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Cost of introducing group prenatal care (GPC) in Bangladesh: a supply-side perspective

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Abstract

Background: Progress towards Millennium Development Goals (MDG) 5 is uneven across different countries. Maternal and neonatal deaths occur mainly in developing countries especially in rural areas and among the poor communities due to underutilization of maternal services. It is evident that group prenatal care (GPC) model could improve health-care utilization among pregnant women that suit in developing countries. The GPC model has introduced in a public facility in the context of Bangladesh, and this study intended to estimate the incremental cost of introducing GPC model over the existing government health-care facility.

Methods: Activity-based costing method was employed for analysis of cost during 2015–2016 in a selected Maternal and Child Welfare Centre (MCWC) in Bangladesh. Cost information was collected by applying ingredients approach considering supply-side perspective.

Results: The total cost of integrating GPC model over the government service delivery system was estimated to be BDT 1,186,868 (US$15,216.3). The proportion of cost for the start-up period and implementation cost covered approximately 24% and 76% of the total intervention costs, respectively. Considering the total number of per session beneficiary ($N = 844$), the average cost of the per-beneficiary per-GPC session was BDT 1406 (US$18.0) while cost per beneficiary ($N = 300$) was estimated to be BDT 3956 (US$50.7) and cost per session ($N = 125$) was BDT 9495 (US$121.7).

Conclusions: It appears from the findings that the built-in interventions of GPC model are doable in the existing government settings at the grass-root level and perhaps at a lower cost if adjusted with the existing government and NGO functionaries.

Keywords: Bangladesh, Maternal health, Program cost, Service delivery

Background

Progress towards Millennium Development Goals (MDG) 5 to reduce maternal mortality is uneven across different countries while approximately 99% of all maternal and neonatal deaths occur in developing countries, especially in the rural areas and among the poor [1–3]. In Bangladesh, despite relatively high rates of utilizing antenatal care (ANC) and better access to health facilities, maternal and neonatal mortality still remains high at 194/100,000 live births and 28/1000 live births, respectively, and almost 62% of deliveries perform at home [4]. Further, breastfeeding initiation within 1 h after birth has increased over time, though it still remains below 50% [5]. Despite a fair amount of advocacy around maternal and newborn care, the actual progress on the ground remains slow [6]. Additional efforts are required to ensure better coverage of antenatal care, as well as improved quality and content of this care [7] that should be economically sustainable and affordable to achieve maternal and neonatal health goals. A report on Maternal and Child Health Expenditure in Bangladesh showed that estimated expense on MNCH services was BDT 17.3 billion in the fiscal year 2007 while only 28% of the total expenditure was for childbirth care.

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The major expenditure relied on household out-of-pocket spending, and only 28% of the expenditure was financed by the government [8]. According to WHO, financial costs and well-being costs associated with maternal mortality can have a devastating impact on household due to have multiple roles of women in households. It can cause economic disruption, loss, and poverty caused by the death of mothers [9]. Financial cost burden could be mitigated by reducing maternal and child mortality that could be achieved by improving utilization through feasible efforts taken by the service providers.

The scenario of ANC shows a positive and significant trend while comparing last few years in Bangladesh. The antenatal coverage increased substantially from 58% in 2004 to 79% in 2014 as well as ANC visits through a medically trained provider also increased from 51 to 64% [4]. However, only 31% of pregnant mother received recommended ANCs (4 or 4+) whereas 18% visited only once [4]. The Health, Population, Nutrition Sector Development Program (HPNSDP) framework sets a target that 50% of pregnant women making at least four ANC visits would be achieved by 2016 [10]. However, the evidence showed that Bangladesh lags far behind reaching this target [7]. Further innovations are needed to ensure better coverage of antenatal care, as well as to attract users to consume the services that are convenient to them.

