboratory tests, surgery, transportation costs and costs on stay and accommodations are also accumulated in this question. However, we have not incorporated the costs due to the loss of work, care giver cost and other similar opportunity costs likely productivity loss are not calculated in this question. While for insurance and health coverage we have select Bait-ul-mal, Armed Force Health Insurance Coverage (AFHIC), Civil Service Health Insurance Coverage (CSHIC), and "Others). In this question "others" are consisting of those who are benefiting a small proportion of their treatment costs by pleading through social media, from different donor agency and trusts, or help from the surrounding in rural areas as they know each another all are included in "other" portion. The different types of cancer incidence among the individuals taking treatment in Karachi and Quetta for both male and female are tabulated to estimate the proportions. The several types of cancer along with their stages among the women in this sample size are calculated to find the ratio for the women patient.

According to global status report (2010), there are more chances for poor to be victimized by cancer compare to non-poor for the reason that poor have more exposures to behavioral and health risk along with very low level of access to better quality of

health care related services. To find out the relationship of poverty level of household with the chronic diseases such as cancer, it is considered as: 0=poor and 1=non-poor (those who are jobless or earn less than 10,000 per month), while (those who are earn more than 10,000 are considered non-poor), it is also taken as independent variable. According to literatures there is strong positive association between the smoking and cancer and particularly to mouth and lung cancer, mortality increase with an increase in the number of cigarettes smoke per day (Doll & Peto , 2000). There are 1.3 billion smokers globally (Guindon & Boisclair, 2003). It is taken as independent variable and defined into two categories 1=Yes, 2=No. According to (Durstine *et al.*, (2013) physical inactivity is one the most vital modifiable risk factor for the numerous cases of mortality owing to chromonic diseases like cancer (Larry *et al.*, 2013). We also investigate about their work status, occupation, and their type of work. Moreover, the work status only focuses the individuals who are working and taken as independent variable by classifying it into the given categories: 1= Employed, 2= Unemployed, 3= Retried, 4= Other. While the occupation is also taken as an explanatory variable and classified into the given categories: 1= Farmer, 2= Businessmen, 3= Civil Servant, 4= Armed Force, and 5= Other. Remembering that the “others” are those who working daily wages, as labor or indulged with any institution other than public sector, moreover the housewives are also kept in the categories of “others).

The time duration of absenteeism from work due to different types of cancer, among the patients of both gender expressed that the total sample size of 500 cancer patients, 482 respondents are included in this question with different time of absentees due to cancer. For work and absenteeism portion we have not only included those as wage earner, but also, we have incorporated those who are self-employed, shopkeeper, daily wage workers, housewife, individuals with elder age as helper in house garden, and house helper in family circle are also included and their absentees are considered as the material and non-material loss for the individuals with cancer incidence.²

3.1 Estimation Technique

After the detailed data analysis and description now, we must check the linkages between our dependent and independent variables. The generalized form of logistic

² Descriptive analysis of the data is provided on request.

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model is introduced in 3.2 donated by Y and the vector of independent regressor is X and β is vector of all coefficient's parameters.

$$\log\left(\frac{y}{1-y}\right) = XB \quad (4.4.2.1)$$

$$\left(\frac{y}{1-y}\right) = e^{x\beta}$$

$$y = (1-y)e^{x\beta}$$

$$y = e^{x\beta} - e^{x\beta}y$$

$$y + e^{x\beta}y = e^{x\beta}$$

$$(1 + e^{x\beta})y = e^{x\beta}$$

$$y = \frac{e^{x\beta}}{1 + e^{x\beta}}$$

We have used bivariate logistics regression model to capture the association between dependent and independent variables and study the socio-economic exclusion among the individuals with cancer diseases.

