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RESEARCH ARTICLE

Cost comparison and determinants of out-of-pocket payments on child delivery care in Bangladesh

Abdur Razzaque Sarker[1,5] | Marufa Sultana[2,3] | Nausad Ali[1] | Raisul Akram[1] | Nurnabi Sheikh[1] | Rashidul Alam Mahumud[4] | Alec Morton[5]

[1] Health Economics and Financing Research, International Centre for Diarrhoeal Disease Research, Bangladesh, Dhaka, Bangladesh

[2] Nutrition and Clinical Services Division, International Centre for Diarrheal Disease Research, Bangladesh, Dhaka, Bangladesh

[3] School of Health and Social Development, Deakin University, Melbourne, Victoria, Australia

[4] School of Commerce, University of Southern Queensland, Toowoomba, Queensland, Australia

[5] Department of Management Science, University of Strathclyde, Glasgow, UK

Correspondence
Abdur Razzaque Sarker, Health Economics and Financing Research, International Centre for Diarrhoeal Disease Research, Bangladesh (icddr,b), Dhaka, Bangladesh.
Email: arazzaque@icddrb.org

Summary

Objectives: The objective of this study is to capture the relevant out-of-pocket (OOP) costs, coping mechanisms, and associated factors that are related to child delivery in Bangladesh through the use of nationwide household level data.

Data and methods: The study was conducted using a secondary data source of the latest Bangladesh Demographic and Health Survey 2014. A cross-sectional survey was performed for 6 months, from June to November 2014, where closed-ended questions regarding child delivery–related expenditure were included. Log linear regression and descriptive analysis methods were used to analyze these data.

Results: Analysis indicated that the average self-reported OOP payment per child delivery was US$ 79.23 (SD ±128.05). The highest OOP was observed for C-section (US$ 249.89, SD ±153.54), followed by institutional normal delivery (US$ 61.62, SD ±75.28). The average cost per normal home delivery was US$ 15.89 (SD ±25.84). The richest quintile spent significantly more than the poorest quintile regarding C-section (US$ 281 vs US$ 204), normal delivery at an institution (US$ 80 vs US$ 65), and even normal delivery at home (US$ 22 vs US$ 13).

Conclusions: The study showed that there was a huge variation of OOP, which was dependent on the facility and socioeconomic demographic status of the households. As such, policy efforts need to focus on lowest wealth quintiles

to avoid economic burdens during child delivery–related activities, and therefore, financial risk protection should be provided. Social health insurance might be an option for financing during child delivery, which is in line with the core objective of the Healthcare Financing Strategy of Bangladesh, which is to achieve universal health coverage.

KEYWORDS

Bangladesh, delivery care, out-of-pocket expenditure, service utilization, universal health coverage

1 | INTRODUCTION

Every day, approximately 830 mothers die globally due to pregnancy and childbirth-related complexities, with 99% of all maternal deaths occurring in developing countries. However, one third of these global maternal mortalities and morbidities occur in the Asian region.[1,2] The common causes that are responsible for these maternal deaths include hemorrhage, eclampsia, and abortion-related complexities, most of which occur within 24 hours of the following delivery. As such, the quality of the care provided during pregnancy is crucial for the survival of mothers and their children.[3] In these circumstances, mothers are often advised to seek care from medically trained providers or from a recognized facility to avoid any complications during the pregnancy, at delivery, or in the postpartum period.[4] Bangladesh has achieved a remarkable improvement in both maternal-related and child mortality-related health indicators. Despite the current focus on safe motherhood programs and better access to health facilities, maternal and neonatal mortality remains high, at 194/100 000 live births and 28/1000 live births, respectively. Furthermore, almost 62% of deliveries are performed at home.[5]

The health service delivery structure is well organized in Bangladesh. Services are organized through community clinics, health and family welfare centers, upazila health complexes, district level hospitals, tertiary level medical college hospitals, and specialized hospitals. Private and nongovernment organizations (NGOs) also play an active role in providing health services to its population. According to the latest Bangladesh Maternal and Child Health Expenditure report, Bangladesh spent approximately 21.1 billion Bangladeshi Taka in the fiscal year of 2012 for reproductive health, while almost 90% of this expenditure was spent for preventive care services.[6] However, the major expenditure during child delivery care relied on out-of-pocket (OOP) spending by the household.[7] As such, maternal care-related financial and well-being costs might be devastating and could significantly impact the livelihoods of family members by causing economic disruption. Indeed, in the case of Bangladesh, many households experience catastrophic economic burden and fall into poverty due to these expenses.[8-12] Households often mitigate this excessive expenditure by borrowing, selling assets, or using savings, donation from relatives, bank loans, and relying on transfers.[13,14] In the order to avoid the financial consequences of maternal health shocks, the Sustainable Development Goals placed a high emphasis on financial sustainability and affordability for maternal care to reduce the cases of maternal, neonatal, and under-five mortality. Numerous studies related to the cost of maternal, neonatal, and child health program have been conducted in Bangladesh.[15-18] However, the pattern regarding OOP expenditure and cost comparison related to child delivery is still limited, although such analysis is vital for policy makers, as it allows them to adopt investment plans for improving the maternal healthcare delivery system despite being constrained by limited resources. Out of pocket is the primary payment strategy for healthcare in Bangladesh, and OOP's share of total health expenditure has been increasing alarmingly, from 55.9% in 1997 to 67% in 2015.[19] The objective of this study is thus to capture the relevant OOP costs, coping mechanisms, and associated factors related to child delivery in

Bangladesh using nationwide household level data. The findings from the study show the extent of OOP expense during child delivery care and can also have broad implication for improving the efficiency and equity of maternal child delivery care in Bangladesh.

