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***Corresponding author:** Muhammad Shakeel, PhD,
Visiting Faculty at University of the Punjab and
Independent Researcher, Lahore, Pakistan,
Email: m.shakeel32@gmail.com

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Research Article

Socio-economic assessments of Hepatitis C Virus infection: Evidence from Vehari district of Pakistan

Dilshad Ahmed¹, Muhammad Shakeel^{2*}, Bilal Tariq¹ and Tariq Mahmood¹

¹COMSATS University Islamabad, Vehari Campus, Pakistan

²Visiting Faculty at University of the Punjab and Independent Researcher, Lahore, Pakistan

Abstract

The present study corroborates the annual average economic burden of Hepatitis C virus (HCV) and socio-economic factors concerning awareness of HCV in Pakistan. The data of 100 patients collected via conducting interviews/questionnaire from different hospitals to gauge the direct/indirect pecuniary costs of HCV infection. Bottom up approach, Human capital approach and Tobit model were applied to compute the costs and determinants of HCV and its awareness. Results demonstrate that annual average economic burden was 1379.2734 USD. The knowledge/awareness status is vulnerable implying that most of the population has limited knowledge about HCV. Poverty and low levels of schooling years are amidst the main causes of low awareness vis-a-vis HCV and their cures, ceteris paribus. Income, education and test screening have positive impact on knowledge score of HCV. The findings imply for promotion of awareness campaigns and development of diagnostic centers to increase the knowledge score and early diagnostic of HCV.

Introduction

Hepatitis C is an ailment disturbing the functionality of human Liver developed vis-à-vis the Hepatitis C virus [1]. The HCV is considered responsible of causing both the kinds of Hepatitis namely acute Hepatitis and chronic Hepatitis. Globally calculated 71 million people are infected from the chronic Hepatitis C disease. Almost 15-45% of long-sufferings impulsively eliminate the disease in 180 days after infection without getting any kind of care [1]; the remaining 60 to 80% of infection will lead to the chronic Hepatitis C virus. From these 60 to 80% chronic HCV patients almost 15 to 30% are prone to the dangerous Liver cirrhosis in subsequent 20 years. Around 399,000 HCV infected patients give up the ghost in every 20 month [1]. The deaths caused by the liver Cancer are 788,000. A big part of these deaths (more than half, 60%) done by long-term results of chronic Hepatitis B and C toxicities (WHO Cancer day, 2018).

The consequences of Hepatitis C are Worldwide including:

the highly infected areas from Hepatitis C virus of Eastern Mediterranean and European areas, by the spread of Hepatitis of 2.3 percent and 1.5 percent respectively [1]. Spread of this virus in other areas changes from 0.5 percent to 1.0 percent [1]. The area maximum affected by Hepatitis C virus is Egypt. 22 percent of Blood donors are affected from HCV, each year deaths are occurring due to Hepatitis C are 40,000. Total infected population is 15 million. Every year new infected population is 170,000 to 200,000 (WHO, 2015). The population is infected from Hepatitis C in USA is 3.2 million (USA H and H surveys, 2017). Around 14 million people are suffering from HCV in European Union (WHO, 2017).

Hepatitis C is also affecting the lives of Pakistan population. So for various studies highlights the existence of HCV in Pakistan. The most important issues of developing states of Pakistan are Hepatitis B and C [2]. More than 20 million individuals become yearly infected with this virus worldwide and among those, 350 million individuals are chronic carriers (WHO, 2012). Universally, 2.2% of the aggregate residents are



distress from HCV (Alter, et al. 2007). HCV is flatter into a big well-being question of mostly emerging nations while Pakistan has the second most occurrence rate (8%) of Hepatitis C [3]. HBV and HCV illnesses have general wellbeing dangers to most unindustrialized states where medical facilities backgrounds do not have the sufficient apparatus to cope with the higher probabilities of detoxification [4]. Furthermore, there is no vaccination to prevent Hepatitis C [5]. Consequently, awareness and knowledge augmentation about HCV is one way and providing the apparatus for the treatment is another way to control this disease.

Various studies corroborated that people have somewhat inadequate/limited knowledge and awareness about Hepatitis B and C disease especially in underdeveloped regions including Pakistan [6-9]. The numbers of HCV patients are bit higher in rural regions than metropolitan regions of Pakistan (Aziz, et al. 2011). This is somewhat wanting outcome concerning healthy and sustainable environment because 66% of residents live in rural areas in Pakistan (Shaikh, et al. 2005). Punjab is the highly populated province of Pakistan and around 50,000 people are infected from HCV in last six months (dawn paper, 19 December 2017).

