



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

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Summary

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

Methods: The study was conducted using a secondary data source of the latest Bangladesh Demographic and Health Survey (DHS) 2014. A cross-sectional survey was carried out for six 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 analyse this data.

Results: Analysis indicated that the average self-reported out-of-pocket payment (OOPP) per child delivery was US\$ 79.23 (SD \pm 128.05). The highest OOP was observed for C-section (US\$ 249.89, SD \pm 153.54), followed by institutional normal delivery (US\$ 61.62, SD \pm 75.28). The average cost per normal home delivery was US\$ 15.89 (SD \pm 25.84). The richest quintile spent significantly more than the poorest quintile with regards to 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 socio-economic 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, service utilization, out-of-pocket expenditure, universal health coverage

1 | INTRODUCTION

Every day, approximately 830 mothers die globally due to pregnancy and childbirth-related complexities, with ninety-nine percent 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 haemorrhage, 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- 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 centres, upazila health complexes (UHCs), district level hospitals, tertiary level medical college hospitals, and specialized hospitals. Private and Non-Government 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 (BDT) 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 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 in order 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 out of pocket (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. OOP is the primary payment strategy for

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3 healthcare in Bangladesh, and OOP's share of total health expenditure has been increasing alarmingly,
4 from 55.9% in 1997 to 67% in 2015.¹⁹ The objective of this study is thus to capture the relevant out-
5 of-pocket costs, coping mechanisms, and associated factors related to child delivery in Bangladesh
6 using nation-wide household level data. The findings from the study show the extent of out-of-pocket
7 expense during child delivery care, and can also have broad implication for improving the efficiency
8 and equity of maternal child delivery care in Bangladesh.
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14 **2| METHODS**

15 **2.1 | Study design and sampling**

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20 The study was conducted using secondary data sources from the latest Bangladesh Demographic and
21 Health Survey (DHS) 2014. A cross-sectional survey was carried out for six months, from June to
22 November 2014, with closed-ended questions that pertained to child delivery related expenditure. The
23 two-stage stratified sampling design was adopted using a complete list of enumeration areas (EAs)
24 and covering the whole country, which was prepared by the 2011 population census of the People's
25 Republic of Bangladesh. The 2014 BDHS is the seventh Demographic Health Survey (DHS) in
26 Bangladesh, which started in 1993-1994 and continued every four years since. The sampling method,
27 survey design and instruments, and the measurement system, as well as quality control, have been de-
28 scribed elsewhere.^{20,21} The data on the delivery cost was collected from women who gave birth within
29 the three years preceding the survey, and the most recent live birth cost was considered for the
30 analysis. A total of 17,863 ever-married mothers were interviewed, whereas 4, 627 mothers delivered
31 a baby. However, we have excluded 61 mothers from the analysis. This was either due to missing
32 information or the respondent's inability to recall the mentioned cost history and outlier (Supplement
33 1). In this context, the data of 4,566 mothers (98.68%) were analysed.
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41 **2.2 | Data Analysis**

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Descriptive statistics were employed to analyse and summarise the data using different variables. Bi-
variate and multivariable statistics were also employed. Log transformation was used for exhibiting
linearity as out-of-pocket expenditure (the dependent variable), and was positively skewed, thus
allowing the mean, median, and inter-quartile range (IQR) 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, ANC visits, household size, exposure of
mass media, residence, socio-economic 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

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3 normal delivery, C-section delivery, and the total cost of child delivery services. The variance
4 inflation factor (VIF) test was used to detect for multicollinearity in the regression model.^{10,25} All data
5 cleaning, validation, and statistical analyses were performed using Stata/SE 13.0 (StataCorp. College
6 Station, TX, USA).
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10 11 12 **2.3 | Ethical Considerations**

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14 We analysed the publicly available DHS dataset by contacting the MEASURE DHS program office.
15 DHS followed standardised data collection procedures. According to the DHS, written informed
16 consent was obtained from mothers/caretakers who enrolled in the survey.
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20 21 **3 | RESULTS**