2 | METHODS

2.1 | Study design and sampling

The study was conducted using secondary data sources from the latest Bangladesh Demographic and Health Survey (DHS) 2014. A cross-sectional survey was performed for 6 months, from June to November 2014, with closed-ended questions that pertained to child delivery–related expenditure. The two-stage stratified sampling design was adopted using a complete list of enumeration areas and covering the whole country, which was prepared by the 2011 population census of the People's Republic of Bangladesh. The 2014 BDHS is the seventh DHS in Bangladesh, which started in 1993 to 1994 and continued every 4 years since. The sampling method, survey design and instruments, and the measurement system, as well as quality control, have been described elsewhere.[20,21] The data on the delivery cost were collected from women who gave birth within the 3 years preceding the survey, and the most recent live birth cost was considered for the analysis. A total of 17 863 ever-married mothers were interviewed, whereas 4627 mothers delivered a baby. However, we have excluded 61 mothers from the analysis. This was either due to missing information or the respondent's inability to recall the mentioned cost history and outlier (Supplement). In this context, the data of 4566 mothers (98.68%) were analyzed.

2.2 | Data analysis

Descriptive statistics were employed to analyze and summarize the data using different variables. Bivariate and multivariable statistics were also employed. Log transformation was used for exhibiting linearity as OOP expenditure (the dependent variable) and was positively skewed, thus allowing the mean, median, and interquartile range to be presented. However, such coefficients have been interpreted routinely regarding percentage changes using exponential functions.[22-24] The explanatory variables were age, education and working status of mothers, education and occupational status of spouse, birth order, antenatal care (ANC) visits, household size, exposure of mass media, residence, socioeconomic strata, as well as the administrative region. A log linear regression model was used to sort out the factors of OOP associated with home delivery, institutional normal delivery, C-section delivery, and the total cost of child delivery services. The variance inflation factor test was used to detect for multicollinearity in the regression model.[10,25] All data cleaning, validation, and statistical analyses were performed using Stata/SE 13.0 (StataCorp. College Station, TX, USA).

2.3 | Ethical considerations

We analyzed the publicly available DHS dataset by contacting the MEASURE DHS program office. Demographic and Health Survey followed standardized data collection procedures. According to the DHS, written informed consent was obtained from mothers/caretakers who enrolled in the survey.

3 | RESULTS

3.1 | Background characteristics of study participants

A total of 4566 delivered mothers were considered for analysis (Table 1), whereas normal delivery at home, normal delivery at institutions, and C-section were 2812 (62%), 660 (14%), and 1094 (24%), respectively. The mean age of mothers was 24.58 years (SD ±5.75), and most of the mothers were not employed (76%), with only 31% of mothers

TABLE 1 Background characteristic of delivered mother (N = 4566)

Variables	n (%)	95% CI
Age, years (mean ± SD)	24.58 ± 5.75	
Age group		
15-19	957 (20.95)	(19.80-22.16)
20-24	1531 (33.53)	(32.17-34.91)
25-34	1804 (39.51)	(38.10-40.94)
35-49	274 (06.01)	(05.36-06.74)
Women's education		
No education	647 (14.18)	(13.19-15.22)
Primary	1277 (27.97)	(26.69-29.29)
Secondary	2187 (47.90)	(46.46-49.35)
Higher	454 (09.95)	(09.11-10.85)
Husband education		
No education	1093 (23.94)	(22.72-25.20)
Primary	1371 (30.03)	(28.72-31.38)
Secondary	1459 (31.96)	(30.62-33.32)
Higher	643 (14.08)	(13.10-15.12)
Husband occupation		
Farmer	1172 (25.66)	(24.42-26.95)
Day labor	490 (10.73)	(09.86-11.66)
Factory worker	405 (08.87)	(08.08-09.73)
Driver	1100 (24.08)	(22.86-25.34)
Service holder	267 (05.86)	(05.21-06.58)
Business	992 (21.72)	(20.55-22.94)
Other	141 (03.08)	(02.61-03.62)
Mode of delivery		
Home delivery	2812 (61.59)	(60.16-62.99)
Institutional normal delivery	660 (14.45)	(13.46-15.50)
Cesarean section	1094 (23.96)	(22.75-25.22)
Household size		
<4	569 (12.47)	(11.54-13.46)
4-5	1795 (39.32)	(37.91-40.74)
>5	2202 (48.22)	(46.77-49.67)
Birth order		
1	1809 (39.62)	(38.21-41.05)
2-3	2121 (46.45)	(45.00-47.90)
≥4	636 (13.93)	(12.96-14.97)
Working status		
Not working	3478 (76.17)	(74.91-77.38)
Working	1088 (23.83)	(22.62-25.09)
Mass media exposure (TV/radio)		
No exposure	1756 (38.46)	(37.06-39.88)
Exposure	2810 (61.54)	(60.12-62.94)
ANC visit		

(Continues)

TABLE 1 (Continued)

Variables	n (%)	95% CI
No ANC	984 (21.55)	(20.38-22.77)
1-3	2160 (47.31)	(45.86-48.76)
≥4	1422 (31.14)	(29.81-32.50)
Place of residence		
Urban	1178 (25.81)	(24.56-27.10)
Rural	3388 (74.19)	(72.90-75.44)
Division		
Rangpur	449 (09.83)	(09-10.73)
Sylhet	421 (09.22)	(08.42-10.10)
Barisal	262 (05.74)	(05.10-06.45)
Rajshahi	458 (10.04)	(09.20-10.95)
Khulna	365 (7.99)	(07.24-08.82)
Chittagong	1002 (21.93)	(20.76-23.16)
Dhaka	1609 (35.24)	(33.87-36.64)
Wealth index		
Poorest	992 (21.73)	(20.55-22.95)
Poorer	866 (18.97)	(17.86-20.13)
Middle	877 (19.21)	(18.10-20.38)
Richer	945 (20.70)	(19.54-21.90)
Richest	886 (19.40)	(18.28-20.57)
Place of delivery		
Home delivery	2812 (61.59)	(60.16-62.99)
Public facilities	595 (13.03)	(12.08-14.03)
Private hospitals/clinic	1039 (22.75)	(21.55-23.99)
NGO	115 (02.53)	(02.11-03.02)
Others	05 (0.11)	(0.05-0.27.00)

