**Trends in Out-of-Pocket Costs for Child Delivery Care in Bangladesh: An Analysis of Three Nationally Representative Surveys, 2014-2022**

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**Abstract:**

**Introduction:**

In Bangladesh, the primary financial burden of childbirth is often covered through out-of-pocket (OOP) spending, which can place significant strain on household finances and disrupt family livelihoods. This study aims to examine trends in OOP costs, coping strategies, and the factors influencing childbirth expenses in Bangladesh between 2014 and 2022. Specifically, it seeks to understand how these costs have evolved and their impact on maternal health service utilization.

**Data and Methods:**

The study used secondary data from the Bangladesh Demographic and Health Surveys (BDHS) conducted between 2014 and 2022. A sample of 12,752 mothers provided details on the costs of their most recent childbirths. Descriptive statistical methods and log-linear regression were used to analyze trends across each survey wave, as well as pooled data. To account for inflation, costs were adjusted to U.S. dollars based on the year of each survey. The study also assessed changes in the prevalence of high OOP costs over the study period.

**Results:**

From 2014 to 2022, the average OOP cost for childbirth tripled, increasing from US$ 80.94 to US$ 228.16. The overall mean OOP cost for childbirth during this period was US$ 130.32. Cesarean-section (C-section) deliveries consistently incurred the highest OOP costs, ranging from US$ 242.74 in 2014 to US$ 285.14 in 2022, with a mean cost of US$ 275.15 over the entire period. Institutional normal deliveries saw a sharp rise in costs, from US$ 59.91 in 2014 to US$ 93.03 in 2022, with an average cost of US$ 75.88. In contrast, OOP costs for normal home deliveries increased more gradually, rising by approximately US$ 16.02 over the study period, from US$ 15.44 in 2014 to US$ 16.67 in 2017-18. Pooled data analysis revealed a significant positive correlation between the costs of C-sections and institutional normal deliveries compared to home deliveries, with coefficient values of 1.31 and 0.68, respectively. Additionally, significant differences in OOP costs were observed across various socio-demographic factors, including age, employment status, BMI, antenatal care (ANC) visits, husband’s education level, wealth index, birth order, exposure to mass media, division, and place of residence. Wealthier households consistently faced higher delivery costs than the poorest quintile for all types of delivery.

**Conclusions:**

This study highlights a significant increase in OOP costs for childbirth in Bangladesh from 2014 to 2022, with considerable disparities across socio-economic groups and delivery types. Wealthier households continue to bear a disproportionate share of delivery costs, indicating persistent socio-economic disparities in access to maternal healthcare services. To improve financial protection and reduce the burden on lower-income households, targeted interventions are necessary. Social health insurance and other financial protection mechanisms could play a crucial role in addressing these disparities and supporting Bangladesh’s goal of achieving universal health coverage.

**Keywords:** *Bangladesh, delivery care, out-of-pocket expenditure, service utilization, trends, healthcare financing, universal health coverage.*

**Introduction**

Maternal mortality rate (MMR) has always been a universal concern. Many conferences and forums have addressed the global situation of maternal mortality rate (MMR) and the necessity of reducing it worldwide.; however, the declaration of the Millennium Development Goals (MDGs 5) gave it an extra push, which brought a noticeable change in this global crisis (Alkema et al., 2016). While the Middle East and the CIS countries did not show significant contributions, Asia contributed 19%, the second-highest amount to the reduction in the under-five mortality rate due to the MDG campaign (Cha, 2017). Among the nations of Asia, Bangladesh achieved a noteworthy improvement in its maternal mortality ratio (MMR) from 574 per 100,000 live births in 1990 to 176 by 2015. Despite not entirely meeting the three-quarter reduction goal, the progress still deserves commendation (United Nations Millennium Development Goals;.WHO, 2015 ; NIPORT). After the completion of MDG 5, the United Nations introduced the Sustainable Development Goals (SDGs) in 2015, intending to achieve them by 2030 (Sustainable Development Goals (SDGs).