22 23 **3.1 | Background Characteristics of Study Participants**

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25 A total of 4,566 delivered mothers were considered for analysis (Table 1), whereas normal delivery at
26 home, normal delivery at institutions, and C-section were 2,812 (62%), 660 (14%) and 1,094(24%),
27 respectively. The mean age of mothers was 24.58 years (SD \pm 5.75), and most of the mothers were
28 not employed (76%), with only 31% of mothers completing the recommended (4 or more) ANC
29 visits. Regarding education level, most of the mothers (76%) had completed primary and secondary
30 school, whereas approximately 14% mothers had no formal education. A similar educational pattern
31 was also observed in the case of their spouses. Around 48% (n=2,202) of households had more than
32 five members in size, with most of the families (62%) exposed to mass media and lived in rural
33 settings (74%). Dhaka division had the highest proportion (n=1,609, 35%) of mothers participating in
34 the survey, while the lowest proportion of participants belonged to the Chittagong region (n=1,002,
35 22%). Table 1 shows that approximately 62% of the mothers delivered at home, followed by private
36 hospitals and clinics (23%). In addition, about 13% of mothers delivered at public facilities.
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45 46 **3.2 | Distribution of child delivery cost**

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48 The distribution of OOP costs related to child delivery is shown in Table 2. The average self-reported
49 OOP per child delivery was US\$79.23 (SD \pm 128.05), with the highest OOP observed for C-section
50 (US\$ 249.89, SD \pm 153.54), and followed by institutional normal delivery (US\$ 61.62, SD \pm 75.28).
51 The average cost per normal home delivery was US\$15.89 (SD \pm 25.84). As for the age of mothers,
52 the older mothers (aged 35-49) spent significantly more (US\$ 91.16, SD \pm 151.12) than younger ones
53 (p<0.001). The OOP cost was significantly higher for mothers who had higher educational attainment
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3 and who utilised the recommended ANC services. The average OOP of C-section (US\$ 261), normal
4 delivery at institution (US\$73) and normal delivery at home (US\$ 19) was higher for mothers who
5 utilised the recommended ANC visits when compared to those who did not. The average total cost for
6 child delivery was higher in the urban areas (US\$ 113.89) when compared to rural areas (US\$ 62.90).
7 The OOP due to C-section was significantly ($p<0.001$) higher in big cities like Sylhet (US\$ 330),
8 Chittagong (US\$ 312), and Dhaka (US\$ 280), than in Rangpur city (US\$ 187). The richest quintile
9 spent significantly more than the poorest quintile, with regards to C-Section costs (US\$ 281 vs. US\$
10 204), normal deliveries at an institution (US\$ 80 vs. US\$ 65), and even normal delivery at home (US\$
11 22 vs. US\$ 13). Considering the institutionalised normal delivery, OOP was higher for those who
12 delivered their child at private hospitals and clinics (US\$ 92.60) than public facilities (US\$ 52.14). The
13 lower OOP was incurred for those who has delivered normally at NGO facilities (US\$ 31.81). A
14 similar pattern was further observed for the C-section category (Table 2). Our result shows that
15 approximately US\$ 271.24 was spent on those who chose C-section at private hospital and clinics.
16 The cost of C-section was lower at public facilities (US\$ 176.71); indeed, even lower than those for
17 NGO facilities (US\$ 203.74). However, if we include the outliers in the analysis, we find that the
18 average OOP per child delivery was US\$ 83.35 (SD \pm 171.72) and US\$ 265.85 for C-section.
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27 (Table 2 will be inserted here)

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29 (Figure 1 will be inserted here)

30 31 32 **3.3 | Coping mechanisms**

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34 The various coping strategies of households during child delivery, based on the place of residence of
35 the household, is shown in figure 2. We observed that approximately 87% of urban and 85% of rural
36 women met their expenditure through family funding; financial support from the family was another
37 important coping strategy that was slightly higher for rural women (19%) than urban (17%). Other
38 coping strategies included borrowing, support by friends, selling assets, voucher schemes, health
39 insurance and others.
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44 (Figure 2 will be inserted here)

45 46 47 **3.4 | Factors Associated with out-of-pocket expenditures during child delivery strategies**