The functional form of binary model is as follows: Poverty = f (Age, Gender, Marital Status, ES, Occupation, Years of Education, Costs of Treatment, Stage of Cancer, Absenteeism from work, Insurance Coverage, Assets, Risk Factors). The binary model can be expressed as follows:

$$poor\left(\frac{1}{0}\right) = \beta_0 + \beta_1X_1 + \beta_2X_2 + \beta_3X_3 + \beta_4X_4 + \beta_5X_5 + \beta_6X_6 + \beta_7X_7 + \beta_8X_8 + \beta_9X_9 + \beta_{10}X_{10} + \beta_{11}X_{11} + \beta_{12}X_{12} + \mu \dots \dots \dots (4.5.1.1)$$

$$Non - poor\left(\frac{1}{0}\right) = \beta_0 + \beta_1X_1 + \beta_2X_2 + \beta_3X_3 + \beta_4X_4 + \beta_5X_5 + \beta_6X_6 + \beta_7X_7 + \beta_8X_8 + \beta_9X_9 + \beta_{10}X_{10} + \beta_{11}X_{11} + \beta_{12}X_{12} + \mu \dots \dots \dots (4.5.1.2)$$

In this study poverty is taken as the dependent variable and it is constructed in binary form (1, 0); As 1= Patients without monthly income (jobless) or earning less than

10,000 per month, and 0= patients earning more than 10,000. The patients without monthly income and jobless or earning less than 10,000 per month are considered poor, while the respondents (patients) who are earning more than 10,000 are considered non-poor.

4. Estimations and Results

To examine the determinant of socio-economic exclusion of poor population due to prevalence of cancer we use logistic regression model from equation 2 that based on functional equation 1 as explained. On left side we have taken a dependent variable that capture the household income of respondent along with right hand side independent variables age, employment status, gender, marital status, occupation of respondents, insurance coverage from different sources, cost of treatment, stage of cancer, absenteeism from work (loss of productivity), risk factor that are associated with cancer and years of education.

The results of the logistic regression show that all the independent variables contributing significantly to explaining the log of odds for the respondents in favor of non-poor except *age, yoe, soc and assets*. The estimates in the table tell the amount of increase in the predicted log odds of being non-poor = 1 that would be predicted by a 1 unit increase in the predictor, holding all other predictors constant. The interpretation of the predictors using odd ratios is as follows:

To interpret the result for gender, where 0 assign to female and 1 to male. When the odds ratio is less than 1, it describes a negative relationship. We can say that when respondent is male the odds in favor of non-poor would be 0.014 times less than when the respondent is female. *Marital status* (MS) takes value 1 for the respondent who is married and 0 for unmarried. The value of odd ratio 0.257 is less than 1, it describes a negative relationship. When respondent is married the odds in favor of non-poor would be 0.257 times less than when the respondent is unmarried. *Employment Status* (ES) takes value 1 for employed and 0 for an unemployed respondent. The odds ratio is less than 1 i.e., 0.003 which suggests a negative relationship between employment status and social exclusion. When respondent is employed, the odds in favor of non-poor would be 0.003 times less than when he is unemployed.

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Table 2: Logistic Regression Results

VARIABLES	LOGISTIC REGRESSION RESULTS
AGE	1.214
	(0.304)
GENDER	.014***
	(0.010)
MS	.257**
	(0.147)
ES	.003**
	(.007)
OCCUP	.052*
	(.081)
YOE	.856
	(0.148)
COT	1.342*
	(0.220)
SOC	.823
	(0.117)
AFW	1.019***
	(0.110)
IC	.748***
	(0.082)
ASSETS	.834
	(0.102)
RF	1.566***
	(0.266)
Constant	1.51***
	(0.225)
Observations	480

Standard errors in parentheses and *** p<0.01, ** p<0.05, * p<0.1

The odd ratio for *Occupation (OCCUP)* is 0.052, it describes that when respondent belongs to any profession then odds in favor of non-poor would be 0.052 times less than when the respondent does not belong to any profession. The odd ratio 1.32 for *COT* describes a positive relationship between cost of treatment and social exclusion. So, we can say that when respondent's *COT* increases from 1000-40000 and above, the odds in favor of non-poor would increase by 0.34 times. The odds ratio for Absenteeism from work (*AFW*) is 1.019 which means that as the duration of respondent's absenteeism from work increases the odd in favor of non-poor would increase by 0.019. Odd ratio for Insurance coverage (*IC*) is 0.748 suggests a negative relationship between insurance coverage and social exclusion. When respondent has *IC* the odd in favor of non-poor would be 0.748 times less than when the respondent has not any *IC*. The odd ratio 1.566, shows that when respondent is exposed to any risk factor e.g. stress full, sedentary, physical active, exposure to workplace and tobacco use, odds in favor of non-poor would be 0.57 times more than when the respondent is not exposed to any risk factor. The p-value of likelihood ratio test show that overall model is significant and pseudo R² value 0.67 means there is 67 percent source of variation in social exclusion which is explained by the predictors used in the study.