To accomplish this goal, we should decrease MMR through improved antenatal care (ANC), skilled medical delivery, and changing the mode of delivery when required. In recent years, women’s interest in obtaining maternal healthcare services seems to be increasing in Bangladesh. Between 2017 and 2022, the number of mothers receiving high-quality ANC rose from 18% to 21% (NIPORT, 2022; Parsekar et al., 2020). Childbirth through medically qualified professionals also increased remarkably to 70% in 2022, which was 33% in 2011. From 2017 to 2022, deliveries at public institutions decreased by 3%, while deliveries at private facilities increased by 13%. NGO facilities had a meager 4% of the market in 2017–18; by 2022, this had dropped to 2%. According to NIPORT, (2022) these data lead to the conclusion that maternal healthcare services in Bangladesh are improving. However, a significant concern is the rising costs associated with these services, leading to increased out-of-pocket (OOP) spending. The fear of high OOP costs may deter families from seeking skilled birth care, leading to an increased risk of complications during delivery, which can further exacerbate both financial and health-related outcomes for mothers and infants. This growing financial burden from OOP expenses hinders Bangladesh's progress toward achieving the Sustainable Development Goal (SDG) 3 target of ensuring healthy lives and well-being for all.

Both direct and indirect costs present significant barriers to women's use of facility-based maternity care. While direct expenses are more visible, indirect costs like lost wages can also be substantial and are harder to measure because of variations in income, employment, and seasonality. Some studies suggest that these indirect costs may even surpass direct OOP expenses (Perkins et al., 2009). Several factors may influence high OOP costs during childbirth, including the mother's age, educational background, socioeconomic status, the mode of delivery, and even sometimes the mother’s religion. These factors are often key contributors to the variation in OOP expenses. Women who are more educated or have a good socioeconomic background tend to spend more during delivery (Sarker et al., 2018; NIPORT, 2022; Krishnamoorthy et al., 2020). Place of birth has also a substantial influence on OOP expenditure. Delivery costs are highest in private institutions, averaging around Taka 6,800, while public facilities and non-profit organizations have lower average costs, at approximately Taka 3,000 and Taka 2,600, respectively. At private facilities, the median cost of a C-section was approximately Taka 20,000. In contrast, the government facilities had the lowest median cost—roughly Taka 12,000—for C-section deliveries. The cesarean section (CS) is one of the important factors contributing to the skyrocketing OOP costs. Among all the delivery modes, the CS is gaining popularity globally. High rates of cesarean delivery are linked to high rates of catastrophic health spending (CHS) and OOP expenditure (Mohanty et al., 2019). In 2018, families in Bangladesh paid $483 million for a medically unnecessary C-section (Rana et al., 2021; Haider et al., 2018).

Building on the understanding of rising health expenditures in Bangladesh, it becomes clear that the healthcare system, while well-organized and supported by private and nongovernmental organizations (NGOs), faces significant challenges (Sarker et al., 2018). Despite collaborative efforts between the government, development partners, donors, and specialists, out-of-pocket (OOP) expenses related to childbirth continue to increase, exacerbating the financial strain on families (Parsekar et al., 2020). In Bangladesh, 'free' maternity care comes with significant hidden expenses, which could be a big reason fewer people use maternity services overall, especially those from lower-income backgrounds (Nahar & Costello, 1998). Numerous studies have shown that lower-income families in Bangladesh often rely on family savings, gifts from relatives, and bank loans to finance the significant out-of-pocket (OOP) expenses associated with childbirth (Nahar & Costello, 1998). This growing financial burden calls for a thorough investigation into the trend of OOP expenses related to childbirth in the country. This study aims to research the trend of out-of-pocket (OOP) expenses related to childbirth in Bangladesh from 2014 to 2022. By analyzing the increasing rate of these costs over time, the study seeks to identify how escalating OOP expenses impact access to skilled birth attendants and contribute to the ongoing challenges in reducing maternal mortality rates (MMR). The results will help to highlight the urgency for policy interventions, including potential government roles and insurance schemes, to mitigate financial burdens on families while improving maternal healthcare accessibility.