48 Table 3 demonstrates the various factors associated with OOP. Our study shows that several factors,
49 such as the age and education of the mothers, education of spouses, working status of mothers, birth
50 order, recommended ANC utilization, wealth quintiles, and administrative regions were significantly
51 associated with OOP. Overall, older mother spent significantly higher on delivery care. OOP was
52 higher for older mothers (aged 35-49) for C-section (34%, $p<0.01$) and institutional normal delivery
53 (32%, $p<0.01$) for mothers aged 20-24 than that of younger mothers. Overall, OOP was significantly
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3 associated with the higher educational level of spouses. Regarding home delivery, we found
4 significantly lower costs among the smallest families than the larger households (Table 3). The
5 number of child deliveries was highly associated with the expenditure for delivery care overall. The
6 cost was higher for mothers who experienced their first child delivery (97%, $p < 0.001$). The working
7 status of the mother was significantly associated negatively with OOP and working mothers spent less
8 than unemployed mothers. Utilization of ANC was positively associated with delivery-related
9 expenditure, and OOP was higher for those who utilized the recommended ANC care. With regards to
10 the administrative regions, our results demonstrate that OOP was significantly lower in the Rangpur
11 division than others. Overall, the richest wealth quintile spent significantly ($p < 0.001$) more than the
12 poorest quintile.
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18 (Table 3 will be inserted here)
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20 21 **4 | Discussion**

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23 Bangladesh has made tremendous improvements in the health sector through the reduction of
24 maternal mortality and improvement of child health due to a well-structured health system which
25 involves both the public and private sectors, along with non-government organizations. Furthermore,
26 this is supported by the commitment of the “Bangladesh Maternal Health Strategy”, which
27 encourages mothers to deliver under the care of medically trained birth attendants, and have the
28 delivery performed by a skilled birth attendant, along with promoting safe motherhood through
29 various activities.^{5,26} Over the last two decades, the private sector engaged in healthcare delivery
30 significantly, which contributed to the increase of institutional delivery and C-section delivery rates in
31 Bangladesh. However, the C-section rate is unnecessarily high (23%), and is higher than global
32 standard, often resulting in excessive cost.^{5,10,27,28} Nevertheless, the household OOP spending was still
33 the main (67%) payment strategy for healthcare, although the target of the Bangladesh healthcare
34 financing strategy was to reduce the out-of-pocket expenditure from 67% to 32% in total health
35 expenditure to assist in the achievement of Universal Health Coverage.²⁹ In this context, the target
36 will be realistic when larger portions of the population are able to access the pre-payment and pooling
37 mechanisms for all services, including the delivery care. However, this is not yet the case.³⁰ This
38 study thus addresses the extent of households’ OOP variation and the associated factors related to
39 child delivery for Bangladeshi mothers.
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49 The lower cost in public facilities reflect that these public facilities are highly subsidised by the
50 government of Bangladesh and occasionally receive national and international donations for the
51 purchasing of goods.^{16,31} Thus, the financial cost is often shared among the households and the
52 hospitals, whereas in the cases of private facilities, all expenditure (including profits) have to be raised
53 from the households. While, due to the nature of this survey, we were not able to separate the
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3 components of OOP, earlier studies in this context have observed that along with direct medical cost,
4 travel, food, lodging, hiring of an 'aya', and even tip-giving were all major components of child
5 delivery costs.³²⁻³⁴ A previous hospital-based study in Bangladesh reported that the cost of normal
6 delivery and C-section at public facilities was approximately US\$ 44 and US\$ 90, at the price level of
7 2007.¹⁶ A couple of community-based studies in this context observed that, for a normal delivery,
8 households spent anywhere from US\$ 24 up to US\$ 32, while in C-section, the OOP was raised from
9 US\$ 118 to US\$ 230.^{14,32} Our study observed that family funds, support from others, and borrowing
10 were the main coping strategies during the child delivery. Generally, households attempts to mitigate
11 the cost of normal delivery with regular income and savings. However, the coping strategies were
12 often altered if a delivery-related complication arose, or C-section was required. Consequently,
13 households often relied on loans, donations, the selling of assets (e.g., jewellery, land) with the extent
14 of the health shock being larger for the poorest households.^{14,33,34} However, many of the households
15 still had no opportunities to access the appropriate facilities during the delivery care phase due to
16 affordability issues.^{32,35} Thus, it is necessary to strengthen the on-going pro-poor health intervention,
17 along with enriching the demand-side financing strategies in Bangladesh, which could mitigate the
18 financial barriers during the delivery.^{29,36}

