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Catastrophic Health Expenditure, Distress Financing and Impoverishment due to Out-of-Pocket Expenses for Healthcare among Patients with Chronic Liver Disease: A Cross-sectional Study among Hospitalized Patients in Bangladesh

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Abstract

Out-of-pocket (OOP) expenses for hospitalized patients with chronic liver disease (CLD) poses an economic challenge on affected household in the form of catastrophic health expenditure (CHE), distress financing and impoverishment. OOP Expenses data for hospitalized CLD patients from Bangladesh is scarce. This study aimed to estimate the OOP expenses and resulting CHE, distress financing and impoverishment among hospitalized patients with CLD. This cross-sectional study was conducted among conveniently selected 107 diagnosed CLD patients admitted at Bangabandhu Sheikh Mujib Medical University (BSMMU) and Dhaka Medical College Hospital (DMCH) aged 18 years and above. Data were collected from the respondents using a semi-structured questionnaire through face to face interview during discharge from hospital. Out of pocket expenditure for chronic liver disease in selected hospitals was Bangladeshi Taka (BDT) 19,262. Direct medical, direct non-medical and indirect cost was BDT 16,240; 2,165 and 1,510, respectively. Investigation cost and medicine cost contributed to 48.48% and 31.81% of the total OOP expenses, respectively. At 10% threshold level, 29% of the respondents were affected by CHE. 64.5% of the respondents were facing distress financing due to OOP expenses. Among the respondents, 1.9% slipped below the international poverty line of \$1.90 (BDT 161.10, in 2019). There was statistically significant ($p < 0.05$) difference among the mean OOP expenses for different etiological types of chronic liver disease. The study concluded that it requires establishing a more accessible and affordable decentralized health care system for CLD treatment along with the implementation of financial risk protection.

Keywords: Catastrophic Health Expenditure, Distress Financing, Impoverishment, Out-of-pocket Expenses, Liver disease

1. Introduction

Chronic liver diseases (CLD) have become a global public health issue and one of the leading causes of morbidity and mortality irrespective of age, gender, region or race, chronic hepatitis-B, chronic hepatitis-C and liver cirrhosis affects nearly a billion people, and cause about 2 million deaths each year, accounting for 3.5% of all deaths worldwide (Byass, 2014; Xiao et al., 2019; Marcellin & Kutala, 2018). Deaths due to complication of liver cirrhosis are the 11th most common reason of death worldwide (Asrani, Devarbhavi, Eaton & Kamath, 2019). The estimated worldwide prevalence of hepatitis-B is 3.6%, hepatitis-C is 2.5% and liver cirrhosis is 8.5% (EASL, 2012; Hope, Eramova, Capurro & Donoghoe, 2014). In Bangladesh, more than 8 million people suffer from hepatitis-B (Mahtab et al., 2008). Prevalence of hepatitis-B shows substantial heterogeneity among studies, but from recent studies among Bangladeshi population, hepatitis-B shows a prevalence of 4-5.6% (Uz-Zaman, Rahman & Yasmin, 2018; Noor-E-Alam, 2018). On the other hand, hepatitis C is prevalent in 0.2-1% of the citizens of Bangladesh (Mamun-Al-Mahtab, 2016).