**Methodology**

***Research Setting***

Bangladesh is a rapidly growing populous country in the world where approximately 10 thousand children are born in each day (UNICEF). It came to light that the incidence of in Bangladesh sections was extremely high (Ahmed et al., 2023). Data from the National Institute of Population Research and Training show that of the 3.6 million babies born in Bangladesh in 2022, over 1.6 million, or about 45 percent, were delivered via C-section. Furthermore, in 2018, parents paid over Tk 4,071,031,200 in out-of-pocket costs for medically unnecessary C-sections, with an average of Tk 51,905 per case (“Save the Children International, 2019). In 2016-2018, the c-section rate increased from 31% to 51% (Rana et al., 2021).

***Study Design and Sampling***

We collected data from a secondary source from the years 2014, 2017-18, and 2022 of the Bangladesh Demographic and Health Survey (BDHS). These are the BDHS's Seventh, Eighth, and Ninth national surveys respectively and women who had ever been married were the target group for this survey ages ranging from 15-49. Moreover, the purpose of this survey was to report on the demographic and health status of Bangladeshi women and their families and performed by the private research firm Mitra and Associates. However, the sample strategy, survey design, tools, measurement system, quality control, etc. have been described elsewhere (NIPORT, 2014). The survey was carried out under the direction of the Medical Education and Family Welfare Division, the Ministry of Health and Family Welfare, and the National Institute of Population Research and Training (NIPORT).

Interviews were conducted with 17,863 women in the 2014 BDHS, 20,127 women in the 2017-18 BDHS, and 30,078 women in the 2022 BDHS. Among those interviewed, 4,625 women in 2014, 5,051 in 2017-18, and 5,104 in 2022 provided information about the type of facilty and type of delivery. A total of 4,572 women in 2014, 4,948 women in 2017-18, and 3,232 women in 2022 provided information on the costs associated with their most recent births, which occurred within the two years prior to each respective survey. These births took place either at home or in a health facility where expenses were incurred for the delivery. By combining all survey data, we obtained a sample of 12,752 mothers who shared details about the costs of their most recent births under these conditions.

***Outcomes and Covariates***

Dependent Variable

The dependent variable in this study is out-of-pocket expenditure (OOP). OOP was calculated for home deliveries, institutional normal deliveries, C-section deliveries, and the total cost of childbirth services, based on the most recent births that occurred in the two years prior to the survey.

Possible Covariates

By the study's goals and because of the BDHS data's hierarchical structure, two-level independent variables were considered. We classified individual levels of independent variables in different groups such as socioeconomic and demographic factors.

The socioeconomic and demographic factors are the respondent’s age (15-24, 25-34,35+), husband's age (15-29, 30-44, 45+), respondent’s and their husbands’ educational level (no education, primary, secondary, or higher), household heads’ occupation (not working, farmer/agriculture, businessman, skilled others), respondents’ current work status (yes, no), wealth index (poor, middle, rich), respondents’ exposure to the mass media (yes, no). On the other hand, division, and area of residence (urban, rural) are regional independent variables.

Statistical Data Analysis

We performed a comprehensive analysis using descriptive statistics to assess the mean, standard deviation, median, and interquartile range among participants from different socioeconomic backgrounds. Student's t-test is used to compare the means between two groups, whereas ANOVA is used to compare the means among three or more groups, with significance set at p < 0.05 and 95% confidence intervals. Due to the positive skewness of the cost data, we applied a log transformation to the OOP costs to normalize the data and achieve linearity. A log-linear regression model was then used to identify the factors associated with OOP payments for delivery care services, including home delivery, institutional normal delivery, C-section delivery, and the total cost of childbirth services. Socio-demographic variables such as age, education, wealth index, marital status, type of residence, religion, state of residence, number of antenatal visits, place of delivery, and mode of delivery were considered as independent variables. The natural logarithm of OOP payments was treated as the dependent variable, with beta coefficients and 95% confidence intervals (CI) reported. Variables with a p-value less than 0.05 were considered statistically significant and were included in the multivariate regression model through a stepwise selection process. Additionally, we assessed multicollinearity in the final model using a cut-off value of 4.00 for the variance inflation factor (VIF) analysis (Hasan et al., 2023; Kim, 2019). At this stage, all variables were incorporated into the model since the VIF values for each variable were below 4.00. All models were adjusted for sampling weights and survey design using the “svy” command in STATA. Data cleaning, validation, and statistical analyses were performed using Stata/SE 18.0 (StataCorp, College Station, TX, USA).