The work done is in dire need of awareness [10-12], risk factors, treatment, preferences, barbers role in spreading Hepatitis, productivity loss and responses of the general population towards Hepatitis after diagnostician [13-17]. Considering the work done so far in the this regard, the present study endeavors to gauge the economic costs of HCV and the proviso for the delicate levels of the ailment concerning social, economical and Governmental aspects in the modeling framework of district Vehari, Pakistan. The objectives of the study are as follows:

- To compute the economic burden of the Hepatitis C infection
- Gauging Awareness status concerning HCV intertwined the rural and urban areas of southern Punjab
- Suggesting the policy implication based on the empirical findings/calculations of the study.

The findings of the study are potentially contributor towards achieving the low cost of HCV treatment and controlling the diseases with respect to optimal level of apparatuses as well as awareness strategies under Government/Sub-Government basis. The rest of the paper is structured with the description of methodology and data, Results and Conclusion of the study.

Methodology and Data

The study has been conducted on the primary data collected from district Vehari, Punjab Pakistan. List of 500 HCV patients were obtained from DHQ hospital Vehari. Amid these, 100 patients were selected randomly to find the economic burden of Hepatitis. 100 respondents were interviewed to find the awareness status of Hepatitis in general population of the district. Questionnaire-Performa was employed to obtain the information. Bottom up approach is used to calculate the direct

pecuniary cost and Human capital approach is employed to compute indirect pecuniary cost. The subsequent sub-sections elaborate the concerns of calculation in a precise manner.

Economic burden

Variables used in the calculation of economic burden are employed on the basis of the study, Sepehrimanesh and Safarpur (2016) for Iran, on the issue of economic burden of Hepatitis C virus infection analyzing the issue in detail. Economic burden is divided into two costs: direct costs and indirect costs. The sum of the cost is Economic Burden (EB).

$$EB = \text{Direct cost} + \text{Indirect cost} \quad (1)$$

Direct cost

Direct cost is further divided into direct medical cost and direct non-medical cost. Direct medical cost is the sum of annual average outpatient expenditure and annual average self-medication expenditure. Equation 2 shows the direct medical cost.

$$DMC = AOE + ASE \quad (2)$$

DMC is direct medical cost. AOE is annual outpatient expenditure. ASE is annual self-medication expenditure. Annual outpatient expenditure is calculated from one visit expenditure and then multiplying it with number of visits in six months and then multiply it with two to get annual outpatient expenditure. Annual self-medication expenditure is calculated by the same method as in annual average outpatient expenditure. Direct non-medical cost is the expenditure done on meals, travelling cost and travelling time (measures in term of income loss). Equation 3 shows the direct non-medical cost.

$$DNMC = \text{one check up income loss (due to travelling time)} + \text{per visit travelling cost} + \text{meal cost of one visit} \times \text{visits in six months} \times 2 \quad (3)$$

Indirect cost

Indirect cost is the combination of costs beard by patients and state other than medical cost. Indirect cost includes income loss due to sickness, income loss for the sake of care attainment and average care service provider wage. Equation 4 explains the indirect cost.

$$IC = \text{absence from work due to sickness} + \text{absence from work due to care} + \text{cost of care service giver} \quad (4)$$

IC is indirect cost. Absence from work is measured in terms of getting leaves from work due to sickness and for care in six months and multiply these leaves from per day income and then multiply it with two to get annual income loss due to sickness. Cost of care service provider is measured in terms of wage rate of service provider.

Awareness

The awareness variables used for this study are taken following the other study of impact of Hepatitis on agriculture productivity and awareness about disease in rural areas (Sardar,



et al. 2017). Tobit model was used for the determination of socio-economic variables coupled with the familiarity of Hepatitis C virus infection like other studies (Ahmad and Ahmad 2007, Anwar, et al. 2007). Equation 5 add all the variables included in evaluating the awareness status in general population.

$$Knowledge = C + a_1$$

$age + a_2 education + a_3 family size + a_4 earnings + a_5 reside with infected person + a_6 screening test$ (5)