5. Conclusion

Access to health facilities is basic right of every human being and health care is considered as basic need of the people that are living in a particular society. The NCD's are not the part of national health policy of Pakistan but it is one of the major goals of SDG's because the prevalence rate of cancer is increasing at increasing rate in low-income countries and every individual of these societies are suffering the risk factors that are associated with this disease. Due to high cost of cancer treatment the individual of the societies become the vulnerable part of respective nation. As income disparities persist in the developing countries so that those household who are affected by NCD's specifically cancer cannot afford to cure this disease because of insufficient resources that ultimately leads to social exclusion and economic deprivation.

The impoverished people have limited access to the basic need facilities especially health in comparison to high income group. However, at global level the medical care has been considered as a special case and become the dignified right of every individual that are living in a particular society without any fear and favor. To avoid this social

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exclusion there must be health equity across the individuals irrespective of their economic condition whether they are facing financial and non-financial risk factors or not. The financial risk factors are based on medical expenditures that are associated with cost of treatment and may cause economic exclusion of respondent. The intensity and prevalence of cancer might push the individual to social exclusion over the time.

The main objective of this study is to know how household are facing impoverishment due to NCD's while they are being admitted in the hospitals for the treatment of cancer. Not only the respondent is facing economic and social exclusion due to this disease and unaffordability of treatment but also other members of household are being vulnerable due to productivity loss while they are at treatment place with the respondent. In this analysis we have included seven hospitals of Sindh and Baluchistan comprises of the sample of different regions as explained in section data and methodology. The study has incorporated the structured questionnaire and interviews that were conducted from the patients and their attendants. The analysis is based on logistic regression with binary dependent variable that 1 is for non-poor and 0 for others. The households deplete their available assets and as a result impoverishment and loss of earning are being faced by the household. Although cancer is not being a death cause disease in resourceful countries but due to lack of trainings and precautionary measures it become a threat for policy maker because approximately 78 percent of all deaths and 85 percent of premature mortality is due to NCD's in low- and middle-income countries (WHO, 2018). The NCD's in Pakistan is increasing at rapid rate as compared to other Asian countries and it became an alarming situation as there is no awareness programs that might educate the individuals about such diseases. Non-communicable diseases due to its chronic nature is one of the most heated and important issue in the context of Pakistan. In this study we have two hypotheses that are accepted and significantly affect the poor population as explained in our estimations. The reason for its importance is that Pakistan is one of the nations where approximately 50% of population is suffering from chronic non-communicable diseases namely heart/BP, respiratory, cancer, mental illness, diabetes, and renal/kidney, (Jafar et.al, 2013).

Policy Implication

The global burden of cancer incidence highlights that half of the newly diagnosed incidence, and more than half of deaths due to cancer in world-wide are estimated to occurred in Asia, as a reason for covering 60 percent of the global population. Pakistan, being a developing and low middle income country is facing rise in the occurrence of non-communicable diseases (NCDs) at the large scale and it has become a major health issue in the region. For this purpose, we have the following suggestions based on the findings of our study.

- There is a need of strategy of early screening, so we might avoid this moral hazard of chronic epidemic.
- There must be association between national, provincial, and local level needs of health facilities that might be provided for the control of these NCD's which become a threat for low-income countries like Pakistan due to high mortality rates.
- In our analysis we have not find proper registry of NCD's patients at government level and Pakistan health policy only focus on communicable diseases which have high incidence rate in past but NCD's is modern era threat and over a year it become a stigma for the societies and reports of IARC mentioned that high mortality rates were observed in case of Pakistan for last decade that was publish in WHO reports 2008, 2013 and 2018. So, first stage to have records of in patients at each hospital irrespective of nature of disease as NCD's registry become indispensable for its care.
- We have found that most of our respondents are excluded from social security coverage either because of less awareness or lengthy process of these insurance programs.
- There is a need of time to frame out strategies for those people who are living at the subsistence level and are not push towards the impoverishment and ultimately become the burden to society or socially excluded from society.
- There must be periodic screening of female at government level because most of our female respondents are feeling ashamed to share their types of cancer at early stages because it relates to breast cancer. Before screening it is essential to aware them that it is not a taboo it's your life! Get tested before it's too late.