Postnatal care is a vital constituent of safe motherhood and neonatal health. Some earlier studies showed most of the maternal death are caused by hemorrhage (31%), eclampsia (20%), and abortion (15%) which mostly occur within 24 h following delivery [5, 7]. It is suggested to pregnant women to seek care from a medically trained provider or a facility when they experience complications during pregnancy, delivery, and postpartum period till 42 days. Despite a fair amount of advocacy around maternal and newborn care, real progress on the ground remains slow [6]. There is an immediate need for implementation of evidence-based, cost-effective interventions to improve maternal and neonatal health outcomes [11] to reduce burden of maternal and neonatal death. The health care that a woman receives during pregnancy, at the time of delivery, and soon after delivery is important for the survival and well-being of both the mother and the child. In Bangladesh, pregnant women receive prenatal care individually in public, private, or non-government organization (NGO) facilities. A previous study found that traditional individual prenatal care can be supplemented by group prenatal classes, which facilitate support networks, social interaction, and additional education [12]. Group prenatal care is an integrated approach to prenatal care in a group setting, peer support, and education [13]. Also, the study found that group prenatal care ideally suited for mothers in developing countries where adverse cultural and traditional practices and low-quality health services interfere with the satisfactory implementation of prenatal care [11, 12]. Group prenatal care (GPC) provides an integrated approach to prenatal care in a group setting, incorporating family members, peer support, and education [13]. It empowers mother by valuing the knowledge and experience that each woman brings to the group, and enhances this knowledge through skills building and education. The positive influence of group prenatal care has been strongest for women with low socioeconomic status [14] which not been tried much in Bangladesh. Furthermore, estimation of financial and economic costs of such interventions is also limited. To facilitate the acquaintance of costs for introducing prenatal care and to support the resource allocation addressing maternal and neonatal health, the policy makers need an understanding of the magnitude and drivers of the costs of intervention to make decisions on how to allocate limited health resources. As a pilot initiative, GPC intervention was introduced in a government running Maternal and Child Welfare Centre (MCWC) instead of existing prenatal care in the context of Bangladesh. Prenatal assessment of pregnant women as well as health education and skills development during pregnancy were conducted through GPC in an atmosphere that facilitates learning, encourages free exchange, and develops mutual support from its group members for improving maternal and neonatal outcome [15]. This study intended to estimate the cost of the GPC model and to identify the major cost drivers those were associated with introducing this model over existing facility. Estimation of the cost was based on the empirical data from supply-side perspective.

Methods

Study site and population

The project was implemented in a public health facility named MCWC in Chandpur district of Bangladesh. This municipal city has a population of 94,821 with 49% women. It has been reported that among the total registered pregnant women, 98% received the 1st ANC, but only 7% of pregnant women received the 4th ANC from qualified health-care provider in this municipal [16]. The intervention was conducted from November 2014 to March 2016. A total of 300 pregnant women willingly participated in this study, and a total of 125 sessions organized within the intervention period.

Study perspective

Supply-side perspective was considered for estimating costs of integrating the GPC model into the service delivery system. All costs were measured retrospectively based on the financial and administrative records of the project. The estimation of the cost covered the additional costs only that included all field and administrative activities

related to the implementation of the model borne by the project itself.

Intervention design

The GPC intervention was quasi-experimental in design. Pregnant women who were assigned to the intervention program were considered as "intervention group," and, on the contrary, "comparison group" were those who were not assigned for this intervention. The detail procedure of intervention has been published elsewhere [15]. Potential participants for either group were to be pregnant women with less than 20 weeks of gestational age, between the age of 18 and 42, and without medical complications. The intervention group received GPC along with standard care, and the control group received standard care only from existing facility that provided by the Maternal and Child Welfare Centre (MCWC) for this study. Participants were randomly assigned for the intervention or control group.