Abbreviations: ANC, antenatal care; NGO, nongovernment organization.

completing the recommended (four or more) ANC visits. Regarding education level, most of the mothers (76%) had completed primary and secondary school, whereas approximately 14% mothers had no formal education. A similar educational pattern was also observed in the case of their spouses. Around 48% (n = 2202) of households had more than five members in size, with most of the families (62%) exposed to mass media and lived in rural settings (74%). Dhaka division had the highest proportion (n = 1609, 35%) of mothers participating in the survey, while the lowest proportion of participants belonged to the Chittagong region (n = 1002, 22%). Table 1 shows that approximately 62% of the mothers delivered at home, followed by private hospitals and clinics (23%). In addition, about 13% of mothers delivered at public facilities.

3.2 | Distribution of child delivery cost

The distribution of OOP costs related to child delivery is shown in Table 2 and Figure 1. The average self-reported OOP per child delivery was US$ 79.23 (SD ±128.05), with the highest OOP observed for C-section (US$ 249.89, SD ±153.54), followed by institutional normal delivery (US$ 61.62, SD ±75.28). The average cost per normal home delivery was US$ 15.89 (SD ±25.84). As for the age of mothers, the older mothers (aged 35-49) spent significantly more (US$ 91.16, SD ± 151.12) than younger ones ($P < 0.001$). The OOP cost was significantly higher for mothers who had higher educational attainment and who used the recommended ANC services. The average OOP of C-

TABLE 2 Distribution of child delivery cost in Bangladesh, US$[a]

Variables	Home Delivery, (n = 2812)		Institutional Normal Delivery, (n = 660)		Cesarean Section, (n = 1094)		Overall, (n = 4566)	
	Mean (SD)	Median (IQR)	Mean (SD)	Median (IQR)	Mean (SD)	Median (IQR)	Mean (SD)	Median (IQR)
Age group								
15-19	17.85 (28.24)	09.01 (24.46)	56.67 (57.91)	38.63 (51.50)	226.92 (133.40)	193.13 (128.75)	68.58 (108.16)	20.60 (70.82)
20-24	15.40 (22.71)	06.44 (18.03)	65.61 (81.01)	38.63 (51.50)	237.03 (137.93)	218.88 (193.13)	76.08 (119.05)	25.75 (83.69)
25-34	15.98 (28.00)	06.44 (18.35)	61.29 (80.13)	38.63 (57.94)	262.74 (168.77)	231.76 (167.38)	85.84 (140.54)	19.31 (110.73)
35-49	11.14 (16.57)	06.44 (12.88)	56.54 (65.90)	25.75 (51.50)	297.91 (163.99)	257.51 (193.13)	91.16 (151.12)	12.88 (139.06)
P value	0.027		0.665		0.001		0.003	
Women's education								
No education	12.13 (21.73)	06.44 (12.88)	46.59 (44.72)	25.75 (49.57)	200.01 (120.27)	186.69 (128.75)	29.58 (63.64)	06.44 (25.11)
Primary	13.62 (24.27)	06.44 (14.81)	53.30 (62.02)	38.63 (50.86)	238.88 (140.54)	218.88 (193.13)	47.09 (93.77)	12.88 (36.05)
Secondary	18.43 (27.94)	10.30 (23.18)	60.99 (75.04)	38.63 (51.50)	248.71 (146.62)	231.76 (186.69)	88.75 (130.87)	25.75 (122.32)
Higher	23.79 (27.51)	12.88 (32.19)	88.87 (103.18)	64.38 (61.16)	265.37 (174.72)	257.51 (180.26)	175.72 (176.80)	128.75 (225.32)
P value	<0.001		0.001		0.038		<0.001	
Husband education								
No education	12.96 (26.16)	06.44 (12.88)	45.56 (59.34)	25.75 (38.63)	215.88 (140.99)	193.13 (128.75)	35.31 (78.51)	06.44 (24.46)
Primary	15.63 (25.83)	06.44 (18.03)	52.18 (49.08)	38.63 (45.06)	238.25 (136.54)	193.13 (193.13)	54.78 (98.78)	12.88 (46.35)
Secondary	17.85 (24.49)	10.30 (23.18)	66.45 (88.25)	38.63 (57.94)	240.14 (142.3)	206.01 (193.13)	91.37 (130.38)	25.75 (122.32)
Higher	22.04 (27.96)	12.88 (21.89)	83.42 (89.63)	64.38 (56.65)	276.32 (173.38)	257.51 (167.38)	169.60 (177.40)	128.75 (231.76)
P value	<0.001		<0.001		<0.001		<0.001	
Husband occupation								
Farmer	13.03 (22.67)	06.44 (12.62)	50.08 (52.89)	38.63 (47.64)	212.74 (129.06)	193.13 (128.75)	42.41 (83.90)	11.59 (37.34)
Day labor	13.41 (23.58)	06.44 (12.75)	48.79 (65.91)	25.75 (51.50)	210.38 (122.43)	206.01 (128.75)	38.47 (78.11)	07.73 (24.46)
Factory worker	15.78 (25.24)	06.44 (16.74)	59.93 (92.4)	38.63 (51.50)	268.36 (150.18)	257.51 (148.07)	71.64 (124.30)	15.13 (57.94)

(Continues)

TABLE 2 (Continued)