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- The SDG's emphasized that every household must be protected against financial risk while taking health care. State would take those measures that are mentioned by WHO to prevent the loss of lives from this NCD's and adaptation of these measures can make respondent productive, and efficiency of economy might rise.
- There must be a counselling programs that educate all family members and others individual of society who are avoiding these patients because of their illness and in our data almost all the respondents are out of social gathering that are held in their families and become psychologically and socially vulnerable. This social exclusion made them a huge burden on economy and society too.
- There must be speedy and efficient insurance securities if someone being diagnose by NCD's because any delay in the process of social coverage leads to loss of life. This economic exclusion can be easily tackled by efficient social security programs for poor and impoverished individuals.
- The year of education that we have taken in our analysis endorse that the asymmetric information matters more than the level of education because with 14 and 16 years of education individuals are highly exposed to this disease along with illiteracy. So, it is not only the duty of government but also private sector to spread symmetric information about cancer to general public irrespective of their educational level. As we are still far behind in terms of talking about chronic disease especially for female and they are being divorced or left by their families after being diagnosed.

References

- Abbas, S. & Kitchlew. A. R. (2009). Disease burden of ischemic heart disease in Pakistan and its risk factors. *Ann Pak Inst Med Sci*, 5(3), 145-50.
- Abegunde, D. O. & Mathers, C. D. (2007). The burden and costs of chronic diseases in low-income and middle-income countries. *The Lancet*, 370(9603), 1929-1938.
- Afzal, U., & Yusuf, A. (2013). The state of health in Pakistan: An overview.
- Asfaw, A. & Braun. J. V. (2004). Is consumption insured against illness? Evidence on vulnerability of households to health shocks in rural Ethiopia *Economic Development and Cultural Change*, 53(1), 115-129.

- Benziger, C. & Roth, P. (2016). The global burden of disease study and the preventable burden of NCD *Global heart*, 11(4), 393-397.
- Boscoe, F. P. & Henry, K. A. (2016). The relationship between cancer incidence, stage and poverty in the United States *International journal of cancer*, 139(3), 607-612.
- Boutayeb, A. (2010). The burden of communicable and non-communicable diseases in developing countries In *Handbook of disease burdens and quality of life measures* (pp. 531-546). Springer, New York, NY.
- Boutayeb, A. & Boutayeb, S. (2013). Multi-morbidity of non-communicable diseases and equity in WHO Eastern Mediterranean countries. *International journal for equity in health*, 12(1), 60.
- Bray, F. & Ferlay, J. (2018). Global Cancer Statistics 2018: GLOBOCAN Estimates of Incidence and Mortality Worldwide for 36 Cancers in 185 Countries *CA: a cancer journal for clinicians*.
- Chaker, L. & Falla, A. (2015). The global impact of non-communicable diseases on macro-economic productivity: a systematic review *European Journal of Epidemiology*, 30(5), 357-395.
- Chongsuvivatwong, V. & Phua, K. H. (2011). Health and health-care systems in southeast Asia: diversity and transitions, *The Lancet*, 377(9763), 429-437.
- Dodani, S. & Mistry, R. (2004). Prevalence and awareness of risk factors and behaviors of coronary heart disease in an urban population of Karachi, the largest city of Pakistan: a community survey. *Journal of public health*, 26(3), 245-249.
- Dye, C. & Reeder, J. (2013). Research for universal health coverage.
- Ebrahim, S. and Smeeth, L. (2005). Non-communicable diseases in low and middle-income countries: a priority or a distraction?.
- El-Saharty, S. & Ahsan, K. (2013). *Tackling noncommunicable diseases in Bangladesh: now is the time* The World Bank.
- Eyles, H. & Murchu, C. N. (2012). Food pricing strategies, population diets, and non-communicable disease: a systematic review of simulation studies *PLoS medicine*, 9(12).
- Farmer, P. & Frenk, J. (2010). Expansion of cancer care and control in countries of low and middle income: a call to action *The Lancet*, 376(9747), 1186-1193.
- Freeman, H. P. (2004). Poverty, culture, and social injustice: determinants of cancer disparities *CA: A Cancer Journal for Clinicians*, 54(2), 72-77.
- Groome, W. & T. Blancher. (2006). Population ageing, the structure of financial markets and policy implications In *DEMOGRAPHY AND FINANCIAL MARKETS* (p. 340).
- Hanif, M. & Zaidi, P. (2009). Institution-based cancer incidence in a local population in Pakistan: nine year data analysis *Asian Pac J Cancer Prev*, 10(2), 227-30.
- Hogan, D. & R. Stevens. (2018). Monitoring universal health coverage within the Sustainable Development Goals: development and baseline data for an index of essential health services *The Lancet Global Health*, 6(2), 152-168.

