Hidden Costs of Hospital-Based Delivery Among Women Using Public Hospitals in Bale Zone, Southeast Ethiopia

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Abstract

Background: The Ethiopian health care system since 2005 has encouraged safe enhanced obstetrical care. However, hospital delivery has remained expensive for poor households due to hidden costs. Hidden costs are the costs that are not accounted for in direct hospital costs. The aim of this study was to estimate the hidden costs of institutional delivery and to identify its associated factors. Methods: A health facility–based cross-sectional study was conducted in the Bale zone from August 13 to September 2, 2018. Exit interviews were conducted among women who gave birth at the selected hospitals. A total of 390 women from 1 referral hospital and 2 general hospitals were included into the study. Systematic sampling technique was used to select study participants. Multiple linear regression analysis was done to identify the predictors of the hidden cost of institutional delivery. Result: The median hidden cost of institutional delivery was 877.5 ETB (32.03 USD). The median of the direct medical cost of normal delivery was 280 ETB (10.21 USD) while the direct nonmedical cost was 230 ETB (8.40 USD). For cesarean section, the median direct medical cost was 292 ETB (10.66 USD) while indirect costs were 591 ETB (21.60 USD). For forceps delivery, the median direct medical cost was 362 ETB (13.21 USD) while the direct medical cost was 360 (13.14 USD). Distance of household from the hospital (β = 0.165), length of stay at the hospital (β = 0.050), mode of delivery (β = −0.067), and family monthly income (β = 0.201) were the explanatory variables significantly associated with the hidden cost. Conclusion: This study showed hidden cost of facility-based delivery was high. Distance, length of stay, income, and mode of delivery were the predictor of hidden cost. Ethiopian health care system should consider the hidden costs for pregnant women and their families.

Keywords
hidden costs, hospital costs, facility-based delivery, Ethiopia

Background

Federal Ministry of Health (FMOH) of Ethiopia has recognized that lack of skilled birth attendance as an important factor contributing to maternal death.1,2 The current rate of maternal mortality in Ethiopia is 412 per 100,000 live births.3 Home delivery is associated with many of these maternal deaths.4,5 A majority of these deaths are due to hemorrhage, infections, high blood pressure, and unsafe abortion, which can be prevented during delivery.6 The FMOH has determined that it is imperative that all pregnant women have access to skilled attendance.7 Although, maternal services had been made free in the country, a skilled attendant at birth is still very low, at 28%, while facility-based childbirth is only 26%.3 Hidden cost is an important contributor to low utilization of health facility delivery.8 It is not easy to get-facility based delivery service for women from low economic background due to the hidden costs.9

The hidden costs of facility-based delivery service are costs that are not officially accounted for in the direct hospital costs and includes the purchase of outside medications, food and drink, lodging, transportation, communication, and loss of wages by both the patient and the patient’s companions during the hospital stay.10 The hospital costs included cost of registration, medications, medical supplies, laboratory
testing, and the cost of x-ray, which are categorized under direct medical cost and mostly included under free maternity schemes.\textsuperscript{11,12}

The cost of health service and the ability of family to pay is incongruent.\textsuperscript{13} To remove this financial barrier and make delivery services accessible to all households, the government of Ethiopia introduced free maternity services at public health facilities.\textsuperscript{14} Health facilities are meant to give free maternity services starting 2005.\textsuperscript{1,15} Under the free maternity service scheme, hospital costs like registration, consultations, drugs (if available in the stock), and beds are officially free of charge.\textsuperscript{11} Although the free maternity health service was a successful program, the system is not completely free of costs.\textsuperscript{16}

Removing hospital costs or implementing free maternity services alone neither protects households from unnecessary costs nor increases facility-based delivery use.\textsuperscript{11,17} Hospital costs (consultation, registration, drug, and bed costs) that are officially free of charge are much lower than that of hidden costs. For instance, the expenses of hidden cost in Nepal is 7 times more than that of the hospital costs, which are 268 USD and 38 USD, respectively.\textsuperscript{16} In some developing countries, cost of hospital stay alone accounted for 13 USD to 223 USD.\textsuperscript{8,18}

Cost has unquestionably been a major obstacle in seeking and utilizing health care.\textsuperscript{19} Not only consultation fee or cost incurred on medicines count but also the fare spent to reach health facility, lodging, and hence the total amount expended for hidden costs turns out to be unwieldy.\textsuperscript{20} Therefore, it is not sufficient to observe facility based delivery from the provider’s perspective alone. It is important to consider the perspective of the service users also. Knowing the amount of hidden cost spent by pregnant women to attend hospitals during delivery can point out the real situation of the financial hinder for pregnant women.