Variables	Home Delivery, (n = 2812)		Institutional Normal Delivery, (n = 660)		Cesarean Section, (n = 1094)		Overall, (n = 4566)	
	Mean (SD)	Median (IQR)	Mean (SD)	Median (IQR)	Mean (SD)	Median (IQR)	Mean (SD)	Median (IQR)
Driver	18.31 (23.54)	12.88 (23.18)	68.52 (84.23)	38.63 (51.50)	237.93 (144.51)	193.13 (193.13)	84.08 (125.09)	25.75 (109.44)
Service holder	25.98 (27.67)	19.31 (32.19)	92.94 (113.43)	64.38 (55.36)	287.95 (185.63)	257.51 (167.38)	186.46 (189.93)	128.75 (221.46)
Business	17.65 (31.19)	07.73 (17.77)	56.33 (56.59)	38.63 (54.08)	255.36 (157.25)	244.63 (180.26)	101.70 (143.42)	25.75 (147.89)
Other	17.50 (40.06)	06.44 (24.46)	90.83 (88.38)	64.38 (70.82)	275.78 (103.40)	257.51 (141.63)	103.88 (132.87)	32.19 (186.69)
P value	<0.001		0.003		<0.001		<0.001	
Household size								
<4	13.20 (19.58)	06.44 (12.39)	66.02 (91.05)	38.63 (45.06)	236.32 (143.03)	206.01 (167.38)	80.93 (126.49)	19.31 (97.85)
4-5	16.88 (30.35)	06.44 (18.03)	51.78 (59.05)	38.63 (48.28)	247.60 (153.81)	231.76 (193.13)	80.40 (128.82)	20.60 (96.57)
>5	15.75 (23.21)	06.63 (18.03)	68.16 (81.18)	38.63 (51.5)	255.90 (156.25)	231.76 (167.38)	77.88 (127.87)	19.31 (83.69)
P value	0.087		0.024		0.376		0.786	
Birth order								
1	18.76 (27.85)	11.59 (21.89)	70.73 (83.03)	51.50 (51.50)	243.36 (141.99)	218.88 (193.13)	98.13 (133.43)	32.19 (145.49)
2-3	15.06 (25.99)	06.44 (18.54)	52.77 (65.15)	38.63 (47.64)	255.89 (165.39)	231.76 (193.13)	74.85 (129.88)	19.31 (73.39)
≥4	12.78 (20.68)	06.44 (12.49)	57.36 (74.26)	38.63 (50.54)	267.41 (164.50)	257.51 (238.20)	38.99 (90.19)	07.73 (24.46)
P value	<0.001		0.010		0.305		<0.001	
Working status								
Not working	16.50 (26.88)	06.44 (19.31)	65.78 (79.61)	38.63 (51.50)	252.37 (155.22)	231.76 (193.13)	84.39 (132.16)	25.75 (109.44)
Working	14.00 (22.24)	06.44 (14.16)	44.33 (50.30)	25.75 (51.50)	238.20 (145.20)	206.01 (167.38)	60.95 (110.42)	12.88 (60.51)
P value	0.032		0.003		0.253		<0.001	
Mass media exposure (TV/radio)								
No exposure	13.91 (26.02)	06.44 (12.49)	64.43 (78.86)	38.63 (70.82)	217.54 (129.63)	193.13 (128.75)	41.16 (83.54)	09.01 (25.75)

(Continues)

TABLE 2 (Continued)

Variables	Home Delivery, (n = 2812)		Institutional Normal Delivery, (n = 660)		Cesarean Section, (n = 1094)		Overall, (n = 4566)	
	Mean (SD)	Median (IQR)	Mean (SD)	Median (IQR)	Mean (SD)	Median (IQR)	Mean (SD)	Median (IQR)
Exposure	17.86 (25.51)	10.30 (23.18)	60.66 (74.07)	38.63 (45.06)	256.57 (157.27)	244.63 (180.26)	102.69 (144.08)	32.19 (146.78)
P value	<0.001		0.564		0.002		<0.001	
ANC visit								
No ANC	11.9 (24.97)	06.44 (12.75)	56.22 (60.07)	25.75 (77.25)	261.16 (146.62)	257.51 (193.13)	24.49 (63.12)	06.44 (18.67)
1-3	17.20 (26.22)	09.01 (23.18)	52.71 (51.66)	38.63 (45.06)	234.83 (132.07)	193.13 (193.13)	71.18 (111.66)	25.75 (70.82)
≥4	19.06 (25.57)	10.43 (23.82)	73.20 (97.04)	38.63 (51.50)	261.15 (168.40)	257.51 (180.26)	127.85 (161.30)	64.38 (180.26)
P value	<0.001		0.002		0.022		<0.001	
Place of residence								
Urban	17.76 (27.41)	06.73 (23.18)	52.74 (71.93)	38.63 (51.5)	258.12 (163.49)	257.51 (193.13)	113.89 (153.86)	38.63 (185.41)
Rural	15.34 (25.34)	06.44 (18.03)	67.81 (77.01)	38.63 (64.38)	241.83 (142.83)	206.01 (191.84)	62.90 (110.19)	12.88 (60.51)
P value	0.043		0.009		0.084		<0.001	
Division								
Rangpur	11.21 (16.81)	06.44 (12.62)	53.55 (77.46)	25.75 (51.50)	187.47 (97.94)	167.38 (128.75)	54.46 (88.78)	12.88 (58.58)
Sylhet	13.76 (27.24)	06.44 (15.45)	87.14 (93.43)	48.28 (103.0)	329.78 (179.18)	321.89 (193.13)	64.66 (130.36)	12.88 (37.34)
Barisal	19.03 (29.18)	07.73 (21.89)	67.36 (69.88)	38.63 (69.53)	247.57 (130.57)	257.51 (167.38)	69.3 (111.50)	17.38 (70.82)
Rajshahi	13.11 (25.41)	06.44 (12.23)	38.24 (35.73)	25.75 (38.63)	197.62 (106.82)	186.69 (128.75)	69.48 (101.57)	19.31 (109.44)
Khulna	13.73 (23.00)	08.05 (10.30)	32.90 (22.83)	25.75 (31.54)	193.73 (118.76)	167.38 (128.75)	81.64 (110.59)	25.75 (119.74)
Chittagong	24.28 (29.75)	12.88 (19.31)	88.97 (100.75)	64.38 (64.38)	311.59 (162.56)	270.39 (193.13)	92.72 (141.83)	25.75 (80.47)
Dhaka	11.77 (20.07)	06.44 (12.88)	61.04 (62.12)	38.63 (51.50)	280.31 (175.00)	257.51 (154.51)	106.19 (160.95)	25.75 (177.68)
P value	<0.001		<0.001		<0.001		<0.001	
Wealth index								