The intervention consisted of 30–40 min group discussion sessions that focused sequentially on health education and skills building specific to prenatal, delivery, and postnatal care that were facilitated by study nurses. Session themes covered prenatal nutrition, common discomforts of pregnancy, self-care of mother during pregnancy, understanding danger signs during pregnancy, developing a birth plan, breastfeeding, postpartum adjustment, medical procedures and tests required during pregnancy, and newborn care. Identified prenatal problems on the day of antenatal visit were discussed during group session anonymously.

Sample size

Sample size for determining the study participants for the GPC was estimated based on different maternal indicators such as antenatal care (ANC), postnatal care (PNC), skilled birth attendance, institutional deliveries, preterm birth, low birth weight, postpartum complications, and breastfeeding rate. Using this percentage of expected change difference in intervention and comparison groups at 5% error level and 80% power, the estimated sample size for each group is 250. Considering the 15% lost to follow-up, the sample size is 288 for each group. Detailed sample size estimation was published elsewhere [15]. However, the study enrolled 300 mothers for intervention group within the enrollment period May 20, 2015, to May 30, 2016. As the study intended to estimate the additional costs for introducing the GPC program over the existing facility, only the costs incurred by the provider for the intervention group were considered.

Method of measuring cost

For estimating the cost of the program, activity-based cost data were collected using ingredients approach, which included listing all types of inputs by identification of activities, quantities used, and prices for each input [17]. Activity-based costing (ABC) techniques attempted to assign costs to each of these activities in the production process and/or resources [18]. For this purpose, all costs were classified according to major activities and/or sources. All activities and their associated inputs were identified and their respective costs were obtained. Costs were derived from two phases of the intervention named start-up cost and implementation cost. Total costs were considered as the summation of capital and recurrent cost items for each phase. A comprehensive list of cost-related items was made, and finally, cost per session per beneficiary was estimated by dividing the total provider cost per session with the number of beneficiaries who attended the GPC sessions. Costs incurred other than intervention activities of the project such as salary, transportation, and data collection have been excluded from the estimation. All necessary data were extracted from the project's documents, and project staffs were interviewed whenever necessary.

Start-up cost

The start-up cost was borne prior to beginning of the service delivery, i.e., the time between the decision to implement an intervention and starting its delivery to the first beneficiary [19]. Cost items found for that period were the training of staff, designing and preparing the services to be provided, and materials required for intervention which consisted of capital and recurrent items. Capital items are defined as goods that last more than 1 year and typically have a unit cost greater than US$100 [20]. However, those costs usually invested at a bulk amount and used over time [17]. In this program, capital costs were incurred both for medical (e.g., BP machine, stethoscope, and a weight machine) and non-medical (e.g., computer, printer, stapler, punch machine) items. Non-recurrent basic training and workshop with target groups and behavior change communication such as flip chart board, signboard, and board making also considered as capital inputs. For annuitization of capital items, the useful lifetime of inputs and 3% discount rate was considered [17]. Costs related to inputs that were consumed in the course of a year and procured regularly were considered recurrent costs [21]. For the start-up period, general recurrent cost items were stationeries (e.g., pen, pencil, printing) and utilities (e.g., electricity bill) as well as space rent.

Implementation cost

Costs required to run the intervention in a typical post start-up period when the program is implemented are considered as implementation costs [19]. In this program, staff salary, travel cost, behavior change communication

materials, etc. were found as implementation costs. It was based on an estimation of the annual costs that were required for continuing the GPC intervention. The implementation cost included communications, stationeries, printing, meeting-related expenses, refreshment, staff salaries, and the utility costs.

Projection of the cumulative cost of four GPC sessions

The start-up cost is fixed for a certain period of time for a specific facility while the implementation cost varies along with services provided. Therefore, for cumulative projection of the cost for four GPC sessions includes the start-up cost and the implementation cost for conducting four sessions where start-up cost was fixed for a mother irrespective of number of sessions.

Data analysis

All data were entered into Microsoft Excel 2007. All entries data were manually double-checked and verified. Costs were presented as total and per beneficiary per sessions in local currency, i.e., Bangladeshi Taka (BDT) and US dollars (US$) applying the exchange rate (US$1 = BDT 78) during the end of the data collection (mid-year of 2016).