**Results**

From 2014 to 2022, a total of 12,745 mothers who delivered a child were included in this analysis (Table 1). In 2014, 61.52% of deliveries were at home, but this percentage decreased to 50.02% in 2017-18. Overall, 5,284 (41.46%) deliveries were home deliveries. Institutional normal deliveries accounted for 19.34% of the total, with 659 (14.43%) in 2014, 829 (16.78%) in 2017-18, and 976 (30.19%) in 2022. The cesarean section rate showed a significant increase from 24.06% in 2014 to 69.81% in 2022, with 4,997 (39.21%) cases overall. The mean age of the mothers increased slightly over the years, from 24.59 years in 2014 to 25.65 years in 2022, with a mean age of 25.00 years across all years. Regarding age distribution, the majority (around 34%) of the mothers were between the ages of 20-24, followed by 26.26% in the 25-34 age group. A smaller proportion, about 18%, were in the 15-19 age group, and 21.43% were between 35-49 years old. Educationally, the majority of mothers had completed secondary education, with 50.32% overall having received secondary education. However, the percentage of mothers with higher education rose from 10.07% in 2014 to 23.93% in 2022. Notably, only 8.40% of mothers had no education by 2022, a significant decrease from 14.15% in 2014. For fathers, 18.95% had completed higher education, while 16.63% had no education. In 2014, 23.81% of mothers were working, while this proportion increased to 37.56% in 2017-18 but decreased again to 20.23% in 2022. In contrast, the number of non-working mothers remained high, at 71.76% overall. Regarding BMI, the number of underweight mothers decreased significantly, from 23.71% in 2014 to just 6.40% in 2022. Obesity rates also increased, particularly in 2022, where 57.61% of mothers were classified as obese. Regarding prenatal care, the percentage of mothers receiving the recommended four or more antenatal care visits (ANC ≥4) increased from 31.27% in 2014 to 49.60% in 2022. On the other hand, the percentage of mothers with no ANC visits decreased from 21.42% in 2014 to 2.60% in 2022. Concerning husbands' age, the majority (around 60%) were in the 30-44 age range, with a smaller proportion (around 8%) aged 45 or older. The educational levels of husbands mirrored the trend seen among mothers, with 34.41% of fathers having completed secondary education, and 18.95% having completed higher education. Regarding occupation, the most common occupation for husbands was skilled worker (24.48%), followed by business (21.34%) and factory worker (14.56%). Only a small percentage (0.76%) of husbands were not working. The wealth index indicated that 38.51% of the mothers came from poor families, while 41.88% were from wealthy families. A significant proportion (67.83%) of the families had more than four members. In terms of family size, the majority (67.83%) of the mothers came from households with more than four members. Regarding media exposure, 65.62% of mothers had exposure to mass media, which showed a clear increase from 59.71% in 2014 to 75.56% in 2022. Geographically, the Dhaka division had the highest representation of mothers, accounting for 29.20% of the total. The majority of mothers (72.56%) resided in rural areas, a slightly lower proportion than in 2014 when rural residents were 74.09%. Most of the mothers (91.46%) identified as Muslim, with a small proportion (8.54%) identifying with other religions.