Due to the demographic and epidemiological transition, non-communicable disease like CLD is becoming a major economic burden (Stepanova et al., 2017), as it imposes heavy costs on both the healthcare system and the affected households. In a low middle-income country like Bangladesh, health expenses are mostly paid by affected households in the form of out-of-pocket (OOP) expenses (van Doorslaer et al., 2006; van Doorslaer et al., 2007; Huq, Al-Amin Howlader & Kabir, 2015). OOP expenses are primary means of financing healthcare in much of Asia, where the ratio of OOP expenses to total health expenditure ranges from 30 to 82%. In Bangladesh OOP cost, as a share of total health expenditure was 62.4 % in 2003, which became 67% in 2015 (BNHA-V, 2018). In 2017, OOP expenses raised to 73.9% of the total health expenses (World Data Atlas, 2020), showing an average growth rate of 1.22%. On 2015, Bangladesh spent 3.4 % of GDP on health and on 2017, 2.3% (BNHA-V, 2018; World Data Atlas, 2020). Annual per capita health expenses were \$27 in 2015 and \$36 in 2017 (BNHA-V, 2018; World Data Atlas, 2020), of which, more than two third was paid by the households, exerting one of the highest OOP healthcare expenses on affected households economy, exposing them to significant financial risk with potential catastrophic health expenditure where households spends more than 10% of their yearly income (Azzani, Roslani & Su, 2019). When OOP healthcare expense become high enough, households, especially those below or near poverty line spends a substantial share of their income, which they are unable to recuperate from existing resources, disrupting their living standards and ultimately slip below the poverty line (Huq, Al-Amin, Howlader & Kabir, 2015) In more extreme cases, to meet the expenses, it can cause households to resort to borrowing or some other means of collecting cash, exposing them to debt, which ultimately push them further down the poverty line (Khan, Ahmed & Evans, 2017). The OOP expenses for health care services have always been quite expensive for general population of Bangladesh (Huq, Al-Amin Howlader & Kabir, 2015) causing considerable financial risk as 25.5% of the population in Bangladesh lives below poverty line and 12.3% lives in extreme poverty (Kabir, Begum & Hossain, 2006; Chowdhury & Hossain, 2019). Each year OOP expenses for health care services push another 4.2% to extreme poverty (Huq, Al-Amin Howlader & Kabir, 2015) .Globally, each year, 25 million household is being affected by impoverishment due to OOP expenses for healthcare needs (Xu et al., 2006). The impoverishment effect of OOP expenses for health care services is most severe in low- and middle-income countries, matching Bangladesh, where poverty rate is much higher (Huq, Al-Amin, Howlader & Kabir, 2015) .

While there are researches being conducted on the prevalence and distribution of CLD among Bangladeshi population, any research that addresses the issues of financial burden of CLD treatment among hospitalized patients in Bangladesh couldn't be found. An evaluation of out-of-pocket expenses of hospitalized patients with CLD will give us a better understanding of the financial impact of chronic liver disease on patients and their families. This study also assessed the prevalence of catastrophic health expenditure and distress financing along with change in poverty head count due to OOP expenses.

2. Method

This cross-sectional study was conducted among hospitalized patients with CLD. Patients were enrolled from two healthcare institutions, namely; Bangabandhu Sheikh Mujib Medical University (BSMMU), only medical university in Bangladesh and Dhaka Medical College Hospital (DMCH), the largest medical college hospital in Bangladesh. The institutions were chosen due to the high volume of patients seeking healthcare services there. Patients were enrolled for the study from the gastroenterology and hepatology departments of these two hospitals for the duration of April 2019 to September 2019. A total of 107 patients were enrolled matching the selection criteria during the six months of data collection. Selection criteria included hospitalized and already diagnosed cases of chronic liver disease patients. Patients diagnosed with chronic hepatitis-B, chronic hepatitis-C and liver cirrhosis were considered eligible for enrolment in the study. Each patient was interviewed once, using a pretested semi-structured questionnaire during their discharge from the hospital. During interview, detailed socio-demographic and socio-economic data such as age, sex, religion, residence, education, occupation, monthly household income and source of healthcare expenses were taken. Also, data on diagnosed disease, duration of diagnosed disease, duration of hospital stay, number of hospitalizations in last six months and bed type during hospital stay were taken.

Data on expenses for investigations, medical supplies, medicines, blood transfusion and bed rent were collected and used to calculate direct medical expenses. Data on expenses for travel and dietary needs of the patients were collected and used to calculate direct non-medical expenses. Data on unofficial payments and expenses for travel and dietary purposes of the attendants were taken and had calculated as indirect expenses. Combining the direct medical expenses, direct non-medical expenses and indirect expenses gave us the total out-of-pocket expenses. The prevalence of catastrophic health expenditure (CHE), distress financing and impoverishment due to OOP expenses were calculated. CHE was defined as any OOP expenses on healthcare exceeding 10% of total yearly income of the household. CHE was also estimated up to 40% cut-off value at every 5% interval. Distress financing was defined by when a household borrowed money or sold property to meet the OOP expenses for health care. Impoverishment was estimated by the number of poverty headcount before and after the OOP expenses for health care, using the international poverty line.