In Ethiopia, to the knowledge of the investigators, there is a paucity of research in the area and the amount of hidden cost per hospital visit for a woman is not known, particularly in the study area. Hence, the aim of this study was to estimate the hidden costs of hospital-based delivery and identify its associated factors. The results of the study can help policymakers and health managers consider their plan and implementation process in order to improve hospital-based delivery that might reduce the death of mothers and newborns.

**Methods and Material**

**Study Area and Design**

A health facility–based cross-sectional study design was conducted in Bale Zone Public Health facilities from August 13 to September 2, 2018. Bale is one of the zones in Oromia regional state with a Robe town as the administrative center of the zone; located at the 420 km to the southeast of Addis Ababa, the capital. The zone has a total population of 1822,897 people; 50.5\% of whom are males.\textsuperscript{21} The zone is divided into town administrations and 18 districts; 11 districts are semipastoralist while 7 of them pastoralist. The zone has 84 public health centers and 4 hospitals.

**Source and Study Populations**

The source populations for this study were all pregnant women who visited and gave birth in the public hospitals of Bale zone. The study populations were all selected postpartum women who delivered at the selected hospitals during the study period. Women who came for postnatal care, but did not give birth at the selected hospitals, who were in critical complication, unable to talk or listen were excluded from the study.

**Sample Size and Sampling Procedure**

**Sample Size Determination.** To determine the number of participants to be included in the sample, the single populations mean formula was used. The mean cost and standard deviation were derived from a study conducted in Dello Manna hospital to estimate the sample size.\textsuperscript{22} Accordingly, the mean and standard deviation were 110.96 and 65.5, respectively, and \( d \) assumed to be 6.5, 95\% confidence interval was used. Hence, the required sample size was calculated as

\[
n = \frac{(z\alpha / 2)^2 \delta^2}{d^2} = \frac{(1.96)^2 (65.5)^2}{(6.5)^2} = 390
\]

where \( n \) = required sample size, \( z \) = reliability coefficient for 95\% confidence interval (1.96), \( \delta \) = population standard deviation (65.5), and \( d \) = assumed marginal error (6.5). By adding 5\% nonresponse rate, the final sample size for this study was 409.

**Sampling Procedure.** One teaching hospital was selected purposely, since it is the only teaching hospital in the zone and 2 general hospitals were selected randomly by lottery method from the existing 3 hospitals. Monthly expected deliveries of Ginnir, Robe General Hospital, and Gobba Referral hospital were 139, 198, and 300, respectively. Then the proportional allocation of sample was done for each hospital based on the past year data report of delivery service provided. Accordingly, 89 samples from Ginnir, 127 from Robe, and 193 samples Gobba Referral Hospital. To have an individual study participant from each hospital, a systematic sampling technique was done during the data
collection process with $K$ value of 2 (that means every 2 women after delivery during the discharge). Exit interview was conducted among women who meet the eligibility criteria at the time of discharge. For women who did not fulfill the inclusion criteria, the next woman was selected.

**Data Collection Tools**

The data collection tool was developed after reviewing related studies. The content of the questionnaire includes sociodemographic characteristics, delivery-related information, and delivery-related expenses. A questionnaire was first prepared in English then translated to Afan Oromo (the language spoken in the area) and retranslated back into English by language experts to ensure its consistency. Using the one in Afan Oromo, pretest was conducted on 20 women in Dello Manna Hospital. Eight diploma-graduated health professionals who speak Afan Oromo (local language) and work outside the study area collected the data with 3 degree-holder supervisors.