Table 2 shows that the total average self-reported out-of-pocket (OOP) cost for childbirth in Bangladesh in 2014 was US$ 80.94 (SD ± 166.87). The OOP costs for cesarean sections (CS) were significantly higher, with an average of US$ 258.45 (SD ± 261.05). In comparison, the OOP cost for home delivery was US$ 15.44, while institutional normal deliveries incurred an average cost of US$ 59.91, making institutional delivery the second highest in cost. The highest OOP cost was reported among mothers aged 25-34, with an average of US$ 95.61, whereas the lowest OOP cost was observed among younger mothers aged 15-19, at US$ 66.64. Mothers' education level was significantly associated with OOP expenses (P < 0.001). Mothers with higher education reported higher OOP costs, spending an average of US$ 191.37 in 2014, compared to those with no education who spent an average of US$ 194.35 for childbirth. Husbands with higher education were willing to spend more, with an average of US$ 183.29 for childbirth, and up to US$ 301.22 for CS. Obese mothers had the highest OOP costs, with an average of US$ 169.21, particularly for CS deliveries, where costs averaged US$ 305.23. Women with more frequent antenatal care (ANC) visits also spent more; those who attended four or more ANC visits spent an average of US$ 136.39, compared to those who had no ANC visits (US$ 22.83). The OOP costs associated with recommended ANC visits (≥4) were US$ 18.52 for home delivery, US$ 71.13 for institutional delivery, and US$ 282.66 for CS. Wealthier families spent considerably more on childbirth-related expenses. The OOP costs for home delivery in the rich wealth quintile were US$ 19.37, for institutional delivery US$ 67.27, and for CS US$ 277.09. In 2014, among the eight divisions in Bangladesh, the average OOP cost was the highest in Dhaka division (US$ 111.93), while the highest cost for CS was reported in Sylhet (US$ 390.55). Furthermore, families residing in urban areas consistently incurred higher OOP costs, with an average of US$ 119.86, compared to rural areas, where the average cost was US$ 62.54. This indicates significant disparities in access to affordable childbirth services across different regions and socio-economic groups in Bangladesh.

From Table 3, compared to home deliveries, institutional normal deliveries had a positive coefficient of 0.55 (p < 0.000), indicating significantly higher costs. For cesarean sections, the coefficient was 1.24 (p < 0.000), showing an even larger increase in costs. Women aged 20-24 had a small but significant positive coefficient for institutional normal deliveries (0.10, p = 0.028). Working women had a negative coefficient for home deliveries (−0.07, p = 0.013) and institutional normal deliveries (−0.08, p = 0.037), indicating lower costs for working women. Overweight women had a significant positive coefficient for institutional normal deliveries (0.07, p = 0.046) and cesarean sections (0.09, p = 0.003). Women with 1-3 ANC visits had an increased cost for both home deliveries (0.15, p < 0.000) and cesarean sections (0.11, p < 0.000). For ≥4 ANC visits, the coefficients were 0.24 (p < 0.000) for home deliveries and 0.18 (p < 0.000) for cesarean sections. The coefficient for husbands with secondary education was 0.13 (p = 0.032) for institutional deliveries and 0.26 (p = 0.000) for cesarean sections. Women in Chittagong and Khulna had significantly higher costs for institutional deliveries, with coefficients of 0.15 (p = 0.016) and 0.14 (p = 0.082), respectively. Conversely, women in Dhaka and Rangpur had lower costs for home deliveries, with coefficients of −0.11 (p = 0.057) and −0.15 (p = 0.011), respectively. Rural women had slightly higher costs for institutional deliveries (0.14, p < 0.000) compared to urban women.