Statistical analyses were carried out by using Statistical Package for Social Sciences version 25.0 for Windows. Prior to the study, necessary ethical clearance was sought from the Institutional Review Board of National Institute of Preventive and Social Medicine (NIPSOM) and concerned authorities of Bangabandhu Sheikh Mujib Medical University (BSMMU) and Dhaka Medical College Hospital (DMCH). In addition, participants' written consent was taken before collecting the data.

3. Results

Table 1: Socio-demographic and economic factors of study population (n = 107)

Criteria	N = 107 (100%)	OOP Expenses (In BDT) Mean (95% CI)	Significance
Age Group in Years			
18 – 29	5 (4.7)	28,398 (8,230-48,566)	0.056 ^a
30 – 44	26 (24.3)	17,343 (12,984-21,702)	
45 – 59	51 (47.7)	22,296 (16,789-27,803)	
≥ 60	25 (23.4)	13,240 (9,724-16,756)	
Sex			
Male	69 (64.5)	19,900 (15,702-24,098)	0.578 ^b
Female	38 (35.5)	18,102 (13,943-22,262)	
Housing Status			
Rural	76 (71)	19,293 (15,405-23,180)	0.975 ^b
Urban	31 (29)	19,185 (14,421-23,950)	
Education			
Illiterate	16 (15)	17,427 (11,857-22,997)	0.684 ^a
PSC	48 (44.9)	21,431 (15,482-27,381)	
SSC	19 (17.8)	14,667 (9,786-19,548)	

HSC	16 (15)	18,303 (12,847-23,759)	
Graduate	5 (4.7)	22,110 (2,144-42,076)	
Honors	3 (2.8)	23,800 (2,599-45,001)	
Occupation			
Senior Official	4 (3.7)	13,300 (1,180-25,420)	
Professional	4 (3.7)	26,375 (317-53,067)	
Technician	5 (4.7)	9,580 (4,727-14,433)	
Clerk	3 (2.8)	27,717 (10,887-44,547)	
Skilled Worker	5 (4.7)	39,540 (5,732-84,812)	0.169 ^a
Agricultural Worker	8 (7.5)	17,679 (8,622-26,735)	
Craft and Related Trade Worker	25 (23.4)	18,383 (11,011-25,755)	
Industry Worker	6 (5.6)	20,700 (6,569-34,831)	
Elementary Occupation	7 (6.5)	16,743 (664-32,822)	
Unemployed	40 (37.4)	18,279 (14,357-22,200)	
Total Monthly Income of the Family (In BDT)			
46,800 – 93,596	5 (4.7)	18,700 (4,908-42,308)	
35,010 – 46,799	9 (8.4)	21,408 (13,385-29,432)	
23,399 – 35,009	27 (25.2)	20,962 (15,669-26,255)	0.719 ^a
14,038 – 23,398	37 (34.6)	20,378 (13,507-27,249)	
4,685 – 14,037	29 (27.1)	15,684 (11,156-20,213)	
Socioeconomic Status			
Upper Middle	61 (57)	20,033 (15,464-24,601)	
Lower Middle	32 (29.9)	18,600 (13,722-23,479)	0.826 ^a
Lower	14 (13.1)	17,413 (10,427-24,398)	
Source of Healthcare Expenditure			
Household savings	69 (64.5)	18,197 (14,473-21,922)	
Loan from relatives	21 (19.6)	22,913 (13,735-32,090)	0.496 ^a
Donation or charity	17 (15.9)	19,071 (13,423-24,718)	
Diagnosis			
Liver Cirrhosis	52 (48.6)	23,114 (17,878-28,350)	
Chronic Hepatitis-B	44 (41.1)	13,863 (10,710-17,016)	<0.05 ^a
Chronic Hepatitis-C	11 (10.3)	22,645 (13,329-31,960)	
Duration of Diagnosed Disease			
Up to 6 months	87 (81.3)	18,208 (15,128-21,288)	
6 months to 1 year	11 (10.3)	21,413 (14,045-28,781)	0.272 ^a
More than 1 year	9 (8.4)	26,817 (4,174-49,459)	
Duration of Hospital Stay			
Up to 1 week	68 (63.6)	12,745 (10,576-14,914)	
1 to 2 weeks	35 (32.7)	26,378 (22,520-30,236)	<0.001 ^a
More than 2 weeks	4 (3.7)	67,775 (17,251-118,299)	
Number of Hospitalization in Last 6 Months			
1	92 (86.0)	19,290 (15,856-22,723)	
≥ 2	15 (14.0)	19,090 (12,885-25,295)	0.964 ^b
Bed Type			
Non-Paying bed	85 (79.4)	18,946 (15,393-22,499)	
Paying bed	22 (20.6)	20,482 (14,416-26,547)	0.688 ^b
Study Place			
Medical university	79 (73.8)	20,196 (16,249-24,144)	
Medical college hospital	28 (26.2)	16,625 (13,063-20,187)	0.309 ^b
Total	107 (100)		