Knowledge = information with reference to Hepatitis. Knowledge score was classified from 0.00 to 1.00. C is intercept denoting the deterministic impact of unobserved variables of the analysis. Age is the interviewed persons' age considered. Education is calculated with the number of schooling years. family size is counting of household members of the respondent. Earnings is entire monthly earnings adding the earning of household member and revenue from other possessions (rental fee, bequest or remittances). Reside with infected person, indicates that either respondent ever lived with HCV infected patient or not. Screening test, indicates that does respondent ever undergone some screening test for HCV/ HBV or not. These variables nonetheless are quite important and imperative in gauging the linkages of socio-economic factors with respect to HCV and its control via awareness and other precautionary measures in the selected region of Vehari, Pakistan. In addition, the findings may help to cut extempore and inappropriate measures to lower the levels of HCV and may suggest and devise implications for optimal apparatus and measures to control the issue pertaining to the region.

Results and discussion

The present segment elaborates the empirical outputs of the analysis and has three sub-segments of the results demonstrating the economic burden, knowledge score and socio-economic determinants of HCV awareness in Vehari, Pakistan.

Annual average economic burden of Hepatitis C infection

Economic burden is measure in USD. As the 1USD is equal 115.663 on 31 March 2018 (SBP).The average total cost of Hepatitis C infection is sum of average outpatient expenditure, average self-medication expenditure, average direct non-medical cost, the average care giver cost, average income loss due to sickness and average working day leaves (income loss) due sickness.

Notwithstanding, these values are demonstrating a high average cost of economic load of HCV in the underdeveloped region of Vehari. Specifically, Table 1 shows the estimated annual average total economic burden of hepatitis C infection. The average economic burden in dollars is 1379.2734 USD. It has been calculated with the formula given in equation 1 to 4 of section 2. This finding implied that HCV contributes to the economic load/burden in unsubtle manner in the region.

Descriptive statistics for Knowledge status of Hepatitis C infection

This paper analyzes the knowledge status of Hepatitis C infection in the rural and urban areas of the Vehari. The respondents interviewed were randomly selected. Respondents were: Professionals, Students, Medical staff, skilled workers, labor, farmers and housewives.

Table 2 explains the scores of knowledge which general population have about the Hepatitis C disease. Table 2 shows that 16 percent, 6 percent, 10 percent, 17 percent, 10 percent, 3 percent, 4 percent, 2 percent, 5 percent, 5 percent and 22 percent of population have knowledge score about hepatitis is 0.00 %, 0.10 %, 0.20 %, 0.30 %, 0.40 %, 0.50 %, 0.60 %, 0.70 %, 0.80 %, 0.90 % and 1.00 percent knowledge score about Hepatitis respectively. Amid this whole sample of population about 16 percent of population is completely unaware about the Hepatitis in the sense that they never heard about the name of the fatal disease of Hepatitis in their entire life time. The results of the study were almost similar to the other study (e.g. Sardar, et al. 2017) concerning the issue for other region. The minor difference is nevertheless due to difference in sample collection of respondents.

Econometric model analysis

Analyze the knowledge status by using software E-views version 9.0 and applying Tobit model as other study employed for awareness of Hepatitis C in Faisalabad [7]. Table 3 shows

Table 1: Annual average economic burden of Hepatitis C infection.

Sr no	Variables used in finding the average total cost of hepatitis c infection	Cost in USD / visits in
1	Annual average outpatient expenditure	623.2528
2	Annual average self-medication expenditure	141.044
3	Annual average annual direct non-medical expenditure	183.2166
4	Annual average indirect cost	431.76
5	Annual average economic burden	1379.2734

Table 2: Ratings of knowledge/Awareness Counts.

Awareness Count	%	Cumulative %
0.00	16	16
0.10	6	22
0.20	10	32
0.30	17	49
0.40	10	59
0.50	3	62
0.60	4	66
0.70	2	68
0.80	5	73
0.90	5	78
1.00	22	100
Total	100	

This paper analyzes the knowledge status in descriptive statistics by using the SPSS version 20

**Table 3:** Determinants of knowledge regarding Hepatitis C infection.

Sr No	Factors	Estimates	S.E.	Z stats
1	C	-0.403	0.105	-3.815*
2	Age	-0.002	0.002	-1.251
3	Education	0.010	0.004	2.138*
4	Income	1.16	2.19	5.294*
5	No of family members	0.035	0.013	2.690*
6	Respondent live with hepatitis patient	0.252	0.071	3.541*
7	Screening test	0.229	0.054	4.224*