Table 4 shows the total average self-reported out-of-pocket (OOP) cost for childbirth in 2017-18 was US$ 110.89 (SD ± 168.38). The cost distribution varied significantly across different delivery types, with cesarean sections (CS) incurring the highest costs, averaging US$ 272.27 (SD ± 201.26). In comparison, home deliveries had the lowest costs, averaging US$ 16.67, while institutional normal deliveries averaged US$ 69.69. Age was a key factor influencing costs. Mothers aged 35-49 years had the highest OOP expenses, averaging US$ 120.61, while younger mothers aged 15-19 years had the lowest costs at US$ 89.76. The educational level also had a significant impact on OOP expenditures. Mothers with higher education spent an average of US$ 203.99, with CS deliveries averaging US$ 297.85. Husbands' education levels followed a similar trend, with higher education linked to higher costs, especially for CS deliveries, where expenses reached US$ 303.56. Women’s body mass index (BMI) also played a role in cost variation. Obese women had the highest expenses, averaging US$ 192.91, particularly for CS, which cost US$ 308.16. Additionally, women who attended four or more antenatal care (ANC) visits had higher costs, with those delivering via CS spending an average of US$ 285.30. The OOP costs for home deliveries, institutional normal deliveries, and CS for women attending ≥4 ANC visits were US$ 18.94, US$ 71.42, and US$ 285.30, respectively. Wealthier households had significantly higher childbirth costs, with families in the richest quintile reporting US$ 294.90 for CS. Households with higher wealth also had higher costs for institutional and home deliveries, averaging US$ 73.82 and US$ 21.70, respectively. Geographically, Dhaka had the highest overall OOP costs at US$ 153.97, while Barisal reported the highest CS costs at US$ 349.26. Urban residents consistently faced higher OOP costs, with an average of US$ 144.09, compared to US$ 93.60 for rural residents.

From Table 5, we can see that Cesarean sections were associated with the highest delivery costs, showing a significant increase compared to other delivery modes, with a coefficient of 1.32 (p-value < 0.001). Institutional normal deliveries also led to higher costs, with a coefficient of 0.71 (p-value < 0.001). In contrast, home deliveries served as the reference category and had the lowest associated costs. Younger mothers (aged 15-19) had lower delivery costs across all delivery types. For older age groups, particularly those aged 35-49, there was a slight increase in delivery costs, especially for institutional and Cesarean deliveries. However, these differences were less pronounced for institutional normal deliveries. Women with secondary and higher education experienced a significant increase in costs, with coefficients of 0.05 (p-value = 0.006) and 0.04 (p-value = 0.018) for home deliveries, respectively. Working women showed no significant difference in delivery costs. Body mass index (BMI) had some effect on delivery costs. Overweight women, in particular, saw higher costs associated with Cesarean sections (coefficient of 0.05, p-value = 0.021), while obese women also experienced higher costs for Cesarean deliveries (coefficient of 0.05, p-value = 0.037). Adequate antenatal care (ANC) visits were strong predictors of higher delivery costs. Women who had 1-3 ANC visits and 4 or more visits had significantly higher costs compared to those with no ANC visits, with coefficients of 0.14 (p-value < 0.001) and 0.17 (p-value < 0.001), respectively. The wealth index indicated that both middle-income and rich women incurred higher delivery costs, with the richest women facing the highest expenses (coefficient for the rich category = 0.09, p-value = 0.009 for home deliveries). Lastly, geographic region played a role in the variation of delivery costs, with women in Dhaka, Khulna, Mymensingh, Rajshahi, and Rangpur divisions all incurring significantly lower costs than those in Barisal. In particular, the Rajshahi division had the largest decrease in costs for both institutional and Cesarean deliveries (coefficients of -0.25 and -0.26, respectively, both p-values < 0.001).