a = One-way ANOVA, performed to check association with out of pocket payments

b = Independent Samples T-test, performed to check association with out of pocket payments

P < 0.05 is considered statistically significant.

Total 107 hospitalized CLD patients matching selection criteria were enrolled for the study. Nearly half of the hospitalizations were due to liver cirrhosis (48.6%) as shown in **Table 1**, followed by chronic hepatitis-B (41.1%). Statistically significant ($p < 0.05$) relation between disease type and the amount of OOP expenses were found. Study population were predominantly male (64.5%), aged 45 to 59 years (47.7%), Muslim (91.6%), from

rural areas (71%), completed primary education (44.9%), unemployed (37.4%) and according to “Modified Kuppuswamy Socioeconomic Scale” (Saleem, 2019) from Upper middle socioeconomic class (57%). Mean age of the respondents were 49.15 years and mean years of education was 7.98 years. Average monthly family income was BDT 21,822 and average monthly family expense was BDT 17,915. Mean duration for diagnosed disease was 7.07 months and mean duration for hospital stay was 6.99 days. Majority (81.3%) of the respondents had their disease diagnosed within last 6 months of the admission, 63.6% stayed up to one week in hospital and 86% were admitted in the hospital for the first time in past 6 months. More commonly patients were staying in non-paying bed (79.4%) and were from medical university (73.8%).

OOP expenses and its determinants-

Table 2: Distribution of healthcare expenses

Healthcare Expenses	Mean (95% CI)	% OOP Expenses
Direct Medical Cost (in BDT)		
Cost for investigation	9,338 (7,824 – 10,852)	48.48%
Cost for medical supplies	350 (280 – 421)	1.82%
Cost for drugs	6,128 (4,460 – 7,796)	31.81%
Cost for blood transfusion	75 (23 – 127)	0.39%
Cost for bed or cabin	348 (203 – 493)	1.81%
Total	16,240 (13,494 – 18,987)	84.31%
Direct Non-Medical Cost (in BDT)		
Cost for travel to hospital	1,387 (1,053 – 1,720)	7.20%
Cost for food and drinks	777 (638 – 917)	4.03%
Total	2,165 (1,783 – 2,547)	11.24%
Indirect Cost (in BDT)		
Unofficial payment on admission	26 (8 – 44)	0.13%
Unofficial payment for bed	40 (17 – 63)	0.21%
Unofficial payment for wheelchair	12 (4 – 20)	0.06%
Cost of food or drinks for attendant	990 (853 – 1126)	5.14%
Cost of travel for attendant	443 (263 – 623)	2.30%
Total	1,510 (1,304 – 1,718)	7.84%
Total Out of Pocket Expenses	19,262 (16,216 – 22,307)	100%

Mean direct medical cost was estimated to be BDT 16,240, which constituted 84.31% of the total OOP expenses (Table 2). Cost for investigation and drugs were the major contributor in the OOP expenses, 48.48% and 31.81% respectively. Mean direct non-medical cost was estimated to be BDT 2,165, which was 11.24% of the OOP expenses. Mean indirect cost was estimated to be BDT 1,510, which was 7.84% of the OOP expenses. Total OOP expenses were estimated to be BDT 19,262.