(Continues)

TABLE 2 (Continued)

Variables	Home Delivery, (n = 2812)		Institutional Normal Delivery, (n = 660)		Cesarean Section, (n = 1094)		Overall, (n = 4566)	
	Mean (SD)	Median (IQR)	Mean (SD)	Median (IQR)	Mean (SD)	Median (IQR)	Mean (SD)	Median (IQR)
Poorest	12.63 (25.47)	06.44 (12.88)	65.21 (69.24)	38.63 (69.53)	204.25 (119.20)	193.13 (154.51)	28.90 (63.17)	06.44 (25.11)
Poorer	14.46 (23.63)	06.44 (14.16)	44.19 (41.55)	25.75 (36.05)	225.91 (153.34)	193.13 (128.75)	43.17 (88.99)	12.88 (36.05)
Middle	17.01 (26.65)	08.37 (18.03)	54.13 (70.7)	38.63 (45.06)	223.35 (140.02)	193.13 (141.63)	63.76 (107.3)	19.31 (57.94)
Richer	18.82 (24.01)	12.88 (21.89)	58.70 (80.82)	38.63 (45.06)	231.77 (123.59)	206.01 (160.94)	90.39 (122.11)	25.75 (119.74)
Richest	22.20 (31.96)	12.88 (19.31)	80.05 (88.15)	64.38 (64.38)	281.03 (171.89)	257.51 (167.38)	170.84 (177.50)	128.75 (231.76)
P value	<0.001		0.001		<0.001		<0.001	
Place of delivery								
Home delivery	15.89 (25.84)	06.44 (18.03)	…	…	…	…	15.89 (25.84)	06.44 (18.03)
Public facilities	…	…	52.14 (64.66)	32.83 (45.06)	176.71 (128.80)	154.51 (167.38)	96.14 (109.98)	64.38 (103.00)
Private hospitals/clinic	…	…	92.60 (95.11)	64.38 (64.38)	271.24 (153.57)	257.51 (167.38)	234.95 (160.59)	193.13 (193.13)
Nongovernment organization (NGO)	…	…	31.81 (34.07)	20.60 (32.19)	203.74 (147.30)	154.51 (180.26)	79.49 (112.73)	38.63 (77.25)
Others	…	…	108.93 (87.43)	90.13 (16.74)	…	…	108.93 (87.43)	90.13 (16.74)
P value			<0.001		<0.001		<0.001	
Total	15.89 (25.84)	06.44 (18.03)	61.62 (75.28)	38.63 (57.94)	249.89 (153.54)	225.32 (193.13)	79.23 (128.05)	19.31 (83.69)

Abbreviations: IQR, interquartile range; SD, standard deviation.

[a]Note: 1 US$ = 77.667 Bangladeshi Taka at the end of month July 2014.