* denotes < 1% level of significance

the determinants of knowledge regarding Hepatitis C infection. The coefficient whose Z. Statistics is greater from 2 is taken as significant as other study on awareness of Hepatitis C in Faisalabad follows this way as alluded to earlier. Age was found adversely related with the awareness and this finding endorsed the findings of Sardar, et al. [7], Yaseen, et al. [18] and Brouard, et al. [19]. Specifically, coefficient value of the age was -1.251 and p value showed that this variable is statistically significant at the 1% selected level of significance. In the same way, years of schooling are positively related with awareness and coefficient value of the education is 0.010 and p-value indicates that education is statistically significant impacting the awareness concerning the HCV. This implies that people with less knowledge are more vulnerable to the Hepatitis C infection. Earnings/Income is positively related with the knowledge and coefficient value of the income is 1.116 with significant p-value showing impact of earnings is statistically significant in spreading the awareness regarding HCV. Family size was recorded as head counts. It is found that number of family members is positively related with the knowledge score of Hepatitis C infection. The coefficient value of the family size is 0.035 and p-value shows that this variable is statistically significant. So, as smaller the family size, family will be more vulnerable to the disease *ceteris paribus*.

These findings are more similar to the results of the Sardar, et al. [7] and Haq, et al. [20]. The people living with Hepatitis C patients are positively related with the knowledge score of Hepatitis C infection, as the exposure to HCV during experience with them. The coefficient value of the respondent living with the Hepatitis C infection is found out to be 0.252 with p- showing that this variable has an impact which statistically significant. It is found out that the screening test is positively related with the knowledge score of Hepatitis C infection. The coefficient value of the screening test is the 0.229 with p-value showing that screen testing's impact is statistically significant. This implies that people opting for screening tests could have better knowledge about the Hepatitis C infection and their remedies per se.

Conclusion and suggestion

It has been corroborated that Pakistan is the World second biggest country prone to fatal diseases of Hepatitis C, after Egypt being the first. The annual average economic burden has been gauged with a value of 1379.2734 USD in Pakistan by the study which is comparatively lower as the contemporary

empirical evidence indicates that economic burden of Hepatitis C infection is 1625.50 USD in Iran [21]; among others. This economic burden has been observed and recorded in the Southern Punjab including the district Vehari as a sample of population. This average economic burden may be different from other regions of the country due to people social status such as income, education and distance from hospital among others, *ceteris paribus* [22–27].

Notwithstanding, this is still the huge economic burden for the country where GDP per capita income is 1443.6 USD (World Bank 2016). This also implies that on average it is unequivocal to shoulder the burden of HCV treatment easily by the average individual of the region selected with respect to income/earnings. This is because means of attaining the entire list of necessities of life has to be fulfilled with the average amount of income as alluded earlier and any individual infected from HCV may have difficulties to cure the disease due to estimated high economic burden.

The finding of this study also corroborates that only 22% of the sampled population has complete knowledge about the Hepatitis C virus infection, the major part (86%) of these 22% were the medical staff including doctors. The knowledge/awareness status is quite vulnerable implying that most of the population has limited knowledge about Hepatitis C in the region. Poverty and low levels of schooling/education are amidst the main causes of low awareness vis-a-vis HCV and their cures, *ceteris paribus*. Income, education and test screening have positive impact on knowledge score of HCV.

It has been corroborated that awareness about the disease and early diagnostic of the disease can inter alia help to reduce the economic burden of the disease. Pakistan has the best way to stop and eliminate the Hepatitis by creating awareness in the general population. Due to knowledge spillover effect, the permeated information on HCV and their remedies could be pervasive and easily available to the population..

Moreover, launching new campaigns about the knowledge of preventive measures for HCV is also imperative for general public especially to rural population's awareness. Building new set ups with proper functioning diagnostic center of Hepatitis C virus at local, district and provincial levels is pivotal for the prompt action against the HCV spread and for the appropriate treatment of infected patients. Last but not least, encouraging general public to go through HCV test on regular basis will help in the early diagnostic of HCV disease and therein will help in reducing the economic burden of Hepatitis C virus, *ceteris paribus*.

The extant issue of the study has been assessed with respect to the Southern region of Punjab and nonetheless could be further investigated with respect to other regions of the country. These kinds of analyses could be of much use in developing further insights concerning HCV and its control in Pakistan.

Informed consent

All authors are aware of the consequences/outcomes of the present work and agreed the submission to the journal.



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