Distress financing-

The prevalence of distress financing for hospitalization due to OOP expenses for CLD was found to be 64.5%, 19.6% borrowed and 15.9% received money in the form of donation and charity from others to meet the OOP expenses (Table 1).

Catastrophic Health Expenditure (CHE)-

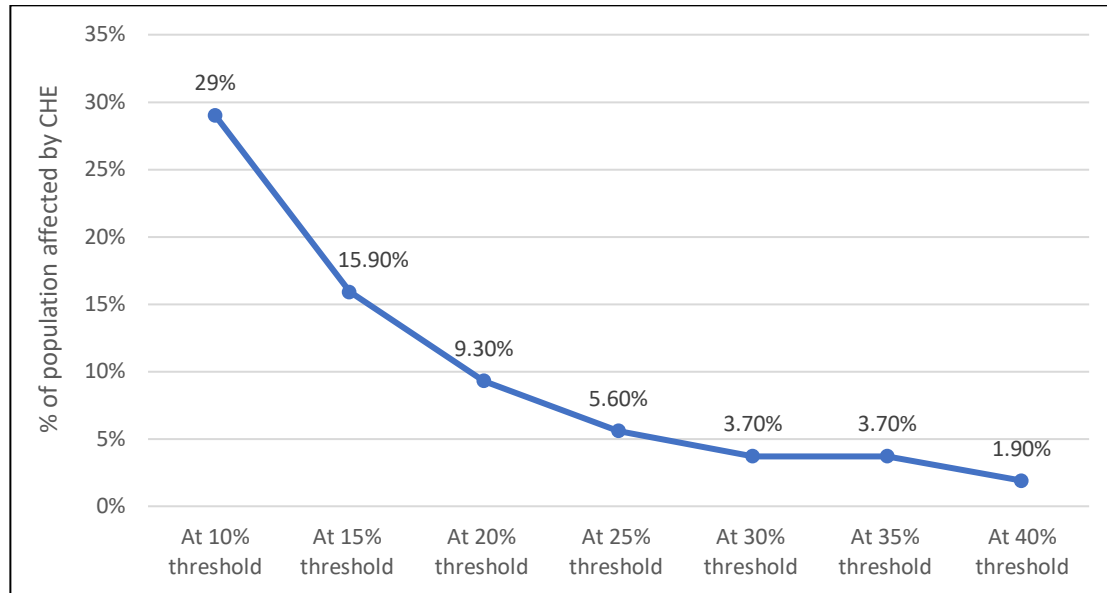


Figure 1: Catastrophic Health Expenditure at different cut-off values

The prevalence of catastrophic health expenditure for hospitalization due to CLD at 10% cut-off value was 29%. The prevalence of CHE decreased to 15.9% at 15% cut-off value and steadily decreased when cut-off value was increased, reaching 1.9% at 40% cut-off value, as shown in **Figure 1**.

Impoverishment-

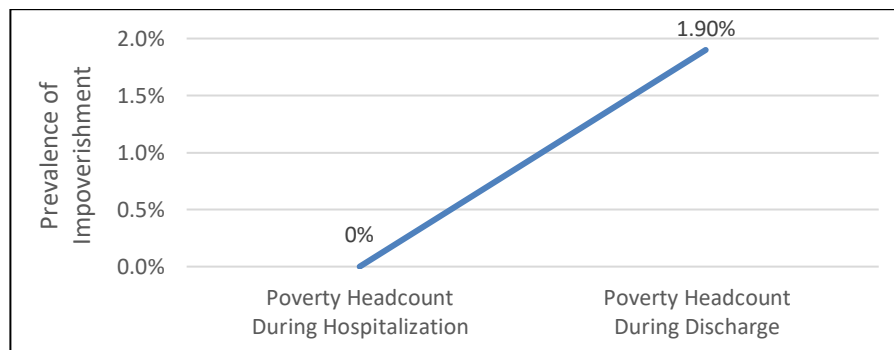


Figure 2: Poverty headcount before and after Out-of-Pocket expenses

Poverty head count as a result of OOP expenses due to hospitalization for CLD treatment was 1.9%. Before the hospitalization, no respondent was below the international poverty line, but after the OOP expenses incurred during the treatment, 1.9% of the study population fell below international poverty line (**Figure 2**).