**Measurements**

The total hidden cost of facility-based delivery was estimated by adding the direct nonmedical cost and the indirect and direct medical costs. Direct nonmedical costs were measured by the cost spent for food, accommodation, communication, and the cost of transportation during institutional delivery while direct medical cost was estimated for the cost of drug and other medical costs due to medicines being out of stock. Indirect cost was calculated from wage loss of mother and the caretaker that incurred due to hospital stay and which is calculated by using the human capital approach. Loss of wage was calculated by the formula of previous monthly income divided by the number of days in the month multiplied by the length of stay. Self-reported daily wage was estimated from responses on detailed questions about income sources. Women were asked about their income (if in work) and whether they had had to stop or reduce work due to their hospital visit. This information was used to calculate the wage losses generated by the visit. A total hidden cost was measured in Ethiopian Birr and then converted to US dollars for the same year. Since the data were skewed to the right, the median was selected as cut off.

**Data Analysis**

Data were cleaned and entered into EpiData software version 3.1 and then exported to IBM SPSS version 21 for analysis. Both descriptive and inferential statistics were done. For sociodemographic characteristics, descriptive statistical analysis was done. Multiple linear regression analysis was done for identifying factors associated with the outcome variable. Before the regression analysis, all assumptions in multiple linear regressions (linearity, normality, and multicollinearity) were checked. The table of normality test of the Kolmogorov-Smirnov and Shapiro-Wilk tests showed that the distribution remains significantly different from a normal distribution at $P < .001$. Data were transformed before the analysis since they were not normally distributed. Dummy variables were done for the categorical variables. A significance level of .05 was used in the final model to judge statistical significance.

**Study Variables**

The dependent variable was hidden cost of delivery, including expenses of food and drinking, transportation cost, lodging, cost of drugs and medical expenses, and loss of wages. Independent variables include sociodemographic characteristic such as age, religion, residence, education level of women and her husband, occupation of women and her husband, family income, and system of arrival, while the delivery-related variables are mode of delivery, length of stay, and transportation modalities.

**Data Quality Management**

The adapted questionnaire was pretested outside the study area and after pretest, reviewed for the appropriateness of wording and clarity of content. One day training was given to data collectors to be familiar with the data collection tool. The completed questionnaires were cross-checked on a daily basis.

**Results**

**Sociodemographic Characteristics of Respondents**

A total of 390 respondents participated in the study, yielding 95.4% response rate. Two-thirds (67%) of respondents were in the age group of 30 to 34 years while 91 (23%) were in the age group of 20 to 24 years. The mean (+SD) age of the respondents was 25.25± 7.18 years. A total of 235 (60.3%) of women were from the rural area, and 161 (41.28%) respondents were passed through a referral system. The median annual family income of respondents was 127.5 USD. Concerning education, the majority (73.3%) of our respondents were literate. Among the literate, about one-third (33.3%) of respondents had primary education while about one-fourth (24.1%) of respondents had secondary education at the highest level of education obtained. A total of 285 (73.1%) study participants were housewives whereas 51 (13.1%) of respondents were merchants. A majority (80.8%) of respondents’ husbands were literate. Among the literate, 109 (27.9%) had primary education while 107 (27.4%) had secondary education as their highest education level. In all, 182 (46.75%) respondents’ husbands were farmers whereas 87 (22.3%) were merchants. Three hundred six (78.5%) of respondents earned monthly income in the range of 1001 to 2000 ETB (36.43-73.79 USD; Table 1).
Of all the study participants, 240 (62%) of mothers had normal delivery while 79 (20.3%) had delivered by cesarean section. A total of 183 (46.9%) respondents used an ambulance while 162 (41.5%) study participants used a private car to come to the hospital. Almost all (94.9%) the study participants stayed less than or equal to 5 days. The median length of stay in the hospital for normal vaginal delivery was 1.6 days (range from 1 to 5 days), for cesarean section was 4.71 days (ranges from 3 to 19 days), and for forceps delivery 2.38 days (range from 1 to 9 days; Table 2).

**The Direct Cost of Hospital Deliveries**

The median cost of the direct medical cost of institutional delivery was 295 ETB (10.80 USD) while the direct nonmedical costs incurred by women were 282.5 ETB (10.31 USD). From the direct medical costs, the median cost of a drug during institutional delivery was 300 ETB (10.94 USD) while the median costs of laboratory services were 290 ETB (10.60 USD). Among the direct nonmedical costs, the median costs of food expense were 296 ETB (10.80 USD) while the drinking expense was 269 ETB (9.82 USD). The median cost of lodging expenses was 340 ETB (12.41 USD) while the median cost of transportation expenses was 221 ETB (8.10 USD) (1 USD = 27.4 ETB; Table 3).

