



## AVERTING MATERNAL DEATH AND DISABILITY

# Improvement of coverage and utilization of EmOC services in southwestern Bangladesh

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### Abstract

**Objective:** The Government of Bangladesh has implemented safe motherhood programs throughout the country supported by the United Nations Children's Fund (UNICEF) and United Nations Population Fund (UNFPA) aimed at reducing maternal morbidity and mortality. The objective of this study is to assess the effect of the interventions on the UN emergency obstetric care (EmOC) process indicators in Khulna division, Bangladesh. **Methods:** Of the 71 government health facilities in Khulna division, 32 were providing comprehensive and 20 were providing basic EmOC services. Another 4 facilities were providing comprehensive or basic EmOC services during the first three-quarters but became non-functional during the last quarter. EmOC data, from January to December 2002, were collected from all these 56 facilities to determine the levels of EmOC process indicators relative to the UN guidelines and compared with baseline data from 1998 to 1999. **Results:** There were 1.04 and 0.64 comprehensive and basic EmOC facilities respectively per 500,000 population. When compared with the baseline data, the coverage of comprehensive EmOC services was substantially increased from 0.23 to 1.04 per 500,000 population, which achieves the minimum UN standards but the coverage of basic EmOC services

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remained the same. The data also showed that, compared with the baseline survey, the proportion of births at the EmOC facilities increased 119% from 5.3% to 11.7% ( $p < 0.001$ ), met need increased 141% from 11.1% to 26.6% ( $p < 0.001$ ), and cesarean section as a proportion of all expected births, increased 151% from 0.5% to 1.3% ( $p < 0.001$ ), while the overall case fatality rate (CFR) decreased by 51% ( $p < 0.001$ ). *Conclusion:* With the exception of coverage of basic EmOC after the interventions, there was significant improvement in all the EmOC process indicators in Khulna division. However, most of the process indicators are still far from the minimum recommended UN standards. *Recommendations:* Efforts should continue to keep the EmOC facilities functional 24/7 while increasing the number of basic EmOC facilities, and improving utilization of services to reach the minimum UN standards. Community mobilization should be directed to understand the danger signs and utilization of services at functional facilities when necessary. Further research to identify the factors influencing utilization of EmOC services and continuous monitoring and periodical assessment of the process indicators are recommended to evaluate the overall situation from time to time.

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## 1. Introduction

South Asia accounts for half of the world's 600,000 annual maternal deaths, although it contributes only 29% of the deliveries in the world [1,2]. Nearly 3.5 million births occur in Bangladesh every year and most (92%) of the deliveries are conducted at home by untrained persons [3–5]. More than 40% of the pregnant women are anemic, leaving them more vulnerable to ill health and less likely to survive a hemorrhage during or after delivery [6,7]. Emergency obstetric care (EmOC) services needed to treat obstetric complications are not readily available and accessible to women due to an inadequate number of EmOC facilities, ignorance about the danger signs and low social status of women [5,8,9]. As a result there is high maternal mortality in Bangladesh as in many other developing countries [2,5,10]. Bangladesh has no effective vital registration or maternal and child health surveillance system to provide information on maternal mortality ratio. However, according to the recent maternal mortality survey, maternal mortality ratio is estimated to be 320 per 100,000 live births [5].

Most of the maternal deaths in developing countries are due to direct obstetric causes, such as hemorrhage, eclampsia, sepsis, unsafe abortion and obstructed labor [8,11,12]. For every maternal death there are more women who experience chronic complications causing disability such as, chronic pelvic infection, uterine prolapse, fistulae and secondary infertility [1,11,13,14]. These problems not only cause enormous suffering to the women themselves, but also cause social rejection and disgrace, jeopardizing the women's social and family life.

Nearly 15% pregnancies develop life-threatening complications, which are unpredictable and require special care [12]. Availability of and accessibility to EmOC services are, therefore, essential to save the women's lives. To reduce maternal mortality and morbidity, the Government of Bangladesh, supported by the United Nations Children's Fund (UNICEF) and United Nations Population Fund (UNFPA), has been implementing an EmOC program throughout the country. This study evaluates the impact of EmOC interventions on coverage and utilization of EmOC services in Khulna division, situated in the south-western part of Bangladesh.