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27 Our study observed a number of factors (such as age, education, working status of the mother, birth
28 order, utilization of ANC, regional variation and wealth status) were significantly associated with a
29 high OOP. Older mothers spent significantly more than younger mothers, as advanced maternal age
30 was associated with various maternal complexities. Thus, older mothers tended to require
31 hospitalization and even C-sections, which reflected a rise in out-of-pocket expenditure in relation to
32 child-birth.³⁷⁻³⁹ Furthermore, the adverse maternal outcome was closely linked with the duration of
33 hospitalisation, which also increased the out-of-pocket expenditure.³⁴ It is well established that a
34 positive association is often visible amongst the level of education and health awareness, which leads
35 to a greater utilisation of maternal care service and thus expenditure.⁴⁰⁻⁴² In line with this statement,
36 we observed a positive link with higher education and OOP for all child delivery care. However,
37 higher education was often linked with higher income, which might be an another reason for high
38 spending during the child delivery care.⁴³ Birth order appeared as a significant factor of high out-of-
39 pocket expenditure. Furthermore, we observed those who experienced first delivery had spent relative
40 to others. Younger mothers tended to give greater attention to their first delivery as they have no
41 previously experience of pregnancy, and would end up spending more to utilise better care.⁴⁴ We also
42 observed that the working status of mothers is significantly negatively associated with OOP and
43 mothers who had engaged a regular job spent less than unemployed mothers. This seems counter-
44 intuitive, and might be due to working women having a better knowledge about pregnancy and
45 childbirth, a greater freedom of movement, and therefore, better access to pregnancy-related
46 information and even healthcare, thus avoiding adverse events.^{42,44,45} Various studies showed that
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3 unemployment often acted as a barrier against optimal, timely utilisations of health service, which
4 could lead to delivery-related complexities and a negative impact on resources.^{46,47} Our results
5 indicated that recommended of ANC drives higher the out-of-pocket cost for child delivery. The
6 average out-of-pocket expenditure for C-sections and normal deliveries at institution and normal
7 delivery at home was significantly higher for those mothers who had utilised the recommended ANC
8 visits than those who did not. ANC recommendations acted as a powerful determinant of institutional
9 delivery, since with the help of ANC services, mothers were often informed about the adverse events
10 linked with pregnancy-related complications and thus developed better communication with
11 healthcare, which encouraged them to access health facilities during delivery and spent spend more
12 for safe delivery care.^{48,49} A study of similar countries observed that recommended ANC increased C-
13 section utilisation by a factor of two compared to those who did not utilise the recommended care.⁵⁰
14 According to the administrative region of the country, OOP was highest for the Dhaka division, as
15 Dhaka is the capital of Bangladesh and the living cost was higher than those of other regions in the
16 country. The study showed that the richest wealth quintile spent significantly more than poorest
17 quintile, although higher cost does not always guarantee the better birth outcome.⁵¹ However, it was
18 well reported that the wealthiest households always utilised more maternal care services than those in
19 the poorest households, in the Bangladeshi context.^{42,52} Recent studies indicated that the utilisation of
20 C-section was highly concentrated among mothers from the richest wealth quintiles, and even the
21 poorest mother often had difficulties accessing this life-saving procedure.^{50,53} Affordability might be
22 an important issue, as the financial burden was greater for poorer households, irrespective of the
23 institutional normal delivery or C-section delivery.¹⁴ Again, many studies explored the unofficial fees
24 associated with the child delivery care in Bangladesh,³²⁻³⁴ and thus effective supervision is also
25 necessary for the reduction of OOP. Although the wealthiest households mitigated the excessive
26 delivery cost from their income and saving, the poor suffered catastrophically and often borrow from
27 local money-lenders with a high-interest rate due to the lack of social protection.^{12,14} Thus, strong
28 policy initiatives are necessary to ensure the accessibility and affordability of delivery care services.
29 However, an affordable social health insurance would be able to finance households during child
30 delivery care, which would be in a similar line with that of the national healthcare financing strategy
31 in Bangladesh.²⁹

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Our study has several limitations. We used secondary data sources of Bangladesh Demographic and
Health Survey, which was based on self-reported information provided by respondents. Therefore,
recall bias and reporting errors might be associated particularly with the out-of-pocket 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

