
OUT OF POCKET EXPENDITURE OF END STAGE RENAL DISEASE PATIENTS FOR MAINTENANCE HAEMODIALYSIS

Asaduzzaman M¹, Islam S², Haque ME³, Patwary MHM⁴

ABSTRACT

Background: End stage renal disease (ESRD) is a major and growing public health problem in Bangladesh. It is linked to higher hospitalization rates, lost productivity, illness, and early death, and it is a major cost on people, health care systems, and societies. Haemodialysis as a life saving measure can save patients but out-of-pocket expenditure of Haemodialysis in Bangladesh is high in comparison to their monthly family income. Therefore, it places a significant financial strain on the families of the disease victims. The aim of this study was to find out the out-of-pocket expenditure of ESRD patients for maintenance haemodialysis.

Methods: This descriptive cross sectional study was carried out among 160 ESRD patients getting haemodialysis at Dialysis centre of a selected tertiary government hospital in Dhaka during the period of January to December 2022. Simple random sampling technique was followed. Data were collected by face to face interview with a semi-structured questionnaire and by check list reviewing medical documents.

Results: The mean (\pm SD) age of the respondents was 49.28 ± 12.706 years. Majority (60.6%) were male and 39.4% were female. Majority (29.4%) had secondary followed by 21.9% who had higher secondary level of education. About three fourths (71.9%) were from urban, 18.8% from rural, 8.1% from semi-urban areas and 1.3% were slum dwellers. The median of monthly family income was Tk. 20000 (interquartile range 15750). The median (IQR) total direct cost was Tk. 15983 (7203). The mean (\pm SD) total indirect cost was Tk. 5431.25 ± 1128.17 . The mean (\pm SD) total haemodialysis cost was Tk. 24205.59 ± 17164.580 .

Conclusion: Out-of-pocket expenditure of Haemodialysis in Bangladesh is high in comparison to monthly family income and it poses huge financial burden to the families of the victims of end stage renal disease. The study recommended cost effective measures like subsidized or free of cost treatment of ESRD and free of cost haemodialysis of patients to reduce the financial burden of the families.

Keywords: ESRD, Haemodialysis, Maintenance, Out-of-Pocket expenditure, Direct cost, Indirect cost.

1. Col Md. Asaduzzaman, DTM&H, MPH, 2. Brig Gen Shafiqul Islam, MPhil, MPH, 3.Col Md Emdadul Haque, MPH, MBA, MHI, 4. Md Helal Morshed Patwary, MS (Statistics).

INTRODUCTION

A considerable amount of the worldwide burden of non-communicable diseases (NCDs) is attributed to kidney diseases, which are also rising along with other non-communicable diseases like diabetes, hypertension, and cardiovascular disease, particularly in developing nations.¹ A good number of Chronic Kidney Disease (CKD) patients proceed to end stage renal disease (ESRD). If the kidneys are unable to sufficiently eliminate waste and water from the blood, it can be fatal, known as end-stage renal disease (ESRD). ESRD affects the activities of daily living because this disease affects physical, psychological, and emotional functions.

Ensuring that ESRD patients receive the best care possible globally is still a significant concern. Early detection of the disease and appropriate measures to prevent the disease will help to mitigate the challenge to a great extent. Approximately 2 million ESRD patients worldwide who regularly receive dialysis as a renal replacement therapy (RRT). Of them, 89% were on haemodialysis (HD), nearly 62% of the HD patients were being treated in high-income countries and the remaining 38% in low- and middle-income countries.² On the other hand, the lack of access to radiation therapy (RT) results in the deaths of about 1.5 million individuals annually, with the majority of these patients coming from developing countries, a strong indication that the prices are unaffordable for the average person.² The difficulties were co-morbidities, delayed presentation, the location of the renal care facilities, and the high cost of the suggested sufficient dialysis that prevented the patient from paying for it.³ Furthermore, in low-resource settings, there are fewer kidney transplant facilities and dialysis is more expensive than the financial situation of the

patients. Maintaining of dialysis quality and infection control is also a big challenge.

