

***National College of Business  
Administration and Economics  
Lahore***



**AN ANALYSIS OF THE SOCIO-ECONOMIC  
CHARACTERISTICS OF PATIENTS OF  
HEPATITIS C: A CASE STUDY OF A PUBLIC  
SECTOR HOSPITAL IN LAHORE, PAKISTAN**

**BY**

***KHALID MEHMOOD***

**MASTER OF PHILOSOPHY  
IN  
ECONOMICS**

**DECEMBER, 2019**

# **NATIONAL COLLEGE OF BUSINESS ADMINISTRATION AND ECONOMICS**

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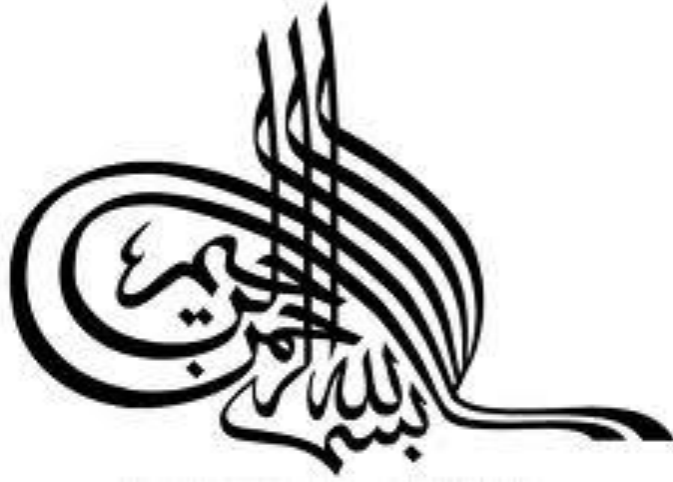
**KHALID MEHMOOD**

**A dissertation submitted to  
Faculty of Social Sciences**

**In Partial Fulfillment of the  
Requirements for the Degree of**

**MASTER OF PHILOSOPHY  
IN  
ECONOMICS**

**December, 2019**



***In the name of ALLAH,  
The Most Beneficial,  
The Most Merciful,***

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Administration and Economics

## **DECLARATION**

It is to declare that this research work as not been submitted for obtaining similar degree from any other university/college.

**Khalid Mehmood**  
**December, 2019**

*DEDICATED*

*TO*

*My Father (Late)*

*&*

*My Wife*

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All praises to Almighty Allah who has given us the wisdom and knowledge to identify the right path and reach the truth.

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Genial love, wishes and thanks are tendered for my all friends especially Mr. Farrukh Imran and Mr. Sajjad Akhter; as they always have remained my inner strength and support. They have always showed faith in my dreams.

# **RESEARCH COMPLETION CERTIFICATE**

Certified that the research work contained in this thesis entitled **“An Analysis of the Socio-Economic Characteristics of Patients of Hepatitis C: A Case Study of a Public Sector Hospital in Lahore, Pakistan”** has been carried out and completed by **Khalid Mehmood** under my supervision during his **M.Phil. Economics** Programme.

***(Dr. A.R. Chaudhary)***  
**Supervisor**

## SUMMARY

Hepatitis C is one of the major and global health problems, affecting millions of people every year particularly in developing countries. Around 11 million people are infected with hepatitis C leading to high mortality in Pakistan. Limited information is available regarding the impact of socioeconomic factors on the prevalence of Hepatitis C (HCV). The objective of our study is to investigate the socioeconomic characteristics of HCV patients and analyzing the impact of socioeconomic factors on the prevalence of hepatitis C by utilizing clinical data of 350 respondents. For this purpose, we have used Binary Logistics Regression (BLR) because our dependent variable is categorical with two possible outcomes. The results show that economic and social variables such as age, education, income, awareness, family history of HCV, history of injectable drug use and occupation are very important factors for determining HCV prevalence. The respondents having age 30-50 years are more likely to have HCV than younger respondents. The educated people are less likely to have HCV than uneducated people. Similarly, those people who belong to rich families are less likely to have HCV as compare to poor families. The unemployed persons are more likely to be infected with HCV than currently employed persons. The people having knowledge about HCV are less likely to have HCV. The history of injectable drug use is also affecting the prevalence of hepatitis C. We conclude that there is a vital role of socioeconomic factors on the prevalence of hepatitis C. Any improvement in these factors is likely to reduce the prevalence of hepatitis C.

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# CHAPTER 1

## INTRODUCTION

### 1.1 BACKGROUND

Hepatitis C is a potentially life threatening infectious disease of liver. It causes serious health problems all around the world like higher mortality and longer morbidity costs to patients. Approximately 71 million people are victim of HCV across the globe (*WHO, 2017*). It causes one tenth of deaths worldwide every year (*WHO, 2012*). There are about 700,000 deaths per year in the world due to Hepatitis C (**WHO, 2016**) and most of these are in low and middle income countries (Lozano et al., 2012).

The frequency of hepatitis C varies all over the world. It is considered low in U.K, Scandinavian Peninsula, Western Europe, U.S, Australia and South Africa. It is intermediary in Eastern Europe, Brazil, and some regions in Africa and Asia. The highest rates are found in Egypt (17% to 26%) (*Wesley and Alter, 2000*). After Egypt, Pakistan has the highest prevalence of Hepatitis C and its range is from 4.5% to 8% (*Khattak et al., 2009; WHO, 2012*). The highest prevalence of hepatitis C was found in Punjab (7%), while around 5% of people were infected in the entire country and over 400 deaths are caused by Hepatitis each day (WHO, 2017). The main reasons for the rapid spread of this disease are lack of knowledge and poor medical facilities especially in the least developed countries (*Crutzen and Goritz, 2012; Du et al., 2012; Alam et al., 2007; Khuwaja et al., 2002; Talpur et al., 2007*).

Hepatitis C affects the economy and living standards in a number of ways. Firstly, it affects households of people being a cause of death. Secondly by reducing productivity among chronically infected people. Thirdly treatment absorbs resources which could be otherwise used in the absence of the endemic (World Bank, 2017).

Chronic Hepatitis C (CHC) levies heavy economic burden on patients and society (**Mane et al., 2014; Scalone et al., 2015**). As annual medical costs of CHC patients are 75% greater than general population in France, Germany, United Kingdom, Spain and Italy (**Vietri et al., 2013**). Indirect costs of CHC are also a contributing factor to the disease's overall economic burden, as employment rates are lower in CHC patients than in the general population (**Dacosta et al., 2012**). In this way it results in a significant burden on the economy and health system of the affected countries.

Regarding the macroeconomic effects of Hepatitis C, the neoclassical growth framework provides a useful tool for assessing the impacts on GDP per capita. In this framework, Hepatitis C affects GDP per capita primarily through three channels: (1) reduces productivity among the population chronically infected, (2) changes in the dependency rate owing to Hepatitis C, and (3) the costs of care and treatment (Romer, 2011).

There are many research studies on work diminishing among employees or patients with Hepatitis C from different countries. Su et al. (2010) found that employees with Hepatitis C had four more absence days per year (about two percent of total working time) in the United States, and were 7.5 percent less productive on the job.

Hepatitis C reduced life expectancy at birth in Egypt from 71.9 years to 70.9 years in 2015. In terms of living standards, this drop in life expectancy is equivalent to a drop in income of 1.5 percent, i.e., with respect to living standards, the increased mortality risks associated with Hepatitis C were equivalent to a drop in GDP of 1.5 percent or US\$ 5 billion annually (World Bank, 2017).

However, lower potential of developing countries due to their poor infrastructure in health sector makes hepatitis a severe challenge to developing countries. Pakistan is a developing country with low health and educational standards. According to the human development index, Pakistan ranked 150th out 189 countries with respect low health and educational standards (UNDP, 2018).

Socio-economic characteristics defined as “an individual’s position in society and may be based on criteria such as education, occupation, income, and value of dwelling place”. Many research studies have found relationship between different socioeconomic determinants and prevalence of hepatitis C (Perez et al., 2005; Armstrong et al., 2006; Meffre et al., 2010).