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3 to show whether household expenditure was “catastrophic”. Again, there might have been numerous
4 households who were not able to utilise the institutional delivery care and/or C-section due to un-
5 affordability, but this study was unable to capture such scenarios. Further investigation was necessary
6 to observe underlying mechanisms of the out-of-pocket variation, which will help to promote value
7 and efficiency in child delivery care in the long run. Despite these limitations, the study’s findings can
8 be generalized to the national level as the study gathered data from a nationally representative
9 demographic and health survey of Bangladesh.
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13 14 **5 | Conclusion**

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16 The present study highlights the distribution and comparison of out-of-pocket expenditure on child
17 delivery in Bangladesh. Our study has shown that there is a huge variation of OOP, according to the
18 facility used and the socio-demographic status. Several factors, such as age, education, working status
19 of the mother, birth order, utilization of ANC, regional variation and wealth status were significantly
20 associated with high OOP. Women belonging to wealthier households tended to receive better care
21 and spend more, and so policy efforts would need to focus on the lowest wealth quintiles in order to
22 avoid economic burden during child delivery-related activities. As such, financial risk protection
23 should be provided. Social and private health insurance might be another alternative for financing
24 during child deliveries, and this is in line with the core objective of the Healthcare Financing Strategy
25 of Bangladesh, which is to achieve Universal Health Coverage.²⁹
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17 Table 1: Background characteristic of delivered mother, (N=4,566)

18 Table 2: Distribution of child delivery cost in Bangladesh, US\$

19 Table 3: Factor association with child delivery cost

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24 Figure 1. Out of pocket expenditure during child delivery across divisions

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26 Figure 2. Coping strategies during child delivery

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29 Supplement 1. Study flow chart

Table 1: Background characteristic of delivered mother, (N=4,566)

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	1,531 (33.53)	(32.17-34.91)
25 - 34	1,804 (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	1,277 (27.97)	(26.69-29.29)
Secondary	2,187 (47.90)	(46.46-49.35)
Higher	454 (09.95)	(09.11-10.85)
Husband education		
No education	1,093 (23.94)	(22.72-25.20)
Primary	1,371 (30.03)	(28.72-31.38)
Secondary	1,459 (31.96)	(30.62-33.32)
Higher	643 (14.08)	(13.10-15.12)
Husband occupation		
Farmer	1,172 (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	1,100 (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	2,812 (61.59)	(60.16-62.99)
Institutional normal delivery	660 (14.45)	(13.46-15.50)
Caesarean section	1,094 (23.96)	(22.75-25.22)
Household size		
<4	569 (12.47)	(11.54-13.46)
4 - 5	1,795 (39.32)	(37.91-40.74)
>5	2,202 (48.22)	(46.77-49.67)
Birth order		
1	1,809 (39.62)	(38.21-41.05)
2 - 3	2,121 (46.45)	(45.00-47.90)
≥ 4	636 (13.93)	(12.96-14.97)
Working status		
Not working	3,478 (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	2,810 (61.54)	(60.12-62.94)
ANC visit		
No ANC	984 (21.55)	(20.38-22.77)
1 - 3	2,160 (47.31)	(45.86-48.76)
≥ 4	1,422 (31.14)	(29.81-32.50)
Place of residence		
Urban	1,178 (25.81)	(24.56-27.10)
Rural	3,388 (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	1,002 (21.93)	(20.76-23.16)
Dhaka	1,609 (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)
Palace of delivery		
Home delivery	2,812 (61.59)	(60.16-62.99)
Public facilities	595 (13.03)	(12.08-14.03)

Private hospitals/clinic	1,039 (22.75)	(21.55-23.99)
Non-Government Organization (NGO)	115 (02.53)	(02.11-03.02)
Others	05 (0.11)	(0.05-0.27.00)

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For Peer Review

Table 2: Distribution of child delivery cost in Bangladesh, US\$

Variables	Home Delivery, (n=2,812)		Institutional Normal Delivery, (n=660)		Cesarean Section, (n=1,094)		Overall , (n=4,566)	
	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)
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	