## 2. Methodology

### 2.1. Operational definitions

Life saving services (signal functions) for direct obstetric complications include: administration of parenteral 1) antibiotics, 2) oxytocics and 3) anti-convulsants; 4) manual removal of placenta; 5) removal of retained products; 6) assisted vaginal delivery; 7) cesarean section (CS); and 8) blood transfusion. A *Basic EmOC* (BEmOC) facility is one that provides signal functions 1–6. A *Comprehensive EmOC* (CEmOC) facility is one that provides all 8 signal functions. *Met need:* Proportion of women with obstetric complications treated in the EmOC facilities. *Case fatality rate* (CFR): Proportion of women admitted with obstetric complications in the EmOC facilities who died. *UN process indicators:* 1) Coverage for BEmOC (at least 4 facilities per 500,000 population); 2) coverage for CEmOC (at

least 1 facility per 500,000 population); 3) proportion of births in EmOC facilities (at least 15%); 4) met need (100%); 5) CS as a proportion of all births (from 5% to 15%); and 6) CFR (<1%).

## 2.2. EmOC interventions in Bangladesh

The Ministry of Health and Family Welfare, through the Directorate of Health Services and Directorate of Family Planning, has implemented the EmOC interventions nationwide. UNICEF has supported the Directorate of Health Services since 1993, and accelerated support in 2000 through implementation of the Women's Right to Life and Health (WRLH) project. UNFPA supported the Directorate of Family Planning and the interventions started on pilot basis in one division (Rajshahi) in 1993. EmOC interventions in Khulna division began in 1997.

### 2.2.1. UNICEF intervention – the WRLH project

The WRLH project, a joint collaboration between the Government of Bangladesh, UNICEF and the Averting Maternal Death and Disability Program (AMDD) at Columbia University, USA is being implemented throughout the country for reduction of maternal morbidity and mortality [15]. The project strategy is to strengthen all 59 district hospitals (DH) and selected 120 upazila (sub-district) health complexes (UHC) to provide 24-h CEmOC services. Of the 179 government health facilities, 10 DHs and 19 UHCs are in the Khulna division.

Major WRLH interventions include needs assessment, minor renovation of the facilities, development of human resources (mainly the Medical Officer, Nurse and Laboratory Technician) and supplying necessary equipment and logistics. To strengthen the management information system (MIS), the project introduced delivery, operation theater and obstetric registers (collectively called the unified MIS registers) at all the designated facilities including Maternal and Child Welfare Centers (MCWCs) and Medical College Hospitals. Relevant persons were trained on unified MIS registers for record keeping and reporting. Reports from all the project facilities including MCWCs and Medical College Hospitals are sent to the MIS section of the Directorate of Health Services monthly in a prescribed format. The report includes information on number of obstetric admissions, deliveries conducted, complications treated, CS done and maternal deaths.

Providing health education in the community is a routine activity of field staff. Community and social mobilization activities, such as future search conference, observation of safe motherhood day, distribution of posters and leaflets, and strength-

ening of facility-based health education were undertaken by the project. Health education mainly focused on the 5 danger signs, antenatal care (ANC), postnatal care (PNC) and information on services available at the facilities.

The project provided minor one-time funding (US\$ 271 per UHC and US\$ 440 per DH) for minor renovation and emergency readiness. This fund was primarily used for minor repairs (e.g., air conditioner, autoclave, laryngoscope, electrical wiring, etc.) and procurement of minor equipment (OT bulb, laryngoscope, etc.) including emergency drugs. Initiative was also taken to develop local level planning (micro plan) either through Appreciative Inquiry or Hospital Action Plan methodology. The Appreciative Inquiry is a participatory (involving all the hospital staff and stakeholders) planning process based on local resources, providers' needs and clients' rights to improve quality of EmOC services. It helps the facility staff envision a collectively desired future and to implement that vision successfully into reality. Hospital Action Plan is a 5-step process to develop a facility-based action plan to improve quality of care involving the key hospital staff.

In addition to 4 central level technical staff, the project employed 12 EmOC Field Officers to facilitate implementation and monitoring of all the project activities. Two of the Field Officers were placed in Khulna division. The Field Officers visit each designated facility bimonthly. During these visits, they collect information on EmOC signal functions [16], availability of human resources at the facility, and all the EmOC information required by the MIS on a prescribed format and report to the central level for monitoring and action. Field Officers also check the unified MIS registers for consistency of record keeping and reporting. Khulna division was chosen for data analyses, as reliable information was available from all the government health facilities through the EmOC Field Officers.

### 2.2.2. UNFPA intervention

UNFPA supports the Directorate of Family Planning to establish CEmOC services at 64 MCWCs throughout the country. Eleven of the MCWCs are in Khulna division. Interventions are similar to those of the WRLH project except for the development of facility-based micro plans [17].