Hepatitis C is mainly transmitted through the use of injectable drugs (WHO, 2016; Folch et al., 2016; Vriend et al., 2013; Latimer et al., 2009; Harris et al., 2012). Higher infection rates, weak diagnosis and burden of HCV have been connected with lower socioeconomic status (Spooner et al., 2005; Flores et al., 2008; Omland et al. 2013). Greater incidence of injectable drugs and high prevalence of hepatitis C is related with lower income, lower education attainment, reduced employment and homelessness (Miller et al., 2009; Lea et al., 2013; Picardi et al., 2007; Latimer et al., 2009; Comas et al., 2015; Stopka et al., 2017). Conversely, highly paid occupation and higher

education level are both connected with more knowledge about HCV (Vermunt et al., 2015) and decreased prevalence of hepatitis C (Latimer et al., 2009). Even after adjusting for other risk factors related to route of infection, these studies found an increased risk of hepatitis C infection in persons with low socioeconomic status (*Perez et al., 2005; Armstrong et al., 2006; Alter et al., 1999; Meffre et al., 2010*). Thus, we carry out primary research study to analyze the socioeconomic characteristics of Hepatitis C patients. We will also analyze the impact of socioeconomic factors on the prevalence of hepatitis C. We will focus on age, employment status, income level, educational status, and knowledge about HCV, family history of HCV and history of injectable drug use.

## **1.2 PROBLEM STATEMENT**

There are about 700,000 deaths per year in the world due to Hepatitis C (WHO, 2016) and most in developing countries (Lozano et al., 2012). The highest prevalence of hepatitis C was found in Punjab (7%), while around 5% of people were infected in the entire country and over 400 deaths are caused by Hepatitis each day (WHO, 2017). The high mortality rate in the country may be a result of insufficient health facilities. This study is an attempt to analyze the socioeconomic characteristics of HCV patients and also investigate the impact of some socioeconomic factors on the prevalence of hepatitis C in Lahore, Pakistan.

## **1.3 SIGNIFICANCE OF THE STUDY**

The studies on socio-economic determinants (i.e. age, employment status, income level, educational status) are available in Pakistan. There are a few research studies carried out by scholars using primary data in different regions of the country. This study is an attempt to investigate the socio-economic characteristics of Hepatitis C patients and also analyzing the impact of socioeconomic factors on the prevalence of hepatitis C by using primary data set of a public sector hospital in Lahore, Pakistan. The findings of the study will be helpful for policy makers to adopt suitable measures to overcome the issue of HCV in Pakistan.

## **1.4 OBJECTIVES OF THE STUDY**

The objectives of the study are:

- 1) To analyze the socio-economic characteristics of Hepatitis C patients.
- 2) To analyze the impact of some significant socio-economic factors on the prevalence of Hepatitis C.

## **1.5 RESEARCH QUESTIONS**

The study is going to answer the following research questions:

- 1) What are the socioeconomic characteristics of Hepatitis C patients in Lahore, Pakistan?
- 2) Do socio-economic factors affect the prevalence of Hepatitis C?

## **1.6 HYPOTHESES OF THE STUDY**

Following hypotheses shall be tested for this study

- H<sub>1</sub>: Younger respondents are less likely to have HCV than older respondents.
- H<sub>2</sub>: Educated respondents are less likely to have HCV than uneducated respondents.
- H<sub>3</sub>: Employed respondents are less likely to have HCV than unemployed respondents.
- H<sub>4</sub>: Rich respondents are less likely to have HCV than poor respondents.
- H<sub>5</sub>: Informative respondents are less likely to have HCV than less informative respondents.

## CHAPTER 2

### SOCIOECONOMIC CONDITIONS IN PAKISTAN: AN OVERVIEW

The main priority of any government is to work for the welfare of its citizens because human welfare and development is a basic right of every individual of the society as enshrined in the United Nation charter and constitution of Islamic Republic of Pakistan (Government of Pakistan, 2017). Welfare is a subjective concept therefore different researchers assessed it differently. However, it is closely linked with the lives of people and quality of their living standard. Welfare of any individual or group of individuals are influenced by different socioeconomic indicators such as life expectancy, mortality rate, literacy rate, employment rate, basic service deliveries i.e. water and sanitation system, availability of electricity and gas, income and wealth, and their distribution within the society (Thewissen, 2014; Stiglitz et al., 2009; Piketty and Saez, 2003; Hagerty et al., 2001; Hasan, 1997; Klasen, 1994; Stewart, 1985; Streeten, 1982; Ahluwalia and Chenery, 1974).

Pakistan has trapped in a severe problem where its low progress in human development is further leading to slow down the pace of economic growth (Ranis et al., 2000). Table 2.1 shows the comparison of socioeconomic conditions in Pakistan with selected developed and developing countries i.e. India, Bangladesh, Sri-Lanka, United Kingdom (UK), Canada and United States of America (USA).

**Table 2.1**  
**Comparison of Pakistan's Performance in Health Indicators**  
**with Selected Countries**

| Country           | GDPP \$  | Health<br>Expenditure<br>% of GDP | Maternal<br>Mortality<br>Rate | Infant<br>Mortality<br>Rate | Life<br>Expectancy |
|-------------------|----------|-----------------------------------|-------------------------------|-----------------------------|--------------------|
| <b>Pakistan</b>   | 1443.62  | 0.76                              | 177                           | 62.00                       | 66.33              |
| <b>India</b>      | 1709.59  | 4.68                              | 174                           | 34.60                       | 68.33              |
| <b>Bangladesh</b> | 1358.78  | 2.81                              | 176                           | 28.20                       | 72.22              |
| <b>Sri-Lanka</b>  | 3909.98  | 3.50                              | 30                            | 8.00                        | 74.98              |
| <b>UK</b>         | 40367.03 | 9.11                              | 9                             | 3.70                        | 81.60              |
| <b>Canada</b>     | 42183.29 | 10.44                             | 7                             | 4.30                        | 82.13              |
| <b>USA</b>        | 57638.15 | 17.14                             | 14                            | 5.60                        | 78.74              |

**Source: World Bank (2017) Government of Pakistan (2017)**

Table 2.1 depicts the comparison of GDP per capita, health expenditure, maternal mortality rate, infant mortality rate and life expectancy of Pakistan with selected developing and developed countries. Government of Pakistan is spending about 0.76% share of GDP on health sector, which is even lower than India (4.68%), Sri-Lanka (3.50%) and Bangladesh (2.81%). Pakistan has been spending on health care about 0.50% to 0.96% share of its GDP over the last 70 years. This allocation of budget for health sector is less than the World Health Organization (WHO) bench mark of at least 6% of GDP. While per capita health spending is currently 3620 rupees which is less than the WHO's bench mark of 8600 rupees for developing countries (Economic Survey of Pakistan, 2016-17).

Table 2.1 also shows that Pakistan's maternal mortality rate and infant mortality rate are very high as compared with some selected countries. However life expectancy is also not high (66.33 years) and lowers than neighboring countries of the region.

Table 2.2 provides the comparison of Pakistan's performance in human development index, GINI coefficient and head count ratio with selected developing and developed countries.

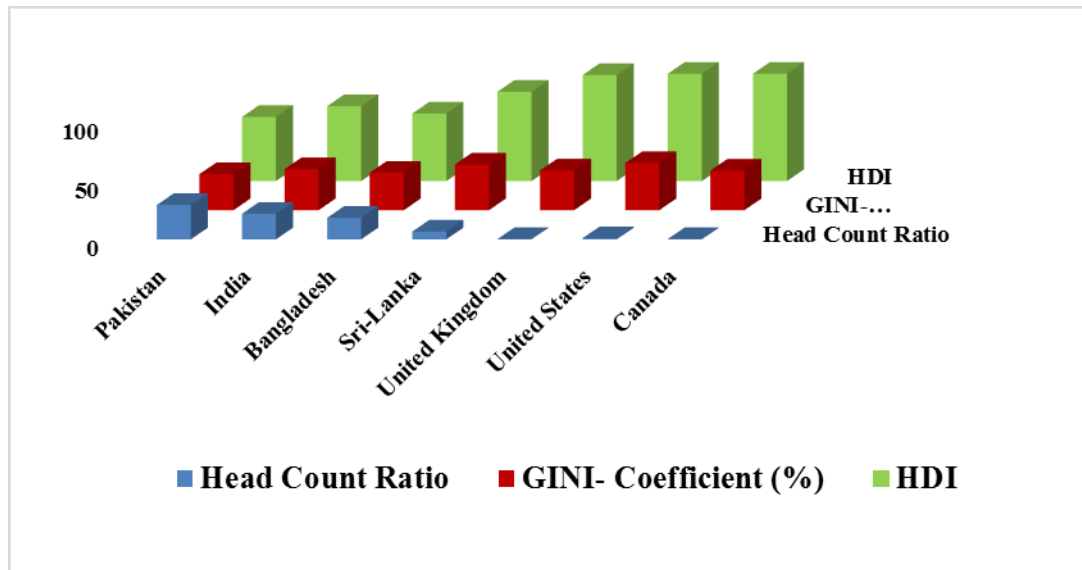
**Table 2.2**  
**Comparison of Socio-Economic Indicators between**  
**Developed and Developing Countries**