Kidney diseases are increasing due to diabetes, hypertension, taking NSAIDs, excessive use of antibiotics, taking herbal medicines, drinking contaminated water and eating adulterated food, living in an polluted environment etc.⁴ Out-of-pocket (OOP) expenditure refers to the portion of medical expenses a patient or his/her family member is responsible for paying. It imparts financial burden which have economic consequences for the family. A diagnosis of CKD/ESRD has significant effects on the family. Everyone involved experiences great discomfort, necessitating a high level of assistance, coping, and adapting. Families may experience an increase in the strain and responsibility of providing at-home care for a sick member, requiring a range of physical and emotional capacities. Furthermore, as most of medical treatments and haemodialysis are done during the working hours, there is a potential for increased loss of income for the patients as well as for the caregivers in the family leading to financial strain. Three main categories of rising expenses were associated with providing care for patients with end-stage renal disease (ESRD): direct, indirect, and intangible expenditures. Direct expenses comprise both non-medical expenditures like transportation fees and direct medical costs like the price of the medical services received. Indirect expenses include lost productivity from the illness when a patient needs to take time from work or is unable to do their job due to physical weakness or irregularities. On the other hand, intangible expenses include things like the price of pain and suffering associated with ESRD diagnosis and treatment.⁵ Families who provide care for an ESRD patient undergoing dialysis must pay huge amounts of money for the disease's

diagnosis, treatment, and aftercare. Four major themes emerged as contributing factors for these expenses: necessary travel; loss of income because of a reduction or termination of employment; out-of-pocket (OOP) treatment expenses and inability to draw an assistance programme to supplement or replace the lost income. Furthermore, a lot of the choices regarding the primary caregiver were based on gender. The wife is usually the one to cut work hours or discontinue employment, which has an impact on the family's financial stability as a whole.⁶

MATERIALS AND METHODS

This descriptive cross sectional study was carried out among 160 ESRD patients getting haemodialysis at Dialysis centre of Kurmitola General Hospital, a tertiary hospital in Dhaka during the period of January to December 2022. All adult patients of both sexes having End Stage Renal Disease (ESRD) attending at dialysis centre of Kurmitola General Hospital (KGH), Dhaka receiving at least 2 haemodialysis per week during the data collection period were the study population. Simple random sampling technique was followed. Data were collected with a pre-tested semi-structured questionnaire by face to face interview with the patients with ESRD taking haemodialysis. All collected data were checked and verified thoroughly. Analysis of data was done by the SPSS, version 25.0. For inferential statistics, non-parametric correlation analysis and ANOVA was done.

RESULTS

Total 160 ESRD patients getting haemodialysis at Dialysis centre of Kurmitola General Hospital, Dhaka during the period of January to December 2022 were included in the study.

Table-I: Socio demographic features of the respondents (n=160)

Characteristics		Frequency	Percent
Age (Years)	Upto 20	2	1.3
	21-30	10	6.3
	31-40	28	17.5
	41-50	48	30
	51-60	38	23.8
	61-70	26	16.3
	>70	8	5
	Total	160	100
Mean±SD : 49.28±12.706			
Gender	Male	97	60.6
	Female	63	39.4
Education	Illiterate	10	6.3
	Primary	33	20.6
	Secondary	47	29.4
	Higher secondary	35	21.9
	Graduate	14	8.8
	Masters	20	12.5
Occupation	Govt service	9	5.6
	Non Govt Service	17	10.6
	Unemployed	67	41.9
	Retired	8	5
	Business	15	9.4
	Farmer	3	1.9
	Day Labour	2	1.3
	House wife	39	24.4
Place of residence	Urban	115	71.9
	Semi-urban	13	8.1
	Rural	30	18.8
	Slum	2	1.3
Monthly family income	Upto 15000	54	33.8
	15001-30000	67	41.9
	30001-45000	11	6.9
	45001-60000	12	7.5
	>60000	16	10
	Total	160	100

The mean (±SD) age of the respondents was 49.28±12.706 years and the range was 19-79 years. Other socio-demographic characteristics are shown in Table-I.