4. Discussion

Chronic liver disease (CLD) is a major non-communicable disease in Bangladesh (Rahman et al., 2014; Islam & Biswas, 2014). The present study was conducted to identify economic impact of CLD in terms of out-of-pocket expenses, and prevalence of distress financing, catastrophic health expenditure and impoverishment due to hospitalization for CLD. Overall OOP expenses for hospitalization was estimated to be BDT 19,262. This study was conducted in two different hospitals, one was medical college hospital, and another was a medical university hospital. No significant difference was observed between the two centers in terms of money spent as OOP expenses (Table 1). The prevalence of distress financing was 64.5%, prevalence of catastrophic health expenditure was 29% at 10% cut-off value and 1.9% at 40% cut-off value. About 1.9% slipped below poverty line due to OOP expenses.

For this study, 107 patients were enrolled. With a 17.3% prevalence of Institutionalized care-seeking behavior for the Bangladeshi population (Rahman, Gilmour, Saito, Sultana & Shibuya, 2013), finding patients who match the selection criteria was difficult. The study population in the present study was predominantly male and aged 45 to 59 years. Prior studies have shown a higher prevalence of CLD in the population over 40 years (Rahman et al., 2014; Sajja, Mohan & Rockey, 2014; Kim, Kisseleva & Brenner, 2015), and in Bangladesh, there was male dominance (67.9%) among CLD patients (Rahman et al., 2014). The current study found that about three-quarters (71%) of respondents came from rural areas, which is consistent with previous public hospital-based research in Bangladesh (Pavel, Chakrabarty & Gow, 2016; Mahumud et al., 2017). This reflects the predominance of rural health seekers in government hospitals in Bangladesh.

In regards to OOP expenses, the amount of money spent by the population of the current study was a little bit higher (BDT 2,695) than a research conducted among the urban Bangladeshi population in 2020 (Rahman et al., 2020). The selection criteria between the participants in the two studies may be the reason behind this difference. The present study enrolled the study population from a pool of hospitalized patients at a medical college hospital and a medical university, with access to patients from all over the country, whereas Rahman et al. (2020) selected study population was only from urban households and took under consideration the amount of health expenses in last 30 days. In contrast, the running study took into account the expenses for the entirety of the duration of the hospitalization, yielding a higher OOP expense. Moreover, only patients with CLD were selected as participants in the present study, which usually requires further administration of investigation and medication, generally contributing to higher OOP costs (Weersink et al., 2019). However, compared to the neighboring country, such as India, the OOP expense for hospitalized patients with liver disease was found to be INR 17,794 (Kastor & Mohanty, 2018) (equivalent to BDT 22,627; using the average exchange rate in 2014, BDT 1 = INR 0.7864).

Among the OOP expenditure, the purchasing of medicine was found to be responsible for 31.81% which was the second biggest contributor to the total OOP expenses after cost for investigations of 48.48%. This is probably due to the disease management nature of the population in our study as hospitalized CLD patients require full and comprehensive investigation, and the cost of investigation is much higher in Bangladesh (Sarin et al., 2019). In previous studies (Prinja, Bahuguna, Duseja, Kaur & Chawla, 2018; Mahumud et al., 2017; Tahsina et al., 2017), cost for medicine and investigation were found to be the most distinctive feature of OOP expenses, contributing up to 62% of healthcare expenses.