**The Indirect Costs of Hospital Deliveries**

The median loss of wages was about 1091 ETB (39.82 USD) while the median loss of wage for caregivers except husband was around 200 ETB (7.29 USD).

**Estimation of Hidden Costs**

For normal delivery, the total median of the direct medical cost was 280 ETB (10.21 USD) while the median direct nonmedical cost of normal delivery was 230 ETB (8.40 USD). For the cesarean section delivery, the median direct medical cost was 292 ETB (10.66 USD) while the indirect costs were 591 ETB (21.60 USD). For forceps delivery, the median cost for direct medical cost and nonmedical costs

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**Table 1.** Sociodemographic Characteristics of Respondents Among Selected Public Hospitals in Bale Zone, 2018 (n = 390).

| Variables                      | Categories       | Frequency | Percent |
|-------------------------------|------------------|-----------|---------|
| Age in years                  |                  |           |         |
| 20-24                         | 91               | 23        |
| 25-29                         | 11               | 3         |
| 30-34                         | 262              | 67        |
| >35                           | 26               | 7         |
| Residence of respondents      |                  |           |         |
| Urban                         | 155              | 39.7      |
| Rural                         | 235              | 60.3      |
| Method of arrival             |                  |           |         |
| Referral                      | 161              | 41.28     |
| By self                       | 229              | 58.72     |
| Literacy capacity of mother   |                  |           |         |
| Illiterate                    | 104              | 26.7      |
| Literate                      | 286              | 73.3      |
| Highest level of education of mother (n = 286) | | | |
| Adult education               | 11               | 2.8       |
| Primary education             | 130              | 33.3      |
| Secondary education           | 94               | 24.1      |
| College or university         | 51               | 13.1      |
| Occupation of mothers         |                  |           |         |
| Government employee           | 38               | 9.7       |
| Merchant                      | 51               | 13.1      |
| Housewife                     | 285              | 73.1      |
| Day laborer                   | 10               | 2.6       |
| Private employee              | 6                | 1.5       |
| Literacy capacity of father   |                  |           |         |
| Illiterate                    | 75               | 19.2      |
| Literate                      | 315              | 80.8      |
| Highest educational level of father (n = 315) | | | |
| Adult education               | 14               | 3.6       |
| Primary education             | 109              | 27.9      |
| Secondary education           | 107              | 27.4      |
| College or university         | 85               | 21.8      |
| Occupation of father          |                  |           |         |
| Government employee           | 71               | 18.2      |
| Merchant                      | 87               | 22.3      |
| Farmer                        | 182              | 46.75     |
| Day laborer                   | 33               | 8.5       |
| Private employee              | 17               | 4.4       |
| Monthly income in ETB         |                  |           |         |
| <1000                         | 19               | 4.9       |
| 1001-2000                     | 306              | 78.5      |
| >2001                         | 65               | 16.6      |

| Variable                      | Categories       | Frequency | Percent |
|-------------------------------|------------------|-----------|---------|
| Mode of delivery              |                  |           |         |
| Normal vaginal delivery       | 240              | 61.5      |
| Cesarean section delivery     | 79               | 20.3      |
| Forceps delivery              | 71               | 18.2      |
| Method of transport           |                  |           |         |
| Ambulance                     | 183              | 46.9      |
| Rent car                      | 162              | 41.5      |
| Horse cart                    | 26               | 6.7       |
| Others*                       | 19               | 5         |
| Length of stay                |                  |           |         |
| ≤5 days                       | 370              | 94.9      |
| >5 days                       | 20               | 5.1       |

*On foot and on locally made stretcher.
were 360 ETB (13.14 USD) and 362 ETB (13.21 USD), respectively. The median total hidden cost was 877.5 ETB (32.03 USD). The range of the hidden cost of institutional delivery was 164 to 2561 ETB (5.98-93.50 USD; Table 4).