Results

Program cost

The total cost of introducing GPC over the existing public facility was approximately BDT 1,186,868 (US$15,216.3). Salary of the staff was determined as the major cost driver for implementing the program. Within the intervention period, a total of 125 sessions were conducted. For estimating the total number of beneficiaries per session, data was gathered from project document considering the number of sessions attended by each mother. A total of 300 mothers attended at least one session whereas 252, 185, and 107 mothers participated in the second, third, and fourth sessions, respectively. Consequently, by allowing all conducted sessions, a total of 844 numbers was considered as beneficiaries. The estimated cost per beneficiary per session was approximately BDT 1406 (US$18.0) while per session cost was estimated at BDT 9495 (US$121.7). However, costs borne by the project per pregnant mother were estimated to be BDT 3956 (US$50.7) as a total of 300 mothers were recruited for intervention. From this integrated GPC intervention, start-up period was considered for 8 months and the costs per session per mother were estimated to be BDT 335 (US$4.3) while costs per mother were BDT 944 (US$12.1) for the start-up. Considering the post start-up period, the implementation costs per session per mother were estimated to be BDT 1070 (US$13.7) and cost per mother as well as cost per session were BDT 3012 (US$38.6) and BDT 7228 (US$92.7), respectively, that considered for about a 9-month period (Table 1).

Start-up cost

The total start-up cost for the program was estimated to be BDT 283,375 (US$3633.0) from a supply-side perspective. It constituted approximately 24% of the total cost of the program. Capital costs were BDT 40,570 (US$520.1) that covered about 14% of the total start-up cost. The recurrent cost was estimated to be BDT 242,805 (US$3112.9) and constituted 86% costs that incurred in the start-up period. Staff salaries were the major cost driver that constitutes 77% of the recurrent costs and approximately 77% of the start-up cost, respectively (Table 2).

Implementation cost

The implementation cost covered 76% of the total cost of the program that estimated to approximately BDT 903,493 (US$11,583.2). Staff salaries and communication cost were found to be the key cost drivers and covered approximately 58 and 16% of the total implementation costs, respectively. In addition, rent for project office was BDT 90,500 (US$1160.3) constituted around 10% of the implementation costs. However, utilities and meeting-related cost also contributed a significant amount and estimated to be BDT 51,977 (US$666.4) and BDT 50,213 (US$643.8), respectively (see Table 2). Other costs such as stationeries and printing combined were estimated to be BDT 37,545 (US$481.3) and accounted for around 4% of the implementation cost (Table 2).

Projection of the cumulative cost of four GPC sessions per pregnant women

The start-up cost per mother for the intervention was estimated to be US$4.3 that was fixed and did not vary with the number of the GPC sessions conducted. The cost of the implementation for conducting GPC per session per mother was estimated to be US$13.7. Consequently, the cumulative projection of the session cost revealed that it would require US$31.8, US$45.5, and US$59.2 for two, three, and four GPC sessions, respectively (Fig. 1).

Table 1 Distribution of cost per activity for GPC

Type of observation	Number of observation (*n*)	Cost per activity	
		BDT	US $
Number of participation in the GPC session	844	1406	18.0
Number of beneficiaries	300	3956	50.7
Number of session(s)	125	9495	121.7