| Country               | Head Count Ratio | Gini-Coefficient | HDI   |
|-----------------------|------------------|------------------|-------|
| <b>Pakistan</b>       | 29.50            | 30.90            | 55.00 |
| <b>India</b>          | 21.90            | 35.20            | 64.20 |
| <b>Bangladesh</b>     | 18.50            | 32.10            | 57.90 |
| <b>Sri-Lanka</b>      | 6.70             | 39.20            | 76.60 |
| <b>United Kingdom</b> | 0.20             | 34.10            | 90.90 |
| <b>United States</b>  | 1.00             | 40.40            | 92.00 |
| <b>Canada</b>         | 0.30             | 34.00            | 92.00 |

**Source: World Bank, 2017; Human Development Report, 2017.**

Table 2.2 shows the comparison of Human development Index, Gini-coefficient and head count ratio of Pakistan with selected developing and developed countries. This comparison is also elaborated in figure 2.1, where Human Development Index (HDI) score shows that Pakistan's performance is worse as compared to other countries. Pakistan's conditions in income inequality and head count ratio of poverty are also not satisfactory, if we

compare it with selected developing and developed countries, where a gap of 30.9% exists between upper and lower quintile of the society due to unequal distribution of income and wealth, furthermore 29.5% of population of the country lives below poverty line.



Source: World Bank, 2017; Human Development Report, 2017.

**Figure 2.1: Comparison of Socio-Economic Indicators between Developed and Developing Countries**

Pakistan's performance in other development indicators has also not been good with the increase in GDP per capita or GDP growth (Easterly, 2001). According to World Bank and UNDP (2017) Multidimensional poverty index (MPI) is 0.237, Gender Development Index (GDI) is 0.741 and income inequality in the country is 38 percent recorded between rich and poor class of the society (World Bank, 2017; UNDP, 2017) therefore welfare of the people of Pakistan is decreasing persistently.

Table 2.3 provides an overview of socioeconomic conditions in Pakistan i.e. GDP growth rate, life expectancy, unemployment rate, Gini-coefficient and poverty line over the period of 1961-2015.

**Table 2.3**  
**Intertemporal Changes in Socioeconomic Conditions in Pakistan**

| <b>Years</b> | <b>GDPPc<br/>(\$)</b> | <b>Life<br/>Expectancy</b> | <b>Literacy<br/>Rate</b> | <b>Unemployment<br/>Rate</b> | <b>GINI</b> | <b>Poverty</b> |
|--------------|-----------------------|----------------------------|--------------------------|------------------------------|-------------|----------------|
| <b>1960s</b> | 122.56                | 49.76                      | 19.30                    | 1.345                        | 35.47       | 43.75          |
| <b>1970s</b> | 194.94                | 55.36                      | 21.70                    | 2.41                         | 36.44       | 30.68          |
| <b>1980s</b> | 354.45                | 58.74                      | 26.20                    | 3.22                         | 36.54       | 27.58          |
| <b>1990s</b> | 466.16                | 61.58                      | 43.92                    | 5.46                         | 39.37       | 34.32          |
| <b>2000s</b> | 784.56                | 64.01                      | 53.96                    | 6.80                         | 31.44       | 33.66          |
| <b>2011</b>  | 1226.21               | 65.43                      | 54.73                    | 0.80                         | 30.90       | 36.80          |
| <b>2012</b>  | 1261.20               | 65.69                      | 56.76                    | 1.50                         | 30.80       | 36.30          |
| <b>2013</b>  | 1272.44               | 65.93                      | 55.59                    | 3.00                         | 30.70       | 39.50          |
| <b>2014</b>  | 1316.98               | 66.14                      | 56.97                    | 1.80                         | -----       | 38.00          |
| <b>2015</b>  | 1428.63               | 66.33                      | 58.00                    | 3.60                         | -----       | 37.90          |

**Source: Anwar, 2005; World Bank, 2017; Government of Pakistan, 2017.**

Historical perspective of Pakistan is an interesting case study of growth without development (Easterly, 2001). Pakistan has long been identified as a case study in social development miscarriage. Table 2.3 shows the situation of different socioeconomic indicators throughout the history of Pakistan. Despite of historical good average growth rate of GDP, Pakistan's socio-economic indicators has not been satisfactory over the period. After 1947 independence of Pakistan, social and infrastructure development was needed for a newly born country i.e. Pakistan, to enhance the welfare of the people. But due to political and legislative instability, effective steps had not been taken for the welfare of the people.

Table 2.3 shows that in 1960's effective welfare policies for the country has been initiated like land reforms, green revolution and industrialization. Land reforms were established for landless people but government did not back it effectively and the poor class could not get much benefit from land reforms. Pakistan achieved 6.8 percent GDP growth rate because of industrial and agricultural policies. But it did not contribute in the welfare of the society positively where the recorded life expectancy and literacy rate are quite low at 49.76 and 19.30 respectively. Also, there is huge income inequality recorded in Pakistan i.e. 35.47% due to which poverty reaches at a high level of 43.75%.

Table 2.3 also shows that in 1970s Pakistan's economic growth rate was more than 4 percent. With the increase in its GDP, other indicators improved too but not with the pace of economic growth i.e. life expectancy increased from 49.76 years to 55.36, literacy in Pakistan increased to 21.70 percent and people below poverty line decreased to 30.68 percent. While unemployment and income inequality are both increased within the society in this decade. Similar to the 1960's government, the autocrat government of 1980's achieved 6.5 percent average GDP growth rate, which indicated that country on right direction of societal welfare in all other socioeconomic indicators except high unequal distribution of income. Due to high economic growth in this decade poverty has been on minimum level in the history of Pakistan, indicated that high growth rate leads to increase the overall income and purchasing power of the poor people.

In 1990s, the 4.5 percent economic growth deteriorates other socioeconomic indicators means that the one-sided growth of economy does not contribute into enrichment of the other side of the economy i.e. social and economic indicators. Different effective measures were taken by the government like Social Action Programme (SAP), initiated by World Bank, in 1992 to 93. SAP was planned to address the Pakistan's relative flaws in elementary societal facilities, which was considered as a key restraint for economic growth and welfare. It was expected from SAP to reverse the country's extraordinary declined investment in social progress. Furthermore, SAP envisaged expanding and improving the coverage, quality and effectiveness of the delivery of basic services to the people (especially to women and girls) like primary education, water supply and sanitation, and basic health and population welfare. 127 billion rupees was financed by government of Pakistan and World Bank. The Project was put into high gear from the very beginning. But at the end of SAP's period it was totally failed because according to Multi-donor Support Unit (MSU) and Pakistan Bureau of Statistics (1996-1997), the overall primary Gross Enrolment Ratio has shown no improvement, net enrolment rates declined from 46 to 42 percent. In this era with poverty, inequality and unemployment are recorded high even with 4.5 percent economic growth and other measures of the government like Social Action Program.

In the first decade of 21<sup>st</sup> century, Pakistan's performance has been good in terms of GDP growth rate and also in other social and economic indicators as shown in table 2.3. In this era, we have seen the improvement in life expectancy, literacy rate, and equal distribution of income and reduction of poverty in the country. The same nexus of growth without development is continuous in recent years even the government of Pakistan initiated some

welfare programs to enhance the overall welfare of the people like increase in telecommunication sector, Baluchistan Package, NFC award, Benazir Income Support Program (BISP), Benazir Tractor Scheme (BTS), PM Youth Training Program, Small Business Loans, PM Housing Scheme, Youth Loan Scheme, Kissan Package etc. but the living condition and welfare of the people is decreasing persistently (Helliwell et al., 2017).

We conclude from table 2.3 that Pakistan not achieved very rapid economic development throughout the years (1961-2015) because of its socioeconomic indicators are worse and the fruits of economic growth did not reach evenly among the all sections of the society.

## **CHAPTER 3**

### **LITERATURE REVIEW**

#### **3.1 LITERATURE REVIEW**

Socioeconomic status (SES) refers “to an individual’s position in society and may be based on criteria such as education, occupation, income, and value of dwelling place” (*Meffre et al., 2010*). There are various studies from develop countries like France, U.S. Puerto Rico and Norway which have established relationship between different SES markers and prevalence of hepatitis C (*Perez et al., 2005; Dalgard et al., 2003; Armstrong et al., 2006; Alter et al., 1999; Meffre et al., 2010*). There is a vast variety of literature available on this topic.

Alter et al. (1999) analysed the prevalence of hepatitis C in the United States. They used data of 21,241 persons from National Health and Nutrition Examination Survey, conducted during 1988 through 1994. The results showed that overall prevalence of anti-HCV was 1.8 percent, corresponding to an estimated 3.9 million persons nationwide with HCV infection. Sixty-five percent of the persons with HCV infection were 30 to 49 years old. Moreover the prevalence of HCV infection was higher among non-Hispanic blacks than among non-Hispanic whites and higher among male subjects than among female subjects. A higher prevalence of HCV infection was also observed among subjects who were below the poverty level, subjects older than 16 years who were divorced or separated, and subjects who had completed 12 or fewer years of education. An increased prevalence of infection was associated with a history of cocaine or marijuana use among all racial and prevalence increased with an increasing number of times each drug was used. Finally they concluded that the strongest factors independently associated with HCV infection were illegal drug use and high-risk sexual behavior.

Dalgard et al. (2003) analysed the prevalence of hepatitis C in Norway. They included only those subjects in the study by using random sampling that have age more than 30 years. The results of the study showed that highest incidence of hepatitis C was observed in those persons who have age between 40 and 45 years. Results also indicated that hepatitis C was significantly associated with unmarried, unemployed and low educated persons.

Perez et al. (2005) analyzed the prevalence of hepatitis C and associated risk behaviors in San Juan, Puerto Rico. They included 964 subjects in this

study and applied multiple logistic regressions for analysis. The findings of the study showed that prevalence of hepatitis C was significantly higher among persons having age between 30 and 50 years. Moreover, the subjects with lower education were more likely to have HCV. The findings also indicated higher prevalence of HCV among subjects with history of imprisonment, life time heroin use and cocaine use.

Miller et al. (2009) analysed the markers and risk factors for HCV, HBV and HIV in a network of injecting drug users in Melbourne, Australia. They collected data of 382 injecting drug users (IDU) and applied multivariate logistic regression. The findings of the study revealed that participants having age greater than 25 years were more likely to have HCV and HBV. Individuals born in Vietnam were significantly more likely to have HCV and to be currently HBV infected than those born elsewhere, and individuals who were born in Australia were significantly less likely to have been exposed to HBV than non-Australian born participants. Moreover participants living with their parents were significantly less likely to be infected with HCV than those living independently. Living with parents did not appear to be protective for HIV or HBV status. Furthermore, unemployed participants were significantly more likely to have HCV. The results also indicated that up to 31% of IDU were infected with HCV who injected for 1 year or less, whereas 53% of IDU were infected with HCV who injected for 2 years or less.

Meffre et al. (2010) analyzed the frequency of hepatitis B and hepatitis C in France. 14,416 adult participants were included in the study. They concluded that low socioeconomic status was significantly associated with hepatitis B and hepatitis C as the participants having less than 12 year education, being born in a country where prevalence of hepatitis C was greater than 2.5% in age greater than 29 year.

Khan et al. (2011) examined the prevalence of Hepatitis B Virus (HBV) infection in the cohort of Internally Displaced Persons (IDP's) of war against terrorism in Malakand division of northern Pakistan. They conducted a survey of 900 subjects. Statistical analysis was performed using SPSS software. The results of the study showed that males were significantly more affected with HBV infection than the females. To study the age-wise prevalence, the highest incidence rate was observed in the age group of 46-60 years while a lower incidence was observed in the age group of  $\leq 15$  years. The observed literacy rate was 34% and most of the patients (71.5%) were from a lower socioeconomic status. HBV positive subjects of the studied area belonged mostly to the rural areas. Most importantly, basic health facilities such as a basic health unit (BHU) or hospitals are far away from their reach or of low hygienic standards.

Verna et al. (2012) analyzed the ethnic and socioeconomic effects on survival and severity of fibrosis in liver transplant receivers with HCV. They collected data of all patients who undertook liver transplant at New York–Presbyterian Hospital (NYPH) from 2000 to 2007. The rank-sum and chi-square tests were applied. The findings of the study revealed that socioeconomic status influenced disease severity as there was more significant fibrosis in patients who had a low median household income. There was no difference in post-liver transplant survival due to hepatitis C between Hispanic and non-Hispanic patients.

Omland et al. (2013) examined the effect of socioeconomic determinants on hepatitis C infected patients in Denmark. Data was collected from Danish nationwide registries. For this purpose, they used conditional logistic regression. They pointed out that employment; income and education were significantly associated with risk of HCV infection in Denmark. The odd ratios indicated that employed persons were less likely to have risk of HCV infection as compared to unemployed persons and disability pensioners. There was low probability in educated persons to have risk of HCV infection as compared to less educated persons. The odd ratios indicated that rich persons were less likely to have risk of HCV infection as compared to poor persons. Regardless of income, employed patients had a higher survival rate than unemployed patients.

Kvitko et al. (2013) analysed the prevalence of risk factors for hepatitis C. They used data which is part of an epidemiology survey conducted by a hospital. They used Chi Square method for analysis. The results showed that there was a direct association between increased age and increased likelihood of blood transfusion and recent hospitalization, and inverse relationship between age and tattoos, piercings and drugs. In the analysis of socioeconomic variables, a statistically significant difference between social class and piercings was observed; prevalence among adults in higher social class was lower than in lower social class. In the same way, it was observed that the higher the educational level, the higher the prevalence of tattoos and piercings. Tattoos and piercings were less frequent among respondents who declared that their self-perception of health status was poor or very poor. This group, however, showed a higher frequency of recent hospitalization. They also concluded that heavy alcohol consumption was directly associated with the risk factor for drug use leading to higher prevalence of HCV.

Lea et al. (2014) analysed the prevalence and associations with sexual risk practices and HIV and hepatitis C infection. Data was taken from Sydney Gay Community Periodic Survey between 2004-06 and 2011. Multivariate

logistic regression was used for analysis. The results showed that men who injected drugs were less likely than other men to have completed university education and to be employed full-time, but more likely to be HIV-positive and to be HCV-positive. They further concluded that gay men who injected drugs ten times more likely to have used party drugs for sex, had engaged in a greater number of esoteric sexual practices, and were less likely to be employed full-time.

Yaseen et al. (2014) examined the impact of socioeconomic factors on hepatitis C in Pakistan. They collected data of 274 persons (Out of which 137 were cases (positive) and 137 were controls (negative) through questionnaire from Liver Center Faisalabad and different localities. Binary Logistic Regression was applied. The results showed that as total income of households increase then the chance of hepatitis C decrease. Results also indicated that knowledge about the transmission of HCV had negative effect on hepatitis C. People living in rural areas had more chance of hepatitis C moreover people who live in joint family system had more chance of hepatitis C as compare to those who live in single family.

Andronie (2015) evaluated the socioeconomic characteristics of Hepatitis B and C patients in Romania. He collected data of 56 patients and analyzed data using chi square method. He concluded that income level, educational status and living conditions were associated with the incidence of Hepatitis B and C. Economic and financial resources of patients and their families appeared to be important factors – the higher the income level and educational status the lower the incidence of HBV and HCV.

Hanus et al. (2015) analyzed the incidence of hepatitis C in Brazil. An epidemiological, temporal, and descriptive study was performed using data from the Information System for Reportable Diseases. They concluded that in the last 10 years, the prevalence of hepatitis C had increased in Brazil, mainly in the south and southeast region. Urban areas of the country presented the highest rates of hepatitis C, and the highest incidences were observed in men, white race, intravenous drug users and those aged 60-64 years.

Sardar et al. (2017) examined the socioeconomic determinants of attitude towards hepatitis B and C. Primary data was collected from 175 hepatitis patients and 175 non patients through questionnaire in district Faisalabad. Tobit model was applied to determine social and economic factors of attitude regarding the patients of hepatitis B and C. The findings suggested that rural population had negative attitude towards the patients of hepatitis B and C. Further results also indicated that people having low income and less

education also had negative attitude towards the patients of hepatitis B and C which may be due to lack of knowledge about disease.

Stopka et al. (2017) identified and characterized hepatitis C virus hotspots in Massachusetts. They compiled socio-demographic and HCV surveillance data ( $n = 99,780$  cases) for Massachusetts census tracts ( $n = 1464$ ) from 2002 to 2013. Chi square and multivariate logistic regression were applied. They found that HCV hotspots were independently and positively associated with the percent of the population that was Hispanic and the percent of households receiving food stamps. HCV hotspots were independently and negatively associated with the percent of the population that were high school graduates or higher and the percent of the population in the “other” race/ethnicity category. They also concluded that percent of population living in poverty, median household income, and median age were associated with HCV hotspots.

Amir et al. (2018) determined the burden of hepatitis B and C infection according to socioeconomic status. This cross-sectional study was conducted at medicine department of Peoples University of Medical and Health science. The sample of 200 patients of hepatitis B and hepatitis C was collected. Simple frequency and percentage were calculated for categorical variables and mean and standard deviation was calculated for numerical variables. They concluded that poor socioeconomic status was significantly associated with hepatitis C infection. Socioeconomic status not a direct risk factor of hepatitis B and C, but it was significantly responsible to develop the other risk factors. They did not take into account the employment status, income level and educational status of patients which are the most important markers of socioeconomic status.

Tosun et al. (2018) analyzed the impact of social and economic factors on the prevalence of hepatitis B virus in Turkey. This analysis based on a cross sectional study of 1112 volunteers using Binary Probit Model. The findings of the study revealed that people with low socioeconomic status are more likely to be infected with HBV infection. Moreover, the higher prevalence of HBV was observed in 46 to 66+ age groups whereas younger population had lower incidence of hepatitis B.

Edmunds et al. (2019) analyzed the distribution and socioeconomic burden of HCV in South Australia. HCV data were sourced from South Australia’s Communicable Diseases Control Branch and socioeconomic population data from the Australian Bureau of Statistics from January 2010 to December 2016. Multivariate logistic regression was performed. The findings of the study revealed that hepatitis C negatively correlated with socioeconomic

status. The results indicated that people living in the poorest areas with high rates of unemployment and injecting drug use were more likely to be infected with Hepatitis C.

Ahsan et al. (2019) estimated the prevalence of hepatitis C in Punjab, Pakistan. They collected data of 66,086 individuals who participated in this study by visiting screening camps established for a week by Punjab AIDS Control Program (PACP) in year 2017, in 80 different towns across the Punjab province. The statistical analysis was performed on SPSS by using Chi-square. The results of the study showed that a significantly high prevalence of hepatitis C was observed within 41–60 years of age. In gender based analysis, higher prevalence of HCV was observed in females as compared to males. To measure HCV prevalence with respect to occupation, four occupations were identified with significantly high HCV prevalence, which included farmers, house residents, laborer and transporter. However, the participants related to academia such as students and faculty or those working in close association with academia, or individuals involved in trade or businessmen demonstrated significantly lower HCV prevalence. In terms of geographical regions, five districts of Punjab including Khanewal, Nankana Sahib, Sheikhpura, Okara and Faisalabad were identified with significantly high seroprevalence as compared to other districts.

Studies on socioeconomic characteristic and impact of socioeconomic factors on the prevalence of hepatitis C are rare in Pakistan. There are a few research studies that have been carried out by scholars using primary data in different regions of the country like Faisalabad, Rawalpindi, Pishawer and Northern areas etc. But no study on socioeconomic characteristics as well as the impact of socioeconomic factors on the prevalence of hepatitis C was conducted in Lahore that is a highly populated city being the capital of the province of Punjab. This study is an attempt to investigate the socio-economic characteristics (i.e. age, occupational status, income level and educational status) of Hepatitis C patients and analyzing the impact of socioeconomic factors on the prevalence of hepatitis C in Lahore, Pakistan.

# CHAPTER 4

## THEORETICAL FRAMEWORK AND METHODOLOGY

### 4.1 THEORETICAL FRAMEWORK

There are several studies which have found association between different SES markers (educational status, employment status, income level and value of living place) and prevalence of hepatitis C (*Perez et al., 2005; Dalgard et al., 2003; Armstrong et al., 2006; Alter et al., 1999; Meffre et al., 2010*). Hepatitis C is mainly transmitted through injecting drug use. Greater frequency of injection drug use and higher prevalence of hepatitis C is associated with lower income, lower education attainment, reduced employment and homelessness. (Poulos et al., 2007; Neale et al., 2008; Craine et al., 2009; Rourke et al., 2011; Lea et al., 2013., *Comas et al., 2015; Stopka et al., 2017*). The major demographic and socioeconomic determinants of hepatitis C are as age, income level, educational status and occupational status.

Age is significantly associated with hepatitis C. There has been consistent evidence on lower prevalence of HCV among young adults having age less than 30 years because of lower interaction with risk factors (factors which have positive effect on HCV) especially injection drug use which is the strongest risk factor for HCV (*Armstrong et al., 2006*). The peak prevalence of HCV has been observed in age between 30 and 50 years old (*Perez et al., 2005*).

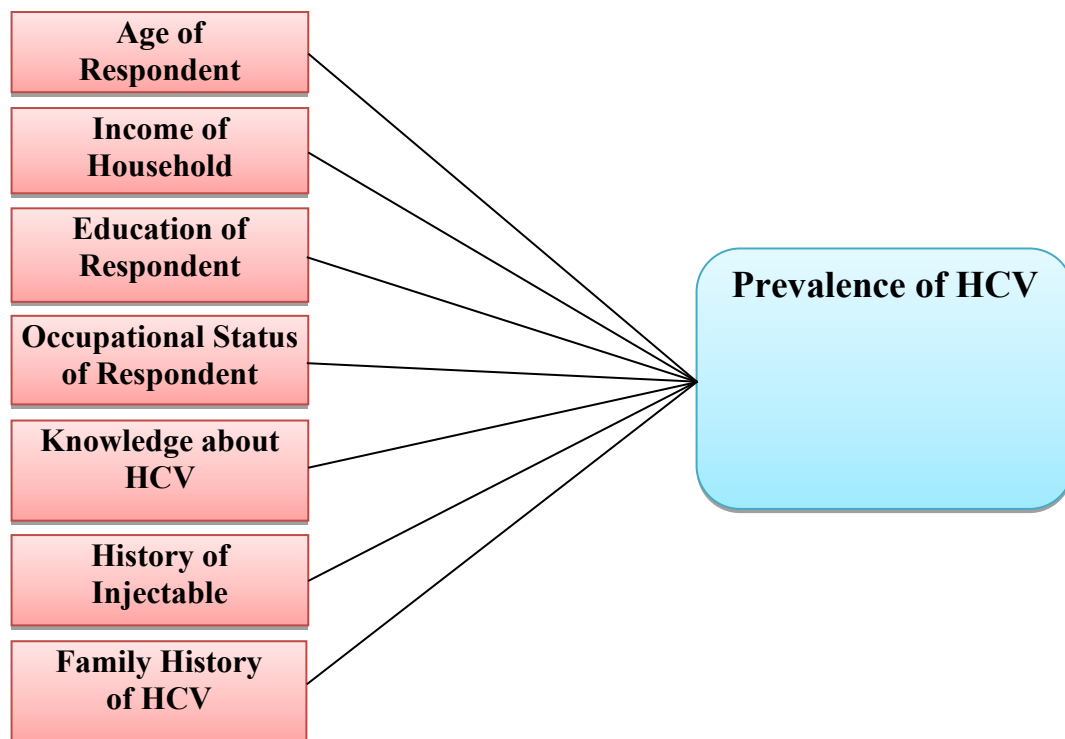
Occupational status is also significantly associated with prevalence of hepatitis C. Highly paid occupations make an easy access to primary health care and tend to reduce the prevalence of HCV (Latimer et al., 2009; Vermunt et al., 2015). Conversely Unemployment is associated with high prevalence of hepatitis C because a large proportion of unemployed persons are less likely to access general practitioners to get HCV test and treatment (Edmunds et al., 2019).

Education is also a major socioeconomic determinant of hepatitis C. People having higher education are supposed to be more aware about the ways of transmission of HCV (Vermunt et al., 2015). In this way higher education tends to reduce the prevalence of hepatitis C (Latimer et al., 2009). Lower education leads to make people less aware about the ways of transmission of hepatitis C and causes higher prevalence of hepatitis C (*Comas et al., 2015*;

Stopka et al., 2017). The lack of knowledge about HCV is one of the major reason of rapid spread of this disease in developing countries like Pakistan (*Crutzen and Goritz, 2012; Du et al., 2012; Alam et al., 2007; Khuwaja et al., 2002; Talpur et al., 2007*).

The likelihood of prevalence of this disease has also been found in low income groups. Because history of injectable drug use is the strongest risk factor for hepatitis C, and it is significantly associated with lower income. People having low income are more likely to have history of injectable because of their limited access to qualified practitioner (*Armstrong et al., 2006; Flores et al., 2008; Meffre et al., 2010; Omland et al., 2013; Stopka et al., 2017*). On the other hand, higher income allows people to purchase goods that improve health, for example, health insurance. Beside this, higher income increases steady-state consumption, and thus raises the utility of living to an older age (Cutler, 2010).

In literature the relationship between hepatitis C and different socioeconomic factors such as age, gender, region of residence, employment status, educational status and income level has been identified from world perspective. In Pakistan there are very few studies available regarding the impact of socioeconomic factors on the prevalence of HCV. In this study we will attempt to investigate the impact of some significant socioeconomic factors on the prevalence of HCV. The theoretical framework of our study is given as.



**Figure 3.1: Conceptual Model of the Study**

## 4.2 METHODOLOGY

In this study, we have attempted to investigate the socioeconomic characteristics of HCV patients and also analyzed the impact of socioeconomic factors like age, income level, educational status, occupational status, number of rooms, and number of people living in the house on the prevalence of hepatitis C. In this section we will discuss the model of our study, specification of our study variables, estimation techniques and data sources.

### 4.2.1 Model

The functional form of our model is as given below.

$$\text{HCV} = f(\text{AGE}, \text{EDU}, \text{INCMH}, \text{OCCUP}, \text{FHOHCV}, \text{KNWHCV}, \text{HOIDU},)$$

where

|                |                                    |
|----------------|------------------------------------|
| <b>HCV:</b>    | Prevalence of Hepatitis C          |
| <b>AGE:</b>    | Age of Individuals                 |
| <b>EDU:</b>    | Education of Individuals           |
| <b>INCMH:</b>  | Income of Individuals              |
| <b>OCCUP:</b>  | Occupational Status of Individuals |
| <b>FMOHCV:</b> | Family History of HCV              |
| <b>KNWHCV:</b> | Awareness/Knowledge about HCV      |
| <b>HOIDU:</b>  | History of Injectable Drug Use     |

When dependent variable is normal qualitative, has some categories and not continuous we cannot apply Ordinary Least Square (OLS), because OLS required that dependent variable is continuous but in many cases the dependent variable is categorical. In this case we need some other model that best deals such kind of dependent variable. The Logistics Regression deals best in such cases, it is a type of regression analysis used to predict the outcome of a categorical variable (binary or others). Logistic regression does not make any assumptions of normality, linearity, and homogeneity of variance for the independent variables.

### Logistic Function:

$$F(t) = \frac{e^t}{e^t + 1} = \frac{1}{1 + e^{-t}}$$

where  $t$  is a linear function of the explanatory variables

$$\pi(x) = \frac{1}{1 + e^{-(\beta_0 + \beta_1 X)}}$$

Which can be interpreted as the probability of dependent variable equaling a 'success' or a 'case'

The logistic function is:

$$g(x) = \ln \frac{\pi(x)}{1 - \pi(x)} = \beta_0 + \beta_1 X$$

This is the  $\ln$  of odds

$$g(x) = \ln \frac{\pi(x)}{1 - \pi(x)} = \beta_0 + \beta_1 X$$

As a latent variable model this has an equivalent formulation. Let  $Y^*$  be a continuous latent variable (unobserved random variable) where  $Y^* = \beta_1 X + \epsilon$

where  $\epsilon \sim \text{Logistic}(0,1)$

### Odd Ratio:

The logistic function is:

$$g(x) = \ln \frac{\pi(x)}{1 - \pi(x)} = \beta_0 + \beta_1 X$$

This is the  $\ln$  of odds

Where odd ratio is defined as: *ratio of probability of an event occurring to probability of an event not occurring*

Dependent variable of our study is categorical. That is why we are using logistic regression for analysis. We have used binary logistic regression because our dependent variable has two possible outcomes. When dependent variable has two possible outcomes, the binary logistics regression deals best in such models. In binary logistic regression, the variable prevalence of HCV has been constructed by using questionnaire based information. In doing so, the prevalence of HCV has been coded as 1, otherwise coded as 0. Odds ratio have been used to explain the nature of relationship of dependent variable with independent variables. The econometric models of our study are as given below.

$$\text{Logit model } (p) = b_0 + b_1(AGE) + b_2(INCMH) + b_3(EDU) + b_4(OCCUP) + b_5(FHOHCV) + b_6(KNWHCV) + b_7(HOIDU)$$

Here  $p$  is the probability of presence of the prevalence of HCV. The logit transformation is defined as the logged odds:

$$\text{odds} = \frac{p}{1-p} = \frac{\text{probability of presence of characteristic}}{\text{probability of absence of characteristic}}$$

and

$$\text{logit}(p) = \ln\left(\frac{p}{1-p}\right)$$

## 4.2.2 Specification of Variables

The brief specification of our variables is as follows

### 4.2.2.1 Prevalence of Hepatitis C

Prevalence of Hepatitis C is dependent variable of our study. The responses for HCV are divided into two categories: HCV is negative (coded as 1) and HCV is positive (coded as 2).

#### 4.2.2.2 Age of Respondent

We have used respondent's age as an independent variable in this model. Respondent's age has been classified into two groups i.e. up to 30 year

and greater than 30 year. If respondent's age is up to 30 year then coded as 1 and respondents' age greater than 30 year is coded as 2.

#### **4.2.2.3 Education of Respondent**

Respondent's education is also an independent variable of our study. Respondent's educational status has been divided into two groups. If respondent has minimum primary education then coded as 0, if respondent has greater than primary education then coded as 1.

#### **4.2.2.4 Income of Household**

Income of household is another independent variable of this study. Income of household has been described into two categories. If household's income is less than or equal to twenty thousand then coded as 0, if household has income greater than twenty thousand then coded as 1.

#### **4.2.2.5 Occupational Status**

Occupational status of individuals has been divided into two categories. If respondent is unemployed then coded as 0, if he is laborer, retired and self-employed/ business owner/ public sector worker then coded as 1.

#### **4.2.2.6 Knowledge about HCV**

This variable is used as independent variable to check respondent's knowledge about hepatitis C. This variable has been divided into two categories. If respondent has no knowledge then coded as 0, and if respondent has knowledge about HCV then coded as 1.

#### **4.2.2.7 History of Injectable**

This variable is divided into two categories. If respondent has no history of injectable then coded as 0. If respondent has history of injectable then coded as 1.

#### **4.2.2.8 Family History of HCV**

This variable is used as an independent variable and divided into two categories. If respondent has no family history of HCV then coded as 0. If respondent has family history of HCV then coded as 1.

#### **4.2.3 Estimation Technique**

We have used binary logistic regression because our dependent variable is nominal with two outcomes: prevalence of HCV coded as 1 and not prevalence of HCV coded as 0 to analyze the effect of age, income level, educational status, occupational status, family history of HCV, knowledge about HCV and history of injectable drugs on the prevalence of hepatitis C.

#### **4.2.4 Data Source**

The data used in our study is taken from Services Hospital Lahore, Pakistan, where patients belong to different localities from Punjab. People who visited hepatitis clinic between July 2019 and August 2019 were chosen to be part of the survey and selected randomly through convenience sampling. We have used convenience sampling because it is considered the best way of getting some basic information quickly and efficiently. The questionnaire was designed by the researcher to assess socio-economic and demographic characteristics of patients, as well as their knowledge and awareness about HCV. This is a cross sectional study of 350 respondents (Out of which 190 have positive HCV and 160 have negative HCV). If polymerase chain reaction (PCR) test was detected then respondent considered to have positive HCV and respondent considered to have negative HCV if PCR was not detected. To be eligible to join the study, respondent should be older than 10 years. A person who is younger than 10 years is excluded from the data set based on the idea that younger respondents have minimum interaction with the major risk factors and less likely to be infected with hepatitis C. Of these 350 respondents, 188 are male and 162 are female.

## CHAPTER 5

### RESULTS AND DISCUSSION

In this study, we have investigated the socioeconomic characteristics of the participants of the study and also have analyzed the relationship of participant's age, participant's education, household's income, respondent's occupation, family history of HCV, history of injectable and knowledge about HCV with prevalence of HCV.

#### 5.1 SOCIO-ECONOMIC CHARACTERISTICS OF RESPONDENTS

Description of different socio-economic variables is presented in Table 5.1.

**Table 5.1**  
**Description of Different Socio-Economic Variables**

| <b>Description of Variables</b>     |                 | <b>Frequency</b> | <b>Percentage</b> |
|-------------------------------------|-----------------|------------------|-------------------|
| <b>Age of Respondent</b>            | 11-20           | 32               | 9.1               |
|                                     | 21-30           | 81               | 23.1              |
|                                     | 31-40           | 113              | 32.3              |
|                                     | 41-50           | 67               | 19.1              |
|                                     | 51-60           | 43               | 12.3              |
|                                     | 61 and above    | 14               | 4.0               |
| <b>Gender of Respondent</b>         | Male            | 188              | 53.7              |
|                                     | Female          | 162              | 46.3              |
| <b>Marital Status of Respondent</b> | Unmarried       | 67               | 19.1              |
|                                     | Married         | 283              | 80.9              |
| <b>Region of Residence</b>          | Urban           | 210              | 60.0              |
|                                     | Rural           | 140              | 40.0              |
| <b>Income of Household</b>          | Less than 10000 | 66               | 18.9              |
|                                     | 10001-20000     | 102              | 29.1              |
|                                     | 20001-30000     | 50               | 14.3              |
|                                     | 30001-40000     | 60               | 17.1              |
|                                     | 40001-50000     | 42               | 12.0              |
|                                     | 50001 and more  | 30               | 8.6               |

Table 5.1 shows the socioeconomic characteristics of the respondents. Table shows that most of the participants are in age group 31-40 years which constituted 32.3% of all age groups. Whereas age group 11-20 years contains 9.1% respondents, 23.1% are in 21-30 years, 19.1% are in 41-50 years, 12.1% are in 51-60 years and 4% are in 61 years and above which is the lowest among all age groups. Regarding gender 53.7% are male, whereas 46.3% are female. Table shows that 60% respondent belongs to urban areas and 40% are from rural areas. Regarding income level, 18.9% respondents have income less than ten thousand, 29.1% have greater than ten thousand and less than or equal to twenty thousand, 14.3% have greater than twenty and less than or equal to thirty thousand, 17.1% have greater than thirty and less than or equal to forty thousand, 12% have greater than forty and less than or equal to fifty thousand and only 8.6% respondents have income greater than fifty thousand which is the lowest among all income brackets. According to educational status, 37.4% respondents have no education, 9.7% got primary, 8% have middle, 14.9% have matriculation, 21.1% have intermediate and 8.9% respondents have higher education. This table shows that majority of the participants of study have no education. Occupational status of respondent shows that 14.3% of them lies in laborer category, 0.6% are retired, 34.4% are self-employed / public sector worker, whereas 51.7% of respondent are unemployed.

Regarding the knowledge about HCV respondents asked whether hepatitis C is preventable or not? Only 34.6% of respondent replied yes and 65.4% replied as no which reflects the lack of knowledge about HCV. The table shows statistics regarding exposure to mass media and family history of participants. Exposure to mass media is a major source of almost all kind of information. The respondents who have exposure to mass media constituted 51.6% of all participants, whereas 48.4% respondents have no exposure to mass media. The respondents with family history of HCV are 14.6%, whereas 85.4% have no family history of HCV. The above table also shows that 54% of respondent have history of injectable and 46% have no history of injectable. At the end we can see in the above table that 54.3% respondent have HCV Whereas 45.7% have no HCV infection.

## **5.2 ASSOCIATION BETWEEN SOCIOECONOMIC VARIABLES AND PREVALENCE OF HCV**

In Table 5.2 we have investigated the relationship of respondent's age, respondent's education, income of household, occupational status, knowledge about HCV, family history of HCV and history of injectable with hepatitis C.

**Table 5.2**  
**Odds ratio (OR) with beta ( $\beta$ ) and Significance Level (sig)**  
**for Prevalence of HCV**

| <b>Description of Variables</b>        |                                | <b>B</b>         | <b>Sig.</b> | <b>OR</b> |
|----------------------------------------|--------------------------------|------------------|-------------|-----------|
| <b>Age of Respondent</b>               | Up to 30                       | <b>Reference</b> |             |           |
|                                        | Greater than 30                | .575             | .000        | 1.777     |
| <b>Household Income of Respondent</b>  | Up to 20,000                   | <b>Reference</b> |             |           |
|                                        | Greater than 20000             | -.255            | .058        | .775      |
| <b>Education of Respondent</b>         | Up to Primary Education        | <b>Reference</b> |             |           |
|                                        | Greater than Primary Education | -.248            | .068        | .780      |
| <b>Family History of HCV</b>           | No                             | <b>Reference</b> |             |           |
|                                        | Yes                            | .732             | .021        | 2.080     |
| <b>History of Injectable</b>           | No                             | <b>Reference</b> |             |           |
|                                        | Yes                            | 2.287            | .000        | 9.843     |
| <b>Knowledge about HCV</b>             | No                             | <b>Reference</b> |             |           |
|                                        | Yes                            | .749             | .096        | 2.114     |
| <b>Employment Status of Respondent</b> | No                             | <b>Reference</b> |             |           |
|                                        | Yes                            | -.441            | .002        | .643      |
| <b>Constant</b>                        |                                | -4.653           | .011        | .010      |

From a demographic perspective, the results of binary logistic regression show that *Age* is statistically significant at the 1% significance level in almost all subgroups except (10-20) year age category. The probability of hepatitis C is higher among people in age group greater than 30 year as compared with less than 30 year age group. The younger respondents are less likely to be infected with HCV as compare to older participants. The reason behind this is lower interaction of young respondents with risk factors like injection drug use, dental instruments and blood transfusion. These findings are supported by previous studies in the United States (Armstrong et al., 2006) and Puerto Rico (Perez et al., 2005).

Income of household is another important variable of our study. The results of the study show that income is statistically significant at the 5% significance level. The coefficient of income is negative which clearly indicate that as income increases the probability of hepatitis C decreases. As results show that richer people are less likely to have HCV as compared to poor people. There are several studies which have linked the prevalence of HCV with lower income, as history of injectable drug use is the strongest risk factor for hepatitis C, and it is significantly associated with lower income. People having low income are more likely to have history of injectable because of

their limited access to qualified practitioner (*Armstrong et al., 2006; Flores et al., 2008; Meffre et al., 2010; Omland et al., 2013; Stopka et al., 2017*). On the other hand, higher income can avail better health facilities to improve health, for example, health insurance etc. The higher income allows people to get HCV test and treatment through convenient and reliable means. Beside this, higher income increases steady-state consumption, and thus raises the utility of living to an older age (*Cutler, 2010*).

Another indicator of wealth is the occupational status of the householder. When examining the impact of the respondent's occupational status, laborer class, retired and public sector worker/business owner/self-employed are less likely to develop Hepatitis C as compared to unemployed. The coefficient of employed category is negative which implies that as employment increases the probability of hepatitis C decreases. In this way unemployment is associated with high prevalence of hepatitis C because a large proportion of unemployed persons are less likely to access general practitioners to get HCV test and treatment. These findings are parallel to different studies (*Miller et al., 2009; Lea et al., 2013; Edmunds et al., 2019*). To sum up, the household income and economic wealth of individuals plays an important role because of their direct effect on living conditions, access to health services and medical care.

Education of respondents is also an independent variable of our model. The results show that education is statistically significant at 10% level of significance. The coefficient of education is negative which indicate that probability of hepatitis C decreases with an increased education. People having higher education are supposed to be more aware about the ways of transmission of HCV (*Vermunt et al., 2015*). In this way higher education tends to reduce the prevalence of hepatitis C (*Latimer et al., 2009*). Lower education leads to make people less aware about the ways of transmission of hepatitis C and causes higher prevalence of hepatitis C (*Comas et al., 2015; Stopka et al., 2017*).

Regression results indicate the significance of the respondent's knowledge about disease on the probability of having hepatitis C. As seen from the table respondent's knowledge about HCV is significance at the 10% level of significance. As coefficient of knowledge about disease is negative which implies that as knowledge about HCV increases the probability of infected with HCV decreases. Parallel to previous studies, a lack of information about the transmission of the disease increases the risk of having Hepatitis C (*Yaseen et al., 2014*). Respondents who had a lack of information about the transmission of the disease are more likely to develop Hepatitis C. Awareness and the knowledge about the prevention and transmission of

hepatitis C among respondents are crucial factors for promoting the testing and for identification of those infected.

Another explanatory variable family history of HCV is also significant at the 1% level of significance. The positive sign of the coefficient of this variable indicates that people having family history of HCV are more likely to be infected with HCV. The last explanatory variable is history of injectable which is significant at 1% level of significance. The positive coefficient of this variable indicates that as frequency of injection drug use increases the probability of infected with HCV also increases. The injection drug use is major risk factor of HCV. The higher frequency of injection drug use is associated with high prevalence of hepatitis C. These findings are supported by various studies (WHO, 2016; Folch et al., 2016; Vriend et al., 2013; Latimer et al., 2009; Harris et al., 2012).

## **CHAPTER 6**

### **CONCLUSION AND RECOMMENDATIONS**

#### **6.1 CONCLUSION**

There are medical and the social-economic factors affecting the prevalence of HCV. This research, clarifies the social and economic factors affecting the prevalence of HCV by utilizing clinical data with the use of the binary logistic regression. Prevalence of HCV in the youngest population is relatively low because of low interaction with risk factors as compare to old respondents. The educated persons and people having higher income are less likely to be infected with hepatitis C. The unemployed persons are more likely to be infected with hepatitis C than employed persons. The people having knowledge about HCV are less likely to have hepatitis C. The family history of HCV and history of injectable drug use are also affecting the prevalence of hepatitis C. All hypotheses are statistically significant and supported the study. In this study education, income and employment are the major socioeconomic variables affecting the prevalence of hepatitis C.

#### **6.2 RECOMMENDATIONS**

The most crucial policy advice we have is that Government should introduce auto disable syringes because reuse of syringes is the major rout cause of hepatitis C.

The lack of knowledge and awareness both in the general population and the population at risk and among healthcare providers is impeding the efforts of preventing and controlling hepatitis C spread. This is why educational programs should be promoted in order to ensure better understanding of infections, transmission, prevention and treatment.

Government should create employment opportunities to reduce the magnitude of unemployment. In this way the prevalence of hepatitis C will reduce because unemployment is positively associated with HCV.

The higher prevalence of hepatitis C in underdeveloped countries like Pakistan points towards the lack of economic resources needed to implement prevention policies, thus generating a rising incidence for chronic viral hepatitis.

Management of long term consequences is also impaired by the lack of economic support. Access to medical care should be improved not only physical but also economic, social and cultural access has to be provided.

One of the indicators of sustainable development targets physical access to primary health care services, including preventive, curative and palliative care for communicable diseases like hepatitis C. These are important elements in ensuring health and wellbeing.

The theme of hepatitis C on hepatitis day in 2018 was “Finding Missing Million” which implies that more than 80% of infected persons with hepatitis C in the world did not know about their disease. So, government should start hepatitis screening in every hospital even in rural areas so that infected people should be diagnosed and treated. In this way the prevalence of hepatitis C would be reduce in Pakistan.

The mass media could play a vital role to decrease the prevalence of hepatitis C by spreading awareness in general public. For this government should provide moral as well as financial support to media.

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# APPENDIX-A

## QUESTIONNAIRE

Socio-economics characteristics of Hepatitis C patients: A Case Study of hepatitis C Patients in a public sector hospital Lahore Pakistan.

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|                                                                 |                                                                               |                                             |                                           |
|-----------------------------------------------------------------|-------------------------------------------------------------------------------|---------------------------------------------|-------------------------------------------|
| <b>Age:</b>                                                     | <input type="checkbox"/> 11-20                                                | <input type="checkbox"/> 21-30              | <input type="checkbox"/> 31-40            |
|                                                                 | <input type="checkbox"/> 41-50                                                | <input type="checkbox"/> 51-60              | <input type="checkbox"/> Above 60.        |
| <b>Gender:</b>                                                  | <input type="checkbox"/> Male                                                 | <input type="checkbox"/> Female             |                                           |
| <b>Marital Status:</b>                                          | <input type="checkbox"/> Unmarried                                            | <input type="checkbox"/> Married            |                                           |
| <b>Income of the household</b>                                  | <input type="checkbox"/> <10000                                               | <input type="checkbox"/> 10001-20000        | <input type="checkbox"/> 20001-30000      |
|                                                                 | <input type="checkbox"/> 30001-40000                                          | <input type="checkbox"/> 40001-50000        | <input type="checkbox"/> >50000           |
| <b>Experience</b>                                               | <input type="checkbox"/> Less than one year                                   | <input type="checkbox"/> 1-3 years          |                                           |
|                                                                 | <input type="checkbox"/> 3-5 years                                            | <input type="checkbox"/> 5-10 years or more |                                           |
| <b>Education of Respondent:</b>                                 | <input type="checkbox"/> No education                                         | <input type="checkbox"/> Primary            | <input type="checkbox"/> Middle           |
|                                                                 | <input type="checkbox"/> Matric                                               | <input type="checkbox"/> Intermediate       | <input type="checkbox"/> Higher Education |
| <b>Employment Status of Respondent</b>                          | <input type="checkbox"/> Currently Unemployed                                 | <input type="checkbox"/> Currently Employed |                                           |
| <b>Occupation of respondent</b>                                 | <input type="checkbox"/> Unemployed                                           | <input type="checkbox"/> Labor              | <input type="checkbox"/> Retired Person   |
|                                                                 | <input type="checkbox"/> Self-employed/Business Owner/ Public Sector Employee |                                             |                                           |
| <b>Area of Residence</b>                                        | <input type="checkbox"/> Urban                                                | <input type="checkbox"/> Rural              |                                           |
| <b>Hepatitis C is Preventable?</b>                              | <input type="checkbox"/> No                                                   | <input type="checkbox"/> Yes                |                                           |
| <b>Exposure to mass media (Newspaper, Radio and Television)</b> | <input type="checkbox"/> No                                                   | <input type="checkbox"/> Yes                |                                           |
| <b>Number of rooms in the House:</b>                            | _____                                                                         |                                             |                                           |
| <b>Number of People Living in the House:</b>                    | _____                                                                         |                                             |                                           |
| <b>Do you use the Internet?</b>                                 | <input type="checkbox"/> No                                                   | <input type="checkbox"/> Yes                |                                           |
| <b>Have your family history of HCV?</b>                         | <input type="checkbox"/> No                                                   | <input type="checkbox"/> Yes                |                                           |
| <b>History of Injection Drug Use?</b>                           | <input type="checkbox"/> No                                                   | <input type="checkbox"/> Yes                |                                           |
| <b>Hepatitis C is</b>                                           | <input type="checkbox"/> Negative                                             | <input type="checkbox"/> Positive           |                                           |