Factors Variation in Institutional Delivery–Related Cost

All predictors of hidden cost with P value less than .25 were entered into a multiple linear regression model. These variables were occupation of mothers, educational status of women, highest education level of father, age, mode of delivery, lengths of stay, distance, income, residence, and lodging expenses. Among these, lengths of stay in hospital, the distance of household from the health facility, mode of delivery, and monthly income appeared to be statistically significant at P value of .05. The model explained about 56.5% (R² = 0.565, P < .001) of the variance in total hidden cost of institutional delivery. As distance increased by 1 km, the hidden cost of the institutional delivery increased by 0.165 units (β = 0.165; 95% CI = 0.139-0.190) holding other variables constant. As the length of stay increased by 1 day, the hidden cost of institutional delivery increased by 0.050 units (β = 0.050; 95% CI = 0.039-0.061). For women who delivered by normal delivery the hidden cost of institutional delivery was decreased by 0.067 units than those women who delivered by forceps modes of delivery (β = −0.067; 95% CI = −0.108 to −0.025). Holding other variables constant, for those women who delivered by cesarean the hidden cost was increased by 0.086 units as compared with those who delivered by forceps (β = 0.086; 95% CI = 0.053-0.119). As the income of families increased by 1 birr the hidden cost of institutional delivery increased by 0.201 units (β = 0.201; 95% CI = 0.101-0.301; Table 5).

Discussion

Even though, rigorous effort by government, more than two-thirds of the deliveries in Ethiopia are not assisted by a health professional.3 The country has implemented a free maternity program and has eliminated some costs for facility-based delivery. In contrary, women are still bearing high

### Table 3. The Direct Costs of Institutional Delivery of Bale Zone Public Health Hospitals, 2018.

| Direct Cost                        | Mean  | SD    | Median | SD    | Min-Max Cost | ETB USD | ETB USD |
|-----------------------------------|-------|-------|--------|-------|--------------|---------|---------|
| Direct medical costs (n = 62)     | 337.42| 156   | 295    | 10.80 | 75-730       | 2.8-26.6|
| Cost of drugs                     | 310.8 | 136.9 | 300    | 10.94 | 75-600       | 2.8-21.9|
| Laboratory costs                  | 285.86| 96.6  | 290    | 10.60 | 150-490      | 5.5-17.9|
| Direct nonmedical costs (n = 390) | 456.1 | 302.6 | 282.5  | 10.31 | 110-1749     | 4.1-63.8|
| Food expenses                     | 306.3 | 90.12 | 296    | 10.80 | 213-534      | 7.7-19.5|
| Drinking expenses                 | 185.65| 51.9  | 269    | 9.82  | 105-312      | 3.8-11.4|
| Lodging expenses                  | 195.3 | 69.6  | 340    | 12.41 | 70-380       | 2.6-13.9|
| Transport expenses                | 109.11| 130.5 | 221    | 8.10  | 38-800       | 1.4-29.2|

*1 USD = 27.4 ETB.

### Table 4. Estimation of Hidden Costs of Hospital Delivery by Mode of Delivery in Bale Zone Public Hospitals, 2018.

| Variable                        | Median Cost | Min-Max Cost |
|---------------------------------|-------------|--------------|
|                                 | ETB USD     | ETB USD      |
| Normal vaginal delivery, n = 240|             |              |
| Direct medical cost             | 280         | 75-600       |
| Direct nonmedical cost          | 230         | 10-1341      |
| Indirect cost                   | 200         | 103-966      |
| Caesarean section, n = 79       |             |              |
| Direct medical cost             | 292         | 115-730      |
| Direct nonmedical cost          | 285.5       | 30-1627      |
| Indirect cost                   | 591         | 198-1186     |
| Forceps delivery, n = 71        |             |              |
| Direct medical cost             | 362         | 165-500      |
| Direct nonmedical cost          | 360         | 110-1749     |
| Indirect cost                   | 300         | 107-1185     |