Note: 1 USD = 78 BDT in March 2016

Table 2 Distribution of program cost for group prenatal care (GPC) in Bangladesh

Cost parameters	Amount of cost		% of cost items by start-up and implementation cost	% of total program cost
	BDT	USD		
Start-up cost				
Capital cost				
Medical equipment cost (e.g., weight machine)	2622	33.6	0.9	3.4
Non-medical equipment cost (e.g., computer)	37,098	475.6	13.1	
BCC materials (e.g., flipchart)	850	10.9	0.3	
Recurrent cost				
Stationeries (e.g., pen, pencil)	1460	18.7	0.5	20.5
Utilities (e.g., electricity, gas bill)	2096	26.9	0.7	
Printing (e.g., mother id card)	3088	39.6	1.1	
Meeting and training (e.g., refreshment)	14,672	188.1	5.2	
Office rent	3750	48.1	1.3	
Salaries	217,739	2791.5	76.8	
Sub-total	283,375	3633.0	100.0	23.9
Implementation cost				
Communication cost (e.g., with mothers)	145,730	1868.3	16.1	76.1
Stationeries (e.g., pen, pencil)	22,193	284.5	2.5	
Stakeholder meeting (e.g., govt. personnel)	50,213	643.8	5.6	
Printing (e.g., photocopy)	15,352	196.8	1.7	
Utilities (e.g., electricity, gas bill)	51,977	666.4	5.8	
Office rent	90,500	1160.3	10.0	
Salaries and conveyance	527,528	6763.2	58.4	
Sub-total	903,493	11,583.2	100.0	76.1
Total program cost	1,186,868	15,216.3	–	100.0

Note: 1 USD = 78 BDT in March 2016

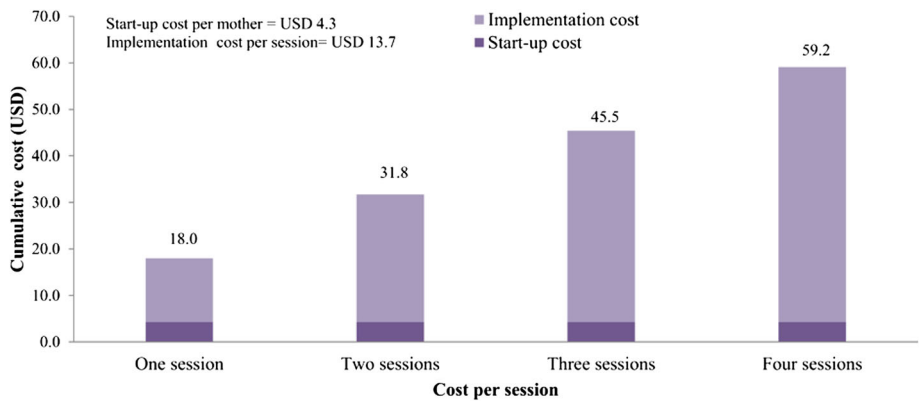

Fig. 1 Projection of the cumulative cost of four GPC sessions per mother

Discussion

In Bangladesh, Ministry of Health and Family Welfare (MoHFW) and different NGOs have been maintaining maternal and child health services which are mostly supply-side driven. Program costs can constitute a substantial component of costs for health interventions and is the precondition of estimating economic evaluation of health interventions [19]. Methods described in this study could be a very innovative approach to implementing GPC in existing selected facility and is expected to have positive perinatal outcomes. It was an approach to estimate costs of the GPC intervention in a public health facility having ANC and delivery services namely MCWC in Chandpur district of Bangladesh.

This paper presents the program costs associated with the GPC intervention in a specific facility. This model actually introduced some additional programmatic elements into the current settings to a reproductive health facility and to produce better pregnancy outcomes. The incurred costs presented in such categorical way so that the policy makers as well as health-care providers can better understand the additional cost of adding up the individual pregnant mother to the GPC intervention over existing health-care delivery system. According to findings, approximately 63% of costs went to staff salaries and conveyances among the total program cost. In the implementation phase, other than the staff costs, communication costs seemed as another cost driver. In contrast, a study in Bangladesh introducing demand-based reproductive health commodity (DBRHC) model found that developing BCC materials and travel costs were the major cost drivers [21]. High cost for staff could be attributed to the relatively high salary level at icddr,b compared to that of government employees. However, staff salary could be reduced to further scale up of the project that would not require any start-up costs, and in addition, government-operated programs would likely implement the program with existing staff.