The figures in Table 6 demonstrate that the total average self-reported out-of-pocket (OOP) cost for childbirth in Bangladesh in 2022 was US$ 228.16 (SD ± 177.50). Cesarean sections (CS) were notably more expensive, averaging US$ 285.14 (SD ± 166.51), while normal deliveries in institutional settings averaged US$ 93.03. The highest costs were associated with mothers in the 25-34 age group, who spent an average of US$ 244.27, while the youngest age group (15-19 years) reported the lowest costs, averaging US$ 196.73. Education played a significant role in determining OOP expenditures. Mothers with higher education had significantly higher costs, averaging US$ 277.54, and those with a higher education level spent US$ 318.47 on cesarean sections. Similarly, husbands with higher education levels contributed to higher family expenses, with average costs of US$ 273.46, and up to US$ 311.41 for CS. The average cost for obese mothers was US$ 234.11, particularly for CS, which cost an average of US$ 292.10. The average OOP expenditure for women with four or more ANC visits was US$ 249.53, with normal deliveries costing US$ 102.85, and CS averaging US$ 299.37. Richer families faced average costs of US$ 114.39 for institutional deliveries, and US$ 301.94 for cesarean sections. The poorest families reported lower costs, with institutional deliveries averaging US$ 77.94, and cesarean sections costing US$ 258.96. Geographic location also played a crucial role in OOP costs. Barisal had the highest average delivery costs, at US$ 270.58, while Sylhet had the highest costs for cesarean sections, averaging US$ 367.71. Urban residents consistently faced higher OOP costs, with an average of US$ 243.96, reflecting the ongoing inequities in access to affordable delivery services in urban areas compared to rural areas, where the average was US$ 218.42. In 2022, several factors significantly impacted OOP costs for childbirth in Bangladesh.

In 2022, cesarean sections were associated with notably higher delivery costs compared to institutional normal deliveries, with a coefficient of 0.60 (SE 0.02), indicating a significant increase in costs (p-value < 0.001). Women in the 25-34 age group, in particular, had slightly higher costs for institutional normal deliveries and cesarean sections, with a coefficient of 0.04 (SE 0.03) for cesarean sections (p-value = 0.027). Husbands with higher education were associated with increased delivery costs, though the statistical significance varied (p-value = 0.055 for the highest education level). Wealth status was another strong determinant of delivery costs. The wealthier families, particularly those in the rich wealth index group, incurred significantly higher costs for cesarean sections, with a coefficient of 0.02 (SE 0.02) for cesarean section (p-value = 0.007) (Table 7).

Overall, from 2014 to 2022, the mean out-of-pocket (OOP) expense during child delivery in Bangladesh was US$ 130.32. The highest OOP costs (US$ 145.87) were observed among women in the 35-49 age group. Women’s education and socioeconomic status were significant determinants of higher OOP spending. Specifically, highly educated women (US$ 228.47) and women from wealthier households (US$ 184.59) incurred the most substantial expenses during childbirth. Furthermore, obese women spent notably more, with an average OOP cost of US$ 217.76. The place of delivery also had a considerable impact on the overall cost. Participants from Dhaka (US$ 164.67) and urban areas (US$ 164.37) had the highest expenditures for child delivery. Additionally, women who had attended four or more antenatal care (ANC) visits with skilled healthcare providers had the highest OOP expenses (US$ 178.83) over the study period. These findings highlight the influence of various demographic and healthcare factors on the financial burden of childbirth in Bangladesh (Table 8).

The analysis revealed several key factors influencing the cost of childbirth in Bangladesh. Cesarean sections were found to be the most expensive delivery option (p < 0.001), followed by institutional normal deliveries (p < 0.001). Women with higher levels of education, particularly secondary or higher, tended to incur higher delivery costs (p < 0.05). Additionally, those who attended more than three antenatal care visits spent significantly more on childbirth (p < 0.001). Wealthier families also faced higher delivery costs, with the middle and rich wealth categories spending more compared to the poor (p < 0.05). Conversely, women with multiple children, particularly those with two or more, generally experienced lower delivery costs (p < 0.001). Regional variations were also notable: childbirth costs were significantly lower in Rajshahi, Rangpur, and Sylhet compared to other regions (p < 0.01). Finally, the place of residence had an impact on delivery costs. Institutional deliveries in rural areas were more expensive than in urban areas (p < 0.05), indicating that geographic location plays a role in determining the cost of childbirth. These findings highlight how socio-economic factors, healthcare access, and regional disparities influence childbirth expenses in Bangladesh (Table 9).**Discussion**

This study aims to explore delivery costs and the determinants associated with them. Our study observed that the proportion of live births delivered in a health facility has increased tremendously over the last three decades (from 3% to 65%), and the proportion of home deliveries decreased (from 97% to 35%). We also observed that institutional and C-section delivery has increased over time. The proportion of live births delivered by cesarean section rose from 3% in 1999–2000 to 45% in 2022 one. We found several indicators of institutional and C-section delivery, such as mother’s education, birth order, ANC visit, wealth quintile, region, etc. This is supported by earlier studies (Dixit & Dwivedi, 2016; Setu et al., 2022).