Catastrophic health expenditure in the current study is found to be lower than Rahman et al. (2020) study (Rahman et al., 2020), 1.9% and 12.3% respectively, both at 40% cut-off value. Socio-demographic conditions play an important role in the variability of the results of these two studies as only 0.9% of the population in the present study belonged to the lower-socio-economic class and the others to the middle or upper-lower class according to the modified Kuppuswamy socio-economic scale of 2019 (Saleem, 2019), which indicates a higher capacity to spend behind healthcare and is less affected by catastrophic health expenditure. In contrast, at 10% cut-off values, the CHE in the current study was 29% which is 51% lower than in previous studies in liver patients in India (Kastor & Mohanty, 2018), this result is usually due to differences in sample size and criteria of the two studies. A prior study from Bangladesh showed the prevalence of CHE to be 14.2% at a 10% cut-off value (Khan, Ahmed & Evans, 2017) among the general population, which is considerably lower than the present study finding. Payments for inpatient care exceed 10% of total household expenditure for around 30% of hospitalized households. On the other hand, an India based nationally representative study showed a 10% cut-off level prevalence of CHE to be 30%, which is almost identical to the running study findings (Flores, Krishnakumar, O'Donnell & van Doorslaer, 2008). A retrospective observational study of health spending using data of household surveys in 133 countries between 1984 and 2015 found that the global incidence of catastrophic spending at the 10% threshold was 9.7% in 2000, 11.4% in 2005, and 11.7% in 2010 due to OOP expenditures (Wagstaff et al. 2018), which is lower than the current study findings.

Prevalence of distress financing was higher in current study than previous study among liver disease patients in Bangladesh (Rahman, Gilmour, Saito, Sultana & Shibuya, 2013). But the difference between these two studies became much smaller when the current study finding was compared to the prevalence of distress financing among the general population (Rahman, Gilmour, Saito, Sultana & Shibuya, 2013). Previous study showed the

prevalence of distress financing for hospitalized patients with liver disease to be 29.4% (Kastor & Mohanty, 2018) which is closer to the current study, and 49% for hospitalized CLD patients needing intensive care (Prinja, Bahuguna, Duseja, Kaur & Chawla, 2018) which is substantially higher than this study finding. In terms of borrowing money to meet OOP expenses, a controversial finding has observed in the present study as previous studies had found both higher and lower percentages of participants than the current study in this regard (Prinja, Bahuguna, Duseja, Kaur & Chawla, 2018; Flores, Krishnakumar, O'Donnell & van Doorslaer, 2008).

This study population showed the prevalence of impoverishment to be 1.9% due to OOP expenses for hospitalized CLD patients, substantially lower than the 3.5% found in previous study from Bangladesh (Khan, Ahmed & Evans, 2017). Compared to the present study, prevalence of impoverishment due to OOP expenses was found to be considerably higher than 1.9% reaching up to 11.40% in other countries (Khammarnia, Keshtkaran, Kavosi & Hayati, 2014; Arenliu Qosaj, Froeschl, Berisha, Bellaqa & Holle, 2018).

5. Limitations of the study

Patients and their attendants were asked about family income for past one year, while they did answer the study questions, there was a possibility of recall bias. Study samples were enrolled only from two hospitals and both are tertiary hospitals, acting as referral centers for other hospitals. Some of the patients received partial treatment at other facilities prior to getting admitted in one of these two hospitals and OOP expenses for that period was not recorded in this study. This might have resulted in an understatement of the overall OOP expenses than reported in this study. Since this study only included hospitalized cases, we were unable to estimate the cost of ambulatory care for CLD patients.

6. Conclusion

The financial burden of chronic liver disease among hospitalized patients is substantial for all socio-economic groups. Decentralization of healthcare facilities from center to periphery could reduce the need for travel to hospitals and shorten the duration of hospital visit, reducing the direct non-medical cost. Expenses for medicine and investigations are the biggest driver for high OOP expenses. Ensuring equitable and affordable access to medicine and medical investigations, especially from government healthcare facilities may reduce the direct medical expenses. This study showed the presence of unofficial payment in tertiary hospitals. By strengthening hospital administration and through proper workplace discipline, unofficial payments could be minimized, and indirect expenses for healthcare could be decreased which may further reduce OOP expenses. Results obtained from this study could be used as a basis for future study with a larger sample size from multiple hospitals of different tier from both public and private hospitals. Policy makers could utilize these findings to implement health policies to enable financial risk protection for economically vulnerable population, minimizing OOP expenses for health, thus minimizing the prevalence of CHE, distress financing and impoverishment.

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