Table-II: Distribution of the respondents by total direct cost (n=160)

Total Direct Cost (Tk.)	Frequency	Percent
Upto 10000	13	8.1
10001-20000	109	68.1
20001-30000	38	23.8
Total	160	100
Median(IQR): 15983(7203), Min: 7133, Max 36083		

Among all the respondents, majority i.e. 109(68.1%) spent Tk. 10001-20000 for total direct cost followed by 38(23.8%) who spent Tk. 20001-30000. The median (IQR) of total direct cost was Tk. 15983(7203) while the range of total direct cost was Tk.7133-36083, which is shown in the Table-II.

Table-III: Distribution of the respondents by total indirect cost (n=160)

Indirect cost (Tk.)	Frequency	Percent
<15000	140	87.5
15001-30000	12	7.5
30001-45000	3	1.9
>45001	5	3.1
Total	160	100.0
Mean±SD: Tk.5431.25±1128.17		

Among all the respondents, majority i.e.140(87.5%) had less than Tk. 15000 as total indirect cost followed by 12 (7.5%) who had Tk. 15001-30000. The mean (±SD) total indirect cost was Tk. 5431.25±1128.17 which is revealed in the Table-III.

Table-III: Distribution of the respondents by total haemodialysis cost (n=160)

Hemodialysis Cost (Tk)	Frequency	Percent
<10000	6	3.8
10001-20000	83	51.9
20001-30000	34	21.3
>30000	37	23.1
Total	160	100
Mean±SD: Tk.24205.59 ±17164.580		

Among all the respondents, majority i.e. 83(51.9%) spent Tk. 10001-20000 for total

haemodialysis cost followed by 37(23.4%) who spent Tk. >30000. The mean (±SD) total haemodialysis cost was Tk. 24205.59±17164.580 which is shown in the Table-IV.

Table-V: Correlation between total direct cost and educational status

		Education	Total direct cost
Education	Spearman's rho	—	
	p-value	—	
Total direct cost	Spearman's rho (r)	0.308	—
	p-value	< .001	—

Correlation analysis shows a moderate positive correlation (r=0.308) between total direct cost and educational status of the respondents which was statistically significant (p<0.001) (Table-V).

Table-VI: Correlation between total hemodialysis cost and educational status

		Education	Total hemodialysis cost
Education	Spearman's rho	—	
	p-value	—	
Total hemodialysis cost	Spearman's rho(r)	0.320	—
	p-value	< .001	—

Correlation analysis shows a moderate positive correlation (r=0.320) between hemodialysis cost and educational status of the respondents which was statistically significant (p<0.001) (Table-VI).

Table-VII: Correlation between monthly income and total direct cost of the respondents

		Income	Total direct cost
Income	Spearman's rho	—	
	p-value	—	
Total direct cost	Spearman's rho (r)	0.281	—
	p-value	< .001	—

Table-VII shows a weak positive correlation (r=0.281) between income and total direct cost

of the respondents which was statistically significant ($p < 0.001$).

Table-VIII: Association between total hemodialysis cost and profession

Occupation	N	Mean	SD	95% CI (ANOVA)	
				Lower Bound	Upper Bound
Govt service	9	19819.67	9635.309	12413.31	27226.02
Non govt service	17	23808.29	11170.442	18064.98	29551.61
Unemployed	67	29939.93	21683.760	24650.84	35229.01
Retired	8	19301.75	4092.933	15879.97	22723.53
Business	15	27237.67	21382.716	15396.31	39079.02
Farmer	3	19136.33	4121.048	8899.08	29373.58
Day labour	2	18543.00	8273.149	-55788.30	92874.30
House wife	39	16059.67	5166.985	14384.72	17734.61
Total	160	24205.59	17164.580	21525.56	26885.62

F=2.852, df=7, p=0.008

ANOVA test reveals statistically significant association between total hemodialysis cost and profession of the respondents ($p < 0.05$) as shown in Table-VIII.