Our study revealed that the tendency toward institutional delivery is higher among educated women and lower among women who have no education (Dixit & Dwivedi, 2016; Setu et al., 2022). According to our study, the more educated the mother, the higher the percentage of deliveries assisted by a medically trained provider. Live births of the first order have a higher C-section rate (51%) than births of the fourth or fifth order (21%). Compared to mothers who had no ANC visits (22%), mothers who had at least four ANC visits (80%) gave birth in a medical facility more frequently. Women in the lowest wealth quintile had the lowest tendency of deliveries in a health facility, whereas women in the highest wealth quintile had the highest tendency. As household wealth rises, so does the percentage of mothers receiving assistance from medically trained providers during delivery; mothers in the lowest wealth quintile receive 47% of this assistance, whereas mothers in the highest quintile receive 91%. Older mothers had a higher demand for institutional delivery than younger mothers.

According to our study, the demand for institutional delivery was higher among employed women than unemployed women (Sarker et al., 2018;Setu et al., 2022). We also found that there was a lower chance for institutional and C-section delivery in rural areas than urban areas (76% versus 61%) (Kifle et al., 2018; Haider et al., 2018;​ Setu et al., 2022). This might be the result of reduced access to institutional delivery in rural areas and a poor communication system, higher transportation costs, and other related expenses. According to a study of Eritrea, due to their limited ability to make decisions, women who lived in rural areas had little control over their reproductive health (Kifle et al., 2018). We observed that the delivery rate in health facilities was highest in Khulna and lowest in Barisal. Maybe socioeconomic environment resulted in this condition.

The delivery cost was typically higher in private facilities than in public facilities. And C-section delivery in private facilities was more than twice according to earlier studies (Borghi et al., 2006;Haider et al., 2018). Our study revealed that the primary coping strategies during delivery were family funds, loans, and outside support, which is supported by another study (Sarker et al., 2018).An earlier study found that generally, richer households preferred to use their current income and savings to pay for their medical expenses, indicating that borrowing money or depleting assets were undesirable options (Hoque et al., 2015). According to our study, although the majority of the costs associated with the delivery were paid for by family funds (85%), the amount of delivery cost payments through loans had increased by almost 50% in the last five years, sold assets and mortgages increased by almost 70%, and gifts from relatives and friends also increased. This indicates the burden of delivery costs is alarming for the households.

We analyzed years of data and compared one year's data with another year's data. We were able to show the increasing rate of delivery cost and which factors were associated with the increase in delivery cost. We were able to present the determinants of delivery-related expenses thoroughly. These are the strengths of our study. We have several limitations in our study. We used the Bangladesh Demographic and Health Survey's secondary data. Since the survey was based on self-reported data from respondents, recall bias may be associated with some factors. The survey was cross-sectional. That's why we were unable to provide any evidence of a causal relationship. Many poor households may have been unable to afford institutional deliveries, but we could not identify those households. We didn’t have available data for several factors. The delivery costs might be varied due to the pandemic situation of 2019-20 or due to other reasons, but we were not able to identify these.

**Conclusion**

Our present study shows the comparison and distribution of delivery cost and its determinants such as age, education, wealth quintile, region, birth order, working status of mother, ANC visits, etc. One noteworthy development is the increasing trend towards better care. There are many variations among the factors affecting delivery cost. Although there are many reasons behind the higher rate of delivery cost, the tendency toward C-section and institutional delivery is increasing, and as a result, the delivery cost is at a higher rate.

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