## 2.3. Baseline survey

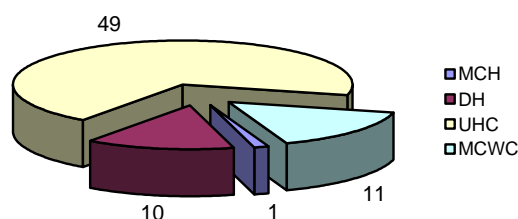
A baseline survey was conducted nationwide in January 2000 to assess the availability and utilization of EmOC services using the internationally

recognized UN process indicators [16]. The survey included 13 Government Medical College Hospitals, 59 DHs, 62 MCWCs, a sample of 104 UHCs (out of 400) and almost all ( $n=224$ ) the functional private and non-government hospitals/clinics. Relevant data for the period of October 1998 to September 1999 were collected from facility registers for analysis. This survey found that CEmOC services were available at 60% DHs, 27% MCWCs and only 3% UHCs, while BEmOC services were available at 14% DHs, 19% MCWCs and 32% UHCs. Coverage for public sector CEmOC facilities was 0.27 per 500,000 population and 8.3% (5.3% in the government facilities) of total expected births were institutional in the country. Met need was found to be 26.5% (19.3% in government facilities) and the CS rate of all the expected births was 2.3% (1% in government facilities). Overall CFR was 2.24% (3.34% in government facilities) with highest CFR at the DHs (4.2%). Survey data also showed that 27% of the women who came for institutional deliveries were delivered by CS.

In Khulna division, coverage for CEmOC and BEmOC was 0.23 and 0.67 per 500,000 population, respectively. Met need and CS rate of all the expected births was 17.4% (11.1% in government facilities) and 2.2% (0.5% in government facilities), respectively. Data disaggregated by division for proportion of births in the EmOC facilities and overall CFR were not available. Details of the baseline survey can be seen elsewhere [9].

## 2.4. Data collection

Second round EmOC data were collected only from the government health facilities in Khulna division to assess the effect of EmOC interventions. In total there were 71 government health facilities. They include 1 Medical College Hospital (MCH) at the divisional headquarters, 10 DHs, 11 MCWCs and 49 UHCs (Fig. 1). All the MCWCs were located in the districts except one, which was at the upazila level. Health facilities were designated as CEmOC, BEmOC or non-EmOC (providing neither basic nor comprehensive services) based on signal functions available in the last quarter of the year [16].



**Figure 1** Government health facilities in Khulna division.

Of the 71 facilities, 52 were providing either BEmOC or CEmOC services in 2002. Another 4 facilities (2 MCWCs and 2 UHCs) were providing CEmOC or BEmOC services during the first three quarters of the year but reverted to non-EmOC during the last quarter. EmOC data (number of deliveries conducted, number of complications treated, number of CS done and number of maternal deaths), from January to December 2002, were collected from all these 56 facilities for analysis. Of the 56 facilities, 26 (10 DHs and 16 UHCs) were under the WRLH project.

Data were extracted by the Field Officers from the unified MIS registers of all the WRLH project facilities ( $n=26$ ), Medical College Hospital ( $n=1$ ) and MCWCs ( $n=11$ ). Data from rest of the facilities ( $n=18$ , all are non-designated UHCs) were collected from the Civil Surgeons' office, as the Field Officers do not visit the non-designated facilities routinely. Specific format was used to collect the information. Data from the private clinics/hospitals could not be collected because of inadequate and inappropriate record keeping and lack of a reporting system. Data were entered into the computer and checked for errors. MS Excel and EPI-Info (version 6.0) computer programs and hand calculators were used to analyze data.

Population of the districts was taken from the 2001 National Census [18]. Mid-year population of 2002 was calculated adjusting the national growth rate of 1.54%. Total number of expected births was estimated taking crude birth rate as 19.9 per 1000 population [19]. Fifteen percent of all expected births were considered as the total number of pregnancy complications. The proportion of institutional deliveries and CS of all estimated births of the districts and division was calculated. Pregnancy complications (antepartum and postpartum hemorrhage, pre-eclampsia/eclampsia, prolonged/obstructed labor, postpartum sepsis, complications of abortion, ectopic pregnancy and ruptured uterus) considered in this study were in accordance with the UN guidelines [16]. EmOC process indicators were calculated according to the UN guidelines and compared with baseline data. Statistical test for difference between two population proportions (*z-test*), as appropriate, was used to determine the significance of difference between the study findings and baseline survey.

## 3. Results

The lone medical college hospital, 9 (90%) DHs, 9 (81.8%) MCWCs and 13 (26.5%) UHCs were providing

**Table 1** Basic demographic and EmOC information of Khulna division including variation among districts

Indicators	Division	Variation among districts	
		Lowest	