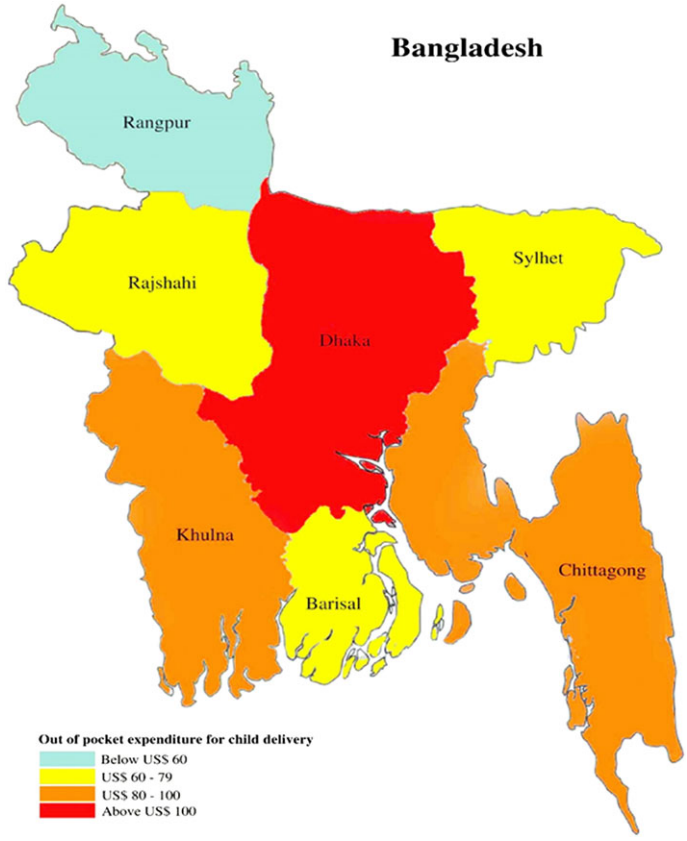

FIGURE 1 Out-of-pocket expenditure during child delivery across divisions

section (US$ 261), normal delivery at institution (US$ 73), and normal delivery at home (US$ 19) was higher for mothers who used the recommended ANC visits when compared with those who did not. The average total cost for child delivery was higher in the urban areas (US$ 113.89) when compared with rural areas (US$ 62.90). The OOP due to C-section was significantly ($P < 0.001$) higher in big cities like Sylhet (US$ 330), Chittagong (US$ 312), and Dhaka (US$ 280), than in Rangpur city (US$ 187). The richest quintile spent significantly more than the poorest quintile regarding C-section costs (US$ 281 vs US$ 204), normal deliveries at an institution (US$ 80 vs US $ 65), and even normal delivery at home (US$ 22 vs US$ 13). Considering the institutionalized normal delivery, OOP was higher for those who delivered their child at private hospitals and clinics (US$ 92.60) than those who delivered their child at public facilities (US$ 52.14). The lower OOP was incurred for those who has delivered normally at NGO facilities (US$ 31.81). A similar pattern was further observed for the C-section category (Table 2). Our result shows that approximately US$ 271.24 was spent on those who chose C-section at private hospital and clinics. The cost of C-section was lower at public facilities (US$ 176.71); indeed, even lower than those for NGO facilities (US $ 203.74). However, if we include the outliers in the analysis, we find that the average OOP per child delivery was US$ 83.35 (SD ±171.72) and US$ 265.85 for C-section.

3.3 | Coping mechanisms

The various coping strategies of households during child delivery, based on the place of residence of the household, are shown in Figure 2. We observed that approximately 87% of urban and 85% of rural women met their expenditure

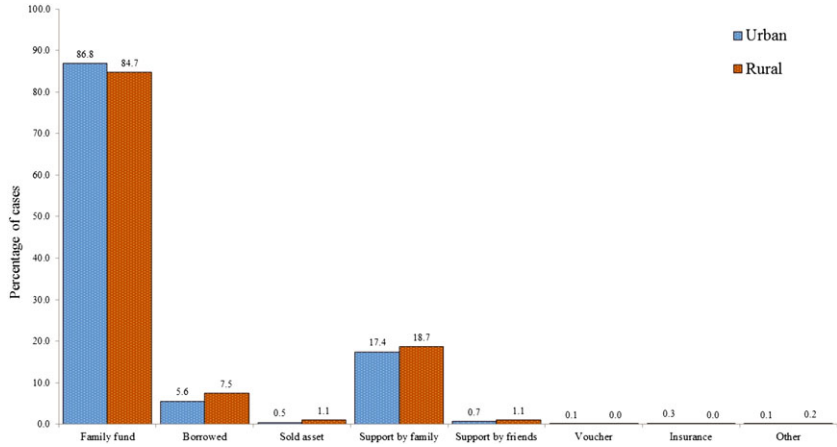

FIGURE 2 Coping strategies during child delivery

through family funding; financial support from the family was another important coping strategy that was slightly higher for rural women (19%) than urban (17%). Other coping strategies included borrowing, support by friends, selling assets, voucher schemes, health insurance, and others.

3.4 | Factors associated with out-of-pocket expenditures during child delivery strategies

Table 3 demonstrates the various factors associated with OOP. Our study shows that several factors, such as the age and education of the mothers, education of spouses, working status of mothers, birth order, recommended ANC utilization, wealth quintiles, and administrative regions, were significantly associated with OOP. Overall, older mothers spent significantly higher on delivery care. Out of pocket was higher for older mothers (aged 35-49) for C-section (34%, $P < 0.01$) and institutional normal delivery (32%, $P < 0.01$) for mothers aged 20 to 24 than that of younger mothers. Overall, OOP was significantly associated with the higher educational level of spouses. Regarding home delivery, we found significantly lower costs among the smallest families than the larger households (Table 3). The number of child deliveries was highly associated with the expenditure for delivery care overall. The cost was higher for mothers who experienced their first child delivery (97%, $P < 0.001$). The working status of the mother was significantly associated negatively with OOP, and working mothers spent less than unemployed mothers. Utilization of ANC was positively associated with delivery-related expenditure, and OOP was higher for those who used the recommended ANC care. Regarding the administrative regions, our results demonstrate that OOP was significantly lower in the Rangpur division than others. Overall, the richest wealth quintile spent significantly ($P < 0.001$) more than the poorest quintile.

4 | DISCUSSION

Bangladesh has made tremendous improvements in the health sector through the reduction of maternal mortality and improvement of child health due to a well-structured health system which involves both the public and private sectors, along with NGOs. Furthermore, this is supported by the commitment of the "Bangladesh Maternal Health Strategy," which encourages mothers to deliver under the care of medically trained birth attendants and have the delivery performed by a skilled birth attendant, along with promoting safe motherhood through various activities.[5,26] Over the last two decades, the private sector engaged in healthcare delivery significantly, which contributed to the increase of institutional delivery and C-section delivery rates in Bangladesh. However, the C-section rate is unnecessarily high (23%) and is higher than global standard, often resulting in excessive cost.[5,10,27,28] Nevertheless, the