For the purpose of clarity, the table has been split into two sections. The first section is “Table 3. The Direct Costs of Institutional Delivery of Bale Zone Public Health Hospitals, 2018.” The second section is “Table 4. Estimation of Hidden Costs of Hospital Delivery by Mode of Delivery in Bale Zone Public Hospitals, 2018.”
costs when seeking delivery care. This study revealed that
the amount of hidden costs during hospital delivery was
high. The median hidden cost of hospital delivery in this
study was 877.5 ETB (32.03 USD). In a least developed
country this amount of cost is catastrophic expenditure. The
cost represented about 28% of annual family income in
Ethiopia. Paying this much for single contact is a devastat-
ing expenditure for one family. This result differs from the
study done in western Nepal in which the hidden cost was
267.6 USD.10 The possible explanation for the discrepancy
might be due to the difference in the cost of medicine,
food and drinking, transportation, informal fees, and
variation in price across the states.25 Hidden cost of cesarean
section was higher compared to other modes of delivery (normal
vaginal and forceps delivery). This is obvious because cae-
sarean section needs complex procedure and longer stays in
the hospital as compared with other types of delivery.
Similarly, in Nepal, the cost of cesarean section was also
higher compared with other modes of delivery in which
normal delivery was 243.4 USD while the cesarean delivery
was 321.6 USD.10 The direct medical cost of normal deliv-
ery was 10.21 USD (280 ETB). This cost was already
included in free maternity program but, women pay due to
drug and other supplies being out of stock. This finding is
lower than study done in India and Bangladesh.18,26 The
possible explanation for this difference is might be due to
differences in the health system between the countries.

The hidden cost of forceps delivery was around 362 ETB
(13.21 USD) for direct medical cost while 360 ETB (13.14
USD) for direct nonmedical cost. This finding is in line with
World Bank reports. The World Bank report showed that in
low income countries like Africa and Latin America, the
cost of normal vaginal delivery at hospital ranges from 10
to 35 USD while the cost of cesarean section or complicated
vaginal delivery range from 50 to 100 USD.8 But, our result
was lower than the study done in Rajasthan (India),
Bangladesh, and study done in India.4,17,27 The possible
explanation might be due to regional variation or differ-
ences in exchange rate as well as the type of fee exemption
in each country.

Table 5. Factors That Predicted the Hidden Cost of Delivery in Selected Public Hospitals in Bale Zone, 2018.

| Variables                        | Unstandardized Coefficients | Standardized Coefficients | 95% Confidence Interval for B |
|----------------------------------|-----------------------------|---------------------------|------------------------------|
|                                  | B                           | Standard Error            | Beta                         | Significance | Lower Bound | Upper Bound |
| (Constant)                       | 1.917                       | 0.252                     | <.001                        | 1.420        | 2.414       |
| Age of mother                    | −0.001                      | 0.004                     | −0.014                        | .846         | −0.009      | 0.007       |
| Method of referral               |                             |                           |                              |              |             |             |
| Self-referral                    | −0.030                      | 0.036                     | −0.053                        | .405         | −0.100      | 0.041       |
| Referral                         |                             |                           |                              |              |             |             |
| Educational status/father        |                             |                           |                              |              |             |             |
| Literate                         | 0.020                       | 0.021                     | 0.067                         | .340         | −0.022      | 0.063       |
| Illiterate                       |                             |                           |                              |              |             |             |
| Occupation                       |                             |                           |                              |              |             |             |
| Private employee                 | −0.026                      | 0.055                     |                               | .405         | −0.100      | 0.168       |
| Government employee              | −0.104                      | 0.138                     | −0.138                        | .453         | −0.375      | 0.168       |
| Merchant                         | −0.021                      | 0.071                     | −0.030                        | .770         | −0.160      | 0.118       |
| Day laborer                      | 0.110                       | 0.089                     | 0.079                         | .217         | −0.065      | 0.284       |
| Residence                        |                             |                           |                              |              |             |             |
| Rural                            | 0.007                       | 0.015                     | 0.030                         | .656         | −0.024      | 0.037       |
| Urban                            |                             |                           |                              |              |             |             |
| Educational status /mother       |                             |                           |                              |              |             |             |
| Literate                         | 0.010                       | 0.013                     | 0.060                         | .449         | −0.016      | 0.035       |
| Illiterate                       |                             |                           |                              |              |             |             |
| Lodging expenses                 | 0.001                       | 0.007                     | 0.090                         | .880         | −0.013      | 0.015       |
| Distance in km                   | 0.165                       | 0.013                     | 0.478                         | <.001        | 0.139       | 0.190       |
| Length of stay                   | 0.050                       | 0.006                     | 0.374                         | <.001        | 0.039       | 0.061       |
| Mode of delivery                 |                             |                           |                              |              |             |             |
| Normal delivery                  | −0.067                      | 0.021                     | −0.125                        | .002         | −0.108      | −0.025      |
| Cesarean                         | 0.086                       | 0.017                     | 0.257                         | <.001        | 0.053       | 0.119       |
| Forceps                          |                             |                           |                              |              |             |             |
| Household income                 | 0.201                       | 0.051                     | 0.139                         | <.001        | 0.101       | 0.301       |

*Shows significant association at $P < .05$. 