DISCUSSION

In this study, the mean age of the respondents was found 49.28 years ($SD \pm 12.706$). A study conducted at BSMMU by Akter et al found mean age of the patients 49.77 years ($SD \pm 11.962$) which is almost similar with the present study.⁷ Another study conducted at Dhaka Medical College Hospital (DMCH) by Akter et al found mean age as 46 years which is also closer to the findings of the present study.⁸ The highest number of patients (23.8%) receiving dialysis in the present study was in the age group of 51-60 years. A study conducted by Biswas et al found majority of the patients were in the age group 50–60 years.⁹ Another study conducted by Mobasher et al revealed mean age of the dialysis patients 45.37 years and 89.80% patients were less than 60 years which is also consistent with the present study.¹⁰

Among all the respondents, majority (60.6%) were male and 39.4% were female. Male female ratio was 1.54:1. A study conducted by Biswas et al found that there were more male patients (61.62%) than female (38.31%)

patients and male-female ratio was 1.61:1.8. Another study conducted by Mobasher et al revealed that 66.8% male and 33.2% female ESRD patients getting maintenance haemodialysis at a dialysis centre of a tertiary level hospital of Bangladesh.⁹ Result of both the studies are consistent with the findings of the present study. As per the 2nd report of Indian CKD registry of 2006 which had 68.9 % males and 31.1 % females among the dialysis patients.¹¹ The fact that men are more likely than women to have CKD and associated risk factors, such as smoking and hypertension, may account for the male predominance. The observed disparities in CKD prevalence between the sexes may also be attributed to the advantages that men have when it comes to their health-seeking behaviors.

In considering level of education, majority i.e. 29.4% were secondary followed by 21.9% were higher secondary level education, 20.6% were primary level, 12.5% were masters, 8.8% were graduate and only 6.3% were illiterate. A study carried by Mobasher et al in the northern district of Rangpur on the patients admitted in the dialysis unit of Rangpur Medical College Hospital found that illiterate patients were 7.90%, primary level was 12.80%, secondary 33.25% and higher secondary and above was 46.05%.¹⁰ There was little variation in the level of education because of the geographical variation of the study population.

On the other hand, 41.9% respondents had monthly family income of Tk.15001-30000, 33.8% had income up to Tk 15000, 10% had Tk. more than Tk. 60000, 7.5% had income of Tk. 45001-60000 and 6.9% had monthly family income of Tk. 30001-45000. The median of monthly family income was Tk. 20000 (interquartile range 15750) while the range of monthly family income was Tk. 0-200000. In a study by Akter et al revealed that maximum,

29.7% family income were in between Tk. 20000-29000 and only 6.3% were in between Tk. 40000-49000. In the present study, 75.7% of the patients' family income was Tk. 30000 or less per month while Akter et al showed 68.2% of the family income was within this range which is quite close.⁸

Majority (68.4%) of the respondents spent Tk. 10001-20000 for total direct cost followed by 23.4% spent Tk. 20001-30000 and 8.2% spent Tk. 10000 or less. The mean (\pm IQR) total direct cost was Tk. 15983 \pm 7203 while the range of total direct cost was Tk. 8093-97253. Correlation analysis showed a moderate positive correlation ($r=0.308$) between total direct cost and educational status of the respondents and this was statistically significant ($p<0.001$). Direct costs included mean(\pm SD) cost of consultation Tk.587.56 \pm 555.885, mean(\pm SD) cost of medicine Tk.7093.44 \pm 3818.109, mean(\pm SD) cost of laboratory investigation Tk. 1074.38 \pm 733.562, mean(\pm SD) cost of food Tk. 1596.79 \pm 828.53, mean(\pm SD) dialysis cost Tk. 3333 \pm 0, mean(\pm SD) transportation cost was Tk. 2499.31 \pm 1548.49. In the current study median of total direct cost was Tk. 15983(7203). In a study in Nepal by Thapa et al the total direct cost of haemodialysis was US\$ 208.59 (Tk. 17,680) which is almost same as the present study finding.¹² The mean(\pm SD) total indirect cost was Tk. 5431.25 \pm 1128.17. Indirect costs included loss of income only. The mean (\pm SD) total haemodialysis cost was Tk. 24205.59 \pm 17164.580. A study carried out in India on haemodialysis cost in Indian public hospitals was INR 22,704 (US\$277) per month.¹³

Correlation analysis also shows a moderate positive correlation ($r=0.320$) between total hemodialysis cost and educational status of the respondents and this was found statistically significant ($p<0.001$). There was a weak

positive correlation ($r=0.281$) between income and total direct cost of the respondents and the correlation was statistically significant ($p<0.001$). ANOVA test shows statistically significant association between total hemodialysis cost and profession of the respondents ($p<0.05$).