TABLE 3 Factor association with child delivery cost

	Standard Coefficient (SE)			
	Model I	Model II Institutional	Model III C-Section	Model IV
Parameters	Home Delivery	Normal Delivery	Delivery	Overall
Age group				
15-19 (ref)				
20-24	−0.06 (0.08)	0.28** (0.10)	−0.01 (0.06)	0.12 (0.07)
25-34	0.07 (0.10)	0.25 (0.13)	0.07 (0.07)	0.40*** (0.09)
35-49	−0.12 (0.16)	0.40 (0.22)	0.29** (0.11)	0.62*** (0.14)
Women's education				
No education (ref)				
Primary	−0.03 (0.09)	−0.10 (0.14)	0.12 (0.12)	0.05 (0.09)
Secondary	0.12 (0.09)	0.00 (0.14)	0.11 (0.11)	0.24** (0.09)
Higher	0.29 (0.17)	0.04 (0.19)	0.03 (0.12)	0.50*** (0.13)
Husband education				
No education (ref)				
Primary	0.08 (0.07)	0.15 (0.12)	0.10 (0.09)	0.14 (0.07)
Secondary	0.00 (0.08)	0.17 (0.12)	0.07 (0.09)	0.18* (0.08)
Higher	0.14 (0.14)	0.40** (0.16)	0.11 (0.10)	0.45*** (0.11)
Husband occupation				
Farmer (ref)				
Day labor	0.06 (0.09)	−0.22 (0.14)	−0.03 (0.11)	−0.02 (0.09)
Factory worker	−0.03 (0.11)	−0.12 (0.15)	0.14 (0.10)	−0.06 (0.10)
Driver	0.04 (0.08)	0.00 (0.12)	0.03 (0.08)	0.00 (0.08)
Service holder	0.15 (0.19)	0.06 (0.19)	0.17 (0.09)	0.24 (0.13)
Business	0.01 (0.08)	−0.07 (0.12)	0.07 (0.08)	0.17* (0.08)
Other	0.14 (0.18)	0.18 (0.21)	0.14 (0.13)	0.31* (0.15)
Household size				
<4	−0.29*** (0.09)	−0.04 (0.11)	−0.02 (0.07)	−0.11 (0.08)
4-5	0.00 (0.06)	−0.15 (0.08)	−0.01 (0.05)	0.05 (0.05)
>5 (ref)				
Birth order				
1	0.21 (0.12)	0.34* (0.17)	0.06 (0.11)	0.68*** (0.11)
2-3	−0.05 (0.09)	0.07 (0.14)	0.09 (0.1)	0.21* (0.09)
≥4 (ref)				
Working status				
Not working (ref)				
Working	−0.10 (0.06)	−0.20* (0.09)	0.00 (0.06)	−0.27*** (0.06)
Mass media				
Not exposure (ref)				
Exposure	0.07 (0.07)	−0.19* (0.10)	0.06 (0.06)	0.05 (0.06)
ANC visit				
No ANC (ref)				
1-3	0.38*** (0.07)	0.08 (0.13)	−0.15 (0.11)	0.66*** (0.07)

(Continues)

TABLE 3 (Continued)

Parameters	Standard Coefficient (SE)			
	Model I Home Delivery	Model II Institutional Normal Delivery	Model III C-Section Delivery	Model IV Overall
≥4	0.47*** (0.08)	0.27 (0.14)	−0.12 (0.11)	0.99*** (0.08)
Place of residence				
Urban	0.00 (0.07)	−0.40*** (0.08)	−0.09 (0.05)	0.00 (0.06)
Rural (ref)				
Division				
Rangpur (ref)				
Sylhet	0.29** (0.11)	0.68*** (0.14)	0.48*** (0.10)	0.21* (0.10)
Barisal	0.36*** (0.11)	0.33* (0.15)	0.24** (0.09)	0.21* (0.10)
Rajshahi	0.11 (0.11)	0.02 (0.13)	0.04 (0.08)	0.24** (0.10)
Khulna	0.12 (0.12)	−0.03 (0.13)	−0.02 (0.08)	0.33*** (0.10)
Chittagong	0.74*** (0.10)	0.64*** (0.13)	0.47*** (0.08)	0.47*** (0.09)
Dhaka	0.20 (0.11)	0.43*** (0.14)	0.30*** (0.08)	0.45*** (0.09)
Wealth quintile				
Poorest (ref)				
Poorer	−0.04 (0.08)	−0.35** (0.13)	−0.02 (0.11)	0.02 (0.08)
Middle	−0.07 (0.09)	−0.35** (0.14)	−0.05 (0.11)	0.15 (0.09)
Richer	0.05 (0.10)	−0.25 (0.14)	−0.02 (0.11)	0.36*** (0.09)
Richest	0.14 (0.13)	−0.03 (0.16)	0.09 (0.12)	0.78*** (0.11)
Intercept	5.87	7.65	9.22	5.46
N	2812	660	1094	4566
Adjusted R^2	0.08	0.21	0.10	0.25
Mean VIF	1.90	2.49	3.67	2.19
F value, (Prob > F)	6.66***	6.38***	4.56***	40.12***

Abbreviations: ref, reference; SE, standard error; VIF, variance inflation factor.

*$P < 0.05$.

**$P < 0.01$.

***$P < 0.001$.

household OOP spending was still the main (67%) payment strategy for healthcare, although the target of the Bangladesh healthcare financing strategy was to reduce the OOP expenditure from 67% to 32% in total health expenditure to assist in the achievement of Universal Health Coverage.[29] In this context, the target will be realistic when larger portions of the population are able to access the prepayment and pooling mechanisms for all services, including the delivery care. However, this is not yet the case.[30] This study thus addresses the extent of households' OOP variation and the associated factors related to child delivery for Bangladeshi mothers.

The lower cost in public facilities reflect that these public facilities are highly subsidized by the government of Bangladesh and occasionally receive national and international donations for the purchasing of goods.[16,31] Thus, the financial cost is often shared among the households and the hospitals, whereas in the cases of private facilities, all expenditure (including profits) have to be raised from the households. While, due to the nature of this survey, we were not able to separate the components of OOP, earlier studies in this context have observed that along with direct medical cost, travel, food, lodging, hiring of an "aya," and even tip-giving were all major components of child delivery costs.[32-34] A previous hospital-based study in Bangladesh reported that the cost of normal delivery and C-section at public facilities was approximately US$ 44 and US$ 90, at the price level of 2007.[16] A couple of

community-based studies in this context observed that, for a normal delivery, households spent anywhere from US$ 24 up to US$ 32, while in C-section, the OOP was raised from US$ 118 to US$ 230.[14,32] Our study observed that family funds, support from others, and borrowing were the main coping strategies during the child delivery. Generally, households attempt to mitigate the cost of normal delivery with regular income and savings. However, the coping strategies were often altered if a delivery-related complication arose, or C-section was required. Consequently, households often relied on loans, donations, and the selling of assets (eg, jewelry and land) with the extent of the health shock being larger for the poorest households.[14,33,34] However, many of the households still had no opportunities to access the appropriate facilities during the delivery care phase due to affordability issues.[32,35] Thus, it is necessary to strengthen the ongoing pro-poor health intervention, along with enriching the demand-side financing strategies in Bangladesh, which could mitigate the financial barriers during the delivery.[29,36]