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In this study, direct nonmedical costs take a higher proportion as compared with indirect and direct medical costs. This result was in line with a study done in Nepal in which the cost of food and drinking had a major cost of hospital-based delivery. Similarly, the cost of transportation was the largest cost in Bangladesh and Ghana. In contrast, a study from rural Tanzania indicated that transportation cost was the third leading cost next to admission and cost of drugs.

The total median loss of wage was 1091 ETB (39.82 USD). This type of cost is difficult to measure in the population of unclear daily or monthly income especially for unemployed women. This finding was lower than the study done in Nepal in which the wage losses were 60.6 USD. A study from Western Nepal showed that the work loss for normal and cesarean section delivery was 84.1 USD and 81.9 USD, respectively. The results indicated that the bulk of variations between the countries. This might be due to underreporting in our study and other possible explanation might be associated with the length of stays in the ward or variation in price across the countries. Women who come from less than 40 km away from health facility pay around 71.24 ETB (2.6 USD) for transportation. But those women who come from greater than 40 km away from the health facility pay more than 2055 ETB (7.5 USD) per person. This finding was lower than study done in Mali. In Mali, the mean transportation cost was 13.1 USD for women who lived 5 km or less from health facility and about 60 USD for those who lived more than 40 km from health facility. It is obvious that distance and cost are direct relationship; as distance increases cost also increases. In addition, living in the community with low road infrastructure also plays an important role in increasing cost. This variation seems to be due to difference in their socioeconomic difference, and in our study, ambulances were supplied to bring pregnant women to health facilities. Evidence showed that among women who gave birth in hospitals 46.9% of them get ambulance service to arrive health facilities in our study. The other possible explanation is might be, there is variation in exchange rate among the states.

Our finding clearly showed that distance of health facility, length of stay, mode of delivery, and household income were the predictors of the hidden cost of institutional delivery. As a distance increased in one kilometer, the cost of institutional delivery increased by 0.165 units ($\beta = 0.165$). As a length of stay increased by one day, the cost of institutional delivery increased by 0.050 units ($\beta = 0.050$). Mode of delivery and cost institutional delivery was inversely related ($\beta = -0.067$). As the income of the family increased by 1 birr, the hidden cost of institutional delivery increased by 0.201 units ($\beta = 0.201$). This finding is in line with studies done in Zimbabwe, Bangladesh, India, and Nepal, which showed that family income, mode of delivery, and length of stay at hospital were factors associated with hidden costs. But, in our study sociodemographic characteristics like education, maternal age, attitude of providers, and travel time were not significant.

**Limitation of the Study**

The study used a standardized tool to measure the hidden cost of institutional delivery. However, there was a possibility of under- or overreporting the cost they incurred, and design effect was not considered. Despite the limitation, we believe that this study has very important findings for strengthening the policy toward improving the institutional delivery in the study area and areas with similar setups.

**Conclusion**

In conclusion, the finding of this study showed that the hidden cost of hospital-based delivery was found to be high. Indirect cost was the leading cost of hidden expenses followed by direct nonmedical costs. One-third of this hidden cost was attributed to food and drinking and followed by the transportation. Mode of delivery, lengths of stay, family income, and distance were factors associated with the hidden cost of hospital-based delivery. The Ethiopian health care system should consider the hidden costs for pregnant women and their families. Hospitals ought to ensure the availability of essential drugs and other medical supplies.

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**Authors Contributions**

MM was involved with the initiation of the idea. TFD and TAA were involved in the designing of method part, analysis, and drafting of the manuscript. All authors reviewed and approved the submission of the manuscript.

**Declaration of Conflicting Interests**

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**Ethical Approval**

Ethical approval was obtained from the Ethical Review board of Institute of Health, Jimma University. Letter of permission was obtained from the Bale Zone Health Department and presented to selected hospitals.
Informed Consent

A verbal consent was taken from each study participant before the start of the data collection. Confidentiality of the collected data was ensured through anonymity. In addition, they were informed that they have the right to withdraw from the study at any time.

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