CONCLUSION

Out-of-pocket expenditure of Haemodialysis in Bangladesh is high in comparison to monthly family income and it poses huge financial burden to the families of the victims of end stage renal disease. Since end stage renal disease is recognized as a major and growing public health problem in Bangladesh, countrywide screening facilities specially in rural areas should be available to measure its actual burden in the country. The study recommended cost effective measures like subsidized or free of cost treatment of ESRD and free of cost haemodialysis of patients to reduce the financial burden of the families.

REFERENCES

1. Klarenbach SW, Tonelli M, Chui B et al. Economic evaluation of dialysis therapies. *Nat Rev Nephrol* 2014; 10:644-52.
2. Neovius M, Jacobson SH, Eriksson JK et al. Mortality in chronic kidney disease and renal replacement therapy: a population-based cohort study. *BMJ* 2014; 1-8.
3. Martins D, Agodoa L, Norris KC. Hypertensive chronic kidney disease in African Americans: strategies for improving care. *Cleve Clin J Med* 2012; 79: 726-34.
4. Tajmim T. Costly dialysis forces 80% patients to quit. *The Business Standard*. Available from: <https://www.tbsnews.net/bangladesh/health/costly-dialysis-forces-80-patients-quit-55300>. Accessed on 16 Feb 2020.

5. Aung L, Saw SM, Chan MY, Khaing T, Quah TC, Verkooijen HM. The Hidden Impact of Childhood Cancer on the Family: A Multi-Institutional Study from Singapore. *Ann Acad Med Singapore* 2012; 41(4):170-175.
6. Miedema B, Easley J, Fortin P, Hamilton R, Mathews M. The economic impact on families when a child is diagnosed with cancer. *Curr Oncol* 2008; 15(4): 173-178.
7. Akter MS, Akter J, Anowar MN. Characteristics of Chronic Kidney Disease Patients Admitted At a Tertiary Care Hospital in Bangladesh. *IOSR Journal of Nursing and Health Science (IOSR-JNHS)* 2020; 9(6): 28-36.
8. Akter T, Rajia MS, Rozario M. Out-of-pocket expenditure of chronic kidney diseases (CKD) patients treated in a tertiary level hospital (DMCH) Bangladesh. *IOSR Journal of Dental and Medical Sciences (IOSR-JDMS)* 2022; 21(3): 50-66.
9. Biswas RSR, Nath JD, Ahmed KF. Financial burden of Chronic Kidney Disease Patients on Maintenance Hemodialysis in Chittagong, Bangladesh 2021. Available from: <https://doi.org/10.1101/2021.07.15.21260572>, accessed on 6 June 2022.
10. Mobasher AA, Jahan N, Anisuzzaman S, Mondal RN, Rani M. Socio-demographic and clinical characteristics of CKD patients of northern part of Bangladesh. *European Academic Research* 2018; 6(2):754-768.
11. Rajapurkar MM, John GT, Kirpalani AL et al. What do We Know About Chronic Kidney Disease in India: First Report of the Indian CKD Registry. *BMC Nephrol* 2012;13(1):10.
12. Thapa N, Sharma B, Jnawali K et al. Expenditure for Hemodialysis : A Study among Patient Attending at Hospitals of Pokhara, *JHAS* 2019; 9(1): 46-50.
13. Kaur G, Prinja S, Ramachandran R, Malhotra P, Gupta KL, Jha V. Cost of hemodialysis in a public sector tertiary hospital of India. *Clinical Kidney Journal* 2018; 11(5): 726-733.