Our study observed that a number of factors (such as age, education, working status of the mother, birth order, utilization of ANC, regional variation, and wealth status) were significantly associated with a high OOP. Older mothers spent significantly more than younger mothers, as advanced maternal age was associated with various maternal complexities. Thus, older mothers tended to require hospitalization and even C-sections, which reflected a rise in OOP expenditure in relation to childbirth.[37-39] Furthermore, the adverse maternal outcome was closely linked with the duration of hospitalization, which also increased the OOP expenditure.[34] It is well established that a positive association is often visible among the level of education and health awareness, which leads to a greater utilization of maternal care service and thus expenditure.[40-42] In line with this statement, we observed a positive link with higher education and OOP for all child delivery care. However, higher education was often linked with higher income, which might be an another reason for high spending during the child delivery care.[43] Birth order appeared as a significant factor of high OOP expenditure. Furthermore, we observed that those who experienced first delivery had spent relative to others. Younger mothers tended to give greater attention to their first delivery as they have no previously experience of pregnancy and would end up spending more to use better care.[44] We also observed that the working status of mothers is significantly negatively associated with OOP and mothers who had engaged a regular job spent less than unemployed mothers. This seems counter-intuitive and might be due to working women having a better knowledge about pregnancy and childbirth, a greater freedom of movement, and therefore better access to pregnancy-related information and even healthcare, thus avoiding adverse events.[42,44,45] Various studies showed that unemployment often acted as a barrier against optimal, timely utilizations of health service, which could lead to delivery-related complexities and a negative impact on resources.[46,47] Our results indicated that recommended of ANC drives higher the OOP cost for child delivery. The average OOP expenditure for C-sections and normal deliveries at institution and normal delivery at home was significantly higher for those mothers who had used the recommended ANC visits than those who did not. Antenatal care recommendations acted as a powerful determinant of institutional delivery because with the help of ANC services, mothers were often informed about the adverse events linked with pregnancy-related complications and thus developed better communication with healthcare, which encouraged them to access health facilities during delivery and spent spend more for safe delivery care.[48,49] A study of similar countries observed that recommended ANC increased C-section utilization by a factor of 2 compared with those who did not use the recommended care.[50] According to the administrative region of the country, OOP was highest for the Dhaka division, as Dhaka is the capital of Bangladesh and the living cost was higher than those of other regions in the country. The study showed that the richest wealth quintile spent significantly more than poorest quintile, although higher cost does not always guarantee the better birth outcome.[51] However, it was well reported that the wealthiest households always used more maternal care services than those in the poorest households, in the Bangladeshi context.[42,52] Recent studies indicated that the utilization of C-section was highly concentrated among mothers from the richest wealth quintiles, and even the poorest mother often had difficulties accessing this life-saving procedure.[50,53] Affordability might be an important issue, as the financial burden was greater for poorer households, irrespective of the institutional normal delivery or C-section delivery.[14] Again, many studies explored the unofficial fees associated with the child delivery care in Bangladesh,[32-34]and thus, effective supervision is also necessary for the reduction of OOP. Although the wealthiest households mitigated the excessive delivery cost from their

income and saving, the poor suffered catastrophically and often borrow from local money-lenders with a high-interest rate due to the lack of social protection.[12,14] Thus, strong policy initiatives are necessary to ensure the accessibility and affordability of delivery care services. However, an affordable social health insurance would be able to finance households during child delivery care, which would be in a similar line with that of the national healthcare financing strategy in Bangladesh.[29]

Our study has several limitations. We used secondary data sources of Bangladesh DHS, which was based on self-reported information provided by respondents. Therefore, recall bias and reporting errors might be associated particularly with the OOP expenditure, including other associated variables, such as age, ANC utilization, and education level of spouses. Furthermore, due to the cross-sectional nature of this survey, we were not able to provide the evidence of a causal relationship. We used asset-based wealth index as a proxy of household SES, as BDHS 2014 did not collect information on household income and expenditure. Therefore, we were not able to show whether household expenditure was "catastrophic." Again, there might have been numerous households who were not able to use the institutional delivery care and/or C-section due to un-affordability, but this study was unable to capture such scenarios. Further investigation was necessary to observe underlying mechanisms of the OOP variation, which will help to promote value and efficiency in child delivery care in the long run. Despite these limitations, the study's findings can be generalized to the national level as the study gathered data from a nationally representative DHS of Bangladesh.

5 | CONCLUSION

The present study highlights the distribution and comparison of OOP expenditure on child delivery in Bangladesh. Our study has shown that there is a huge variation of OOP, according to the facility used and the sociodemographic status. Several factors, such as age, education, working status of the mother, birth order, utilization of ANC, regional variation, and wealth status were significantly associated with high OOP. Women belonging to wealthier households tended to receive better care and spend more, and so policy efforts would need to focus on the lowest wealth quintiles to avoid economic burden during child delivery–related activities. As such, financial risk protection should be provided. Social and private health insurance might be another alternative for financing during child deliveries, and this is in line with the core objective of the Healthcare Financing Strategy of Bangladesh, which is to achieve universal health coverage.[29]

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ORCID

Abdur Razzaque Sarker http://orcid.org/0000-0002-2022-7590

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SUPPORTING INFORMATION

Additional supporting information may be found online in the Supporting Information section at the end of the article.

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