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- Hosseinpoor, A. R. & Bergen. N. (2012). Socioeconomic inequality in the prevalence of noncommunicable diseases in low-and middle-income countries: results from the World Health Surve. *BMC public health*, 12(1), 474.
- Hvidberg, L. & Pedersen. A. F. (2014). Cancer awareness and socio-economic position: results from a population-based study in Denmark *BMC cancer*, 14(1), 581.
- J, Savery R. & M. Duffy. (1995). Problem based learning: An instructional model and its constructivist framework *Educational technology*, 35(5), 31-38.
- Jafar, T. H. & Haaland. B. A. (2013). Non-communicable diseases and injuries in Pakistan: strategic priorities. *The Lancet*, 381(9885), 2281-2290.
- Jain, A. & Raghavan. R. (2014). Acceptability of, and willingness to pay for, community health insurance in rural India. *Journal of epidemiology and global health*, 4(3), 159-167.
- Jessani, S. & Jafar. T. H. (2014). Prevalence, determinants, and management of chronic kidney disease in Karachi, Pakistan-a community based cross-sectional study. *BMC nephrology*, 15(1), 90.
- K, Xu. & D. Evans. (2003). Household catastrophic health expenditure: a multicounty analysis *The lancet*, 362(9378), 111-117.
- Kankeu, H. T. & Saksena. P. (2013). The financial burden from non-communicable diseases in low-and middle-income countries: a literature review *Health Research Policy and Systems*, 11(1), 31.
- Khan, M. T. & Hashmi. S. (2015). Burden of waterpipe smoking and chewing tobacco use among women of reproductive age group using data from the 2012–13 Pakistan Demographic and Health Survey *BMC public health*, 15(1), 1113.
- Khuwaja, A. K. & Khawaja. S. (2011). Preventable lifestyle risk factors for non-communicable diseases in the Pakistan Adolescents Schools Study 1 (PASS-1), *Journal of Preventive Medicine and Public Health*, 44(5), 210.
- Kim, S. Y. & Park. J. H. (2015). The economic burden of cancer in Korea in 2009 *Asian Pacific journal of cancer prevention: APJCP*, 16(3), 1295-1301
- Kowal, P. & Chatterji. S. (2012). Data resource profile: the World Health Organization Study on global Ageing and adult health (SAGE) *International journal of epidemiology*, 41(6), 1639-1649.
- Lagerlund, M. & Bellocco. R. (2005). Socio-economic factors and breast cancer survival—a population-based cohort study (Sweden) *Cancer Causes & Control*, 16(4), 419-430.
- Lang, H. C. (2010). Willingness to pay for lung cancer treatment *Value in Health*, 13(6), 743-749.
- Lloyd-Sherlock, P. (2008). Public Policy and the Challenge of Chronic Noncommunicable Diseases.