This study shows implementation cost was higher than the start-up cost, while, in contrast with our study, another study for behavioral change intervention showed that start-up was much more than the implementation costs [22]. This variation might be caused by the utilization of capital items, staffing and associated training, and study setting. However, capital items including behavior change communication materials those were needed to operate this project were available in the existing health-care system, thus reducing the costs for capital items. A pilot study on group antenatal care shows this care could improve health-care utilization by increasing positive experiences that might help to encourage pregnant women for additional ANC visit and also inspires institutional delivery with a skilled birth attendant [23]. Furthermore, different studies showed the evidence that introducing GPC model proposes effective and efficient care which is sustainable and can be scaled up and integrated into existing antenatal care [24, 25]. Therefore, if the project is planned to be scaled up, it is possible for the public sector as most of the infrastructures are available which could minimize the cost of intervention even could be run by the exiting staffs.

A sensitivity analysis was carried out to examine the cost proposition of changes in some key variables such as staff salaries, rental costs, BCC materials, and discount rate [26, 27]. This has been done to examine how changes in these values would affect the overall costs of the intervention. A 20% reduction in staff salary would decrease a 12.5% cost per session per beneficiary and would cost US$15.8. However, 30% reduction in the rent of the facility as the intervention could be made fully within the existing health system; it would reduce approximately 2.5% of the cost, and the cost per session per beneficiary would then be US$17.6. Additionally, by considering 20% increase or decrease in start-up costs, it would enhance or reduce 5% of the cost per session per beneficiary. Similarly, 20% increase or decrease in implementation costs would cause a 15% change in per beneficiary costs, respectively.

Limitations of the study

The present study has some limitations. The study represents the findings from one health center that might not be generalizable to all regions of the country. Furthermore, nationwide cost projection was not carried out as single health facility is not representing all the platform types available in the health system of Bangladesh. Further, the cost data analysis was based on the project costs and did not consider rural and urban separately which might not reflect the rural-urban differentiation. In addition, the study did not consider any other client-related out-of-pocket expenses borne by the beneficiaries for receiving this intervention [21].

Conclusions

The findings of the study provide empirical evidence to health-care programmer and policy maker about the additional costs that would be needed for implementing GPC within the existing care that might help to assess how to allocate the scarce resources effectively. This study reveals that the incremental cost of the GPC model is doable within the existing government settings having pregnancy and newborn care with few extra additional resources that could improve utilization of pregnancy-related health care. Given the appropriate cost adjustment and resource enlistment by using available technical functionaries of the MoHFW and NGOs,

cost of integrating the GPC might be affordable in health-care system. Nevertheless, this GPC model can have impact on prevention or early detection of maternal complications that indicates it has kept on power in the inevitable reform of health systems of Bangladesh.

Abbreviations

ABC: Activity-based costing; ANC: Antenatal care; DBRHC: Demand-based reproductive health commodity; GPC: Group prenatal care; HPNSDP: Health, Population, Nutrition Sector Development Program; MCWC: Maternal and Child Welfare Centre; MoHFW: Ministry of Health and Family Welfare

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Availability of data and materials

The dataset and materials this publication builds on may be accessed.

Authors' contributions

MS and ARS designed the study plan and took care of the ethical clearing. MS, ARS, RAM, NA, ZI, and JAM were involved in the pilot study for questionnaire approval, supervised the data collection, were involved in the statistical evaluation, and wrote the draft of the manuscript. MS and ARS revised the entire document, commented critically the text, and initiated a re-evaluation of a part of the data. All authors read and approved the final manuscript.

Ethics approval and consent to participate

The research protocol was approved by the Research Review Committee (RRC) and the Ethical Review Committee (ERC) of the International Centre for Diarrhoeal Disease Research, Bangladesh (icddr,b).

Consent for publication

Not applicable.

Competing interests

The authors declare that they have no competing interests.

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