1	Mass media exposure								
2	(TV/Radio)								
3	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)
4	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)
5	P-value	<0.001		0.564		0.002		<0.001	
6	ANC visit								
7	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)
8	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)
9	≥ 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)
10	P-value	<0.001		0.002		0.022		<0.001	
11	Place of residence								
12	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)
13	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)
14	P-value	0.043		0.009		0.084		<0.001	
15	Division								
16	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)
17	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)
18	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)
19	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)
20	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)
21	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)
22	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)
23	P-value	<0.001		<0.001		<0.001		<0.001	
24	Wealth index								
25	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)
26	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)
27	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)
28	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)
29	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)
30	P-value	<0.001		0.001		<0.001		<0.001	
31	Palace of delivery								
32	Home delivery	15.89 (25.84)	06.44 (18.03)	-	-	-	-	15.89 (25.84)	06.44 (18.03)
33	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)
34	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)
35	Non-Government	-	-	31.81 (34.07)	20.60 (32.19)	203.74 (147.30)	154.51 (180.26)	79.49 (112.73)	38.63 (77.25)
36	Organization (NGO)	-	-	108.93 (87.43)	90.13 (16.74)	-	-	108.93 (87.43)	90.13 (16.74)
37	Others	-	-	108.93 (87.43)	90.13 (16.74)	-	-	108.93 (87.43)	90.13 (16.74)
38	P-value			<0.001		<0.001		<0.001	
39	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)

Note: 1 US\$=77.667 BDT at the end of month July, 2014; SD: Standard Deviation; IQR: Inter-Quartile range

Table 3: Factor association with child delivery cost

Parameters	Standard coefficient (S.E)			
	Model I	Model II	Model III	Model IV
	Home delivery	Institutional Normal Delivery	C- section 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)
≥ 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	2,812	660	1,094	4,566
Adjusted R-square	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***

S.E: Standard Error; VIF: Variance Inflation Factor; ref: Reference; *P<0.05; **P<0.01; ***P<0.001

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For Peer Review

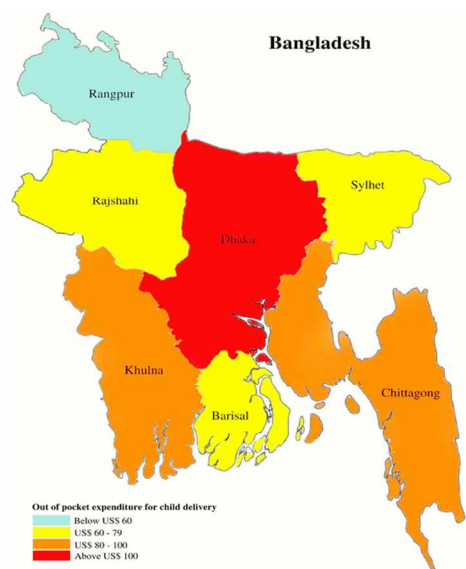


Figure 1 Out of pocket expenditure during child delivery across divisions

108x60mm (300 x 300 DPI)

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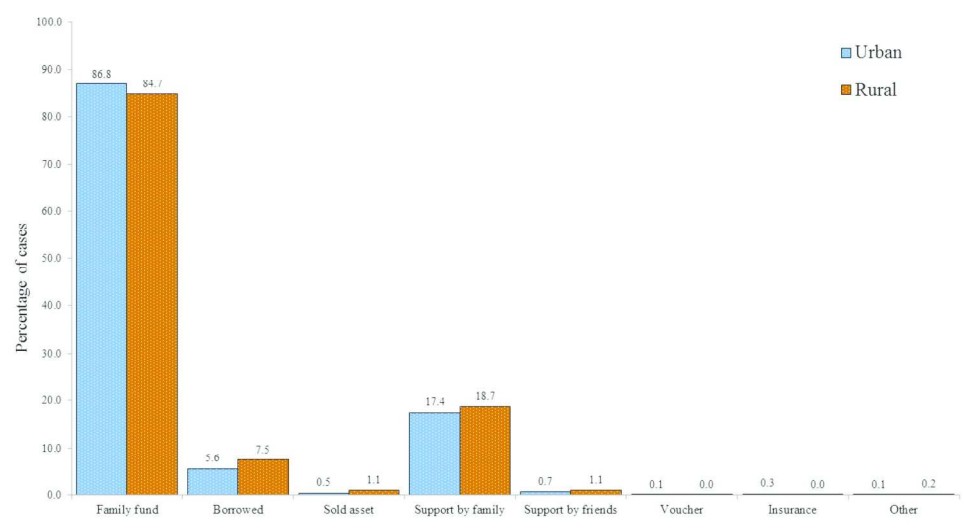


Figure 2. Coping strategies during child delivery

338x190mm (300 x 300 DPI)