- Malik, A. I. & Badar. F. (2015). Surgically treated rectal cancer patients—Outcomes at a tertiary care cancer hospital in Pakistan *Asian journal of surgery*, 38(1), 13-20.
- Masood, K. & Masood. A. (2015). Trends and analysis of cancer incidence for common male and female cancers in the population of Punjab province of Pakistan during 1984 to 2014 *Asian Pac J Cancer Prev*, 16(13), 5297-304.
- McLennan, A. K. & Jayaweera, H. (2014). Non-communicable diseases and risk factors in migrants from South Asian countries.
- Miranda, J. & J. Kinra. (2008). Non-communicable diseases in low-and middle-income countries: context, determinants and health policy *Tropical Medicine & International Health*, 13(10), 1225-1234.
- Murray, C. & J. Vos. (2012). Disability-adjusted life years (DALYs) for 291 diseases and injuries in 21 regions, 1990–2010: a systematic analysis for the Global Burden of Disease Study 2010 *The lancet*, 380(9859), 2197-2223.
- Schulz, A. & Northridge, M. (2004). Social determinants of health: implications for environmental health promotion *Health Education & Behavior*, 31(4), 455-471.
- Sharpe, K. H. & McMahon. A. D. (2014). Association between socioeconomic factors and cancer risk: a population cohort study in Scotland (1991-2006). *PloS one*, 9(2).
- Shin, Hai-Rim. & Marie. Carlos. (2012). Cancer control in the Asia Pacific region: current status and concerns. *Japanese journal of clinical oncology* 42, 867-881.
- Smith, A. B. & Mancuso. P. (2017). Prostatectomy versus radiotherapy for early-stage prostate cancer (Prepare) study: protocol for a mixed-methods study of treatment decision-making in men with localized prostate cancer *BMJ open*, 7(11).
- Sommer, I. & Griebler. U. (2015). Socioeconomic inequalities in non-communicable diseases and their risk factors: an overview of systematic reviews *BMC public health*, 15(1), 914.
- Suhrcke, M. & McKee. M. (2005). *The contribution of health to the economy in the European Union*. Luxembourg: Office for Official Publications of the European Communities.
- Thakur, J. & S. Prinja. (2011). Social and economic implications of noncommunicable diseases in India *Indian journal of community medicine: official publication of Indian Association of Preventive & Social Medicine*, 36.
- Torre, L. & Bray. F. (2015). Global cancer statistics, 2012 *CA: a cancer journal for clinicians*, 65(2), 87-108.
- Tweed, E. J. & Allardice. G. (2018). Socio-economic inequalities in the incidence of four common cancers: a population-based registry study *Public health*, 154, 1-10.
- Vellakkal, S. & Subramanian. S. V. (2013). Socioeconomic inequalities in non-communicable diseases prevalence in India: disparities between self-reported diagnoses and standardized measures *PloS one*, 8(7).
- Wasay, M. & Khatri. I. (2014). Stroke in south Asian countries *Nature Reviews Neurology*, 10(3), 135.

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- Wasay, M. & Zaidi. S. (2014). Non communicable diseases in Pakistan: burden, challenges and way forward for health care authorities.
- World Health Organization. (2009). WHO guide to identifying the economic consequences of disease and injury.
- World Health Organization. (2015). Noncommunicable diseases progress monitor 2015.
- World Health Organization. (2017). Noncommunicable diseases: progress monitor 2017.
- Yost, K. & Perkins. C. (2001). Socioeconomic status and breast cancer incidence in California for different race/ethnic groups *Cancer Causes & Control*, 12(8), 703-711.
- Zafar, S. Y. & McNeil, R. B. (2014). Population-based assessment of cancer survivors' financial burden and quality of life: a prospective cohort study *Journal of oncology practice*, 11(2), 145-150.
- Zaidi, A. A. & Ansari. T. Z. (2012). The financial burden of cancer: estimates from patients undergoing cancer care in a tertiary care hospital *International journal for equity in health*, 11(1), 60.
- Zarogoulidou, V. & Panagopoulou. E. (2015). Estimating the direct and indirect costs of lung cancer: a prospective analysis in a Greek University Pulmonary Department *Journal of thoracic disease*, 7(1 1)12.
- Zhao, T. & Cheng. J. (2016). Inpatient care burden due to cancers in Anhui, China: a cross-sectional household survey *BMC public health*, 16(1), 308.
- Zullig, L. L. & Peppercorn. J. M. (2013). Financial distress, use of cost-coping strategies, and adherence to prescription medication among patients with cancer *Journal of oncology practice*, 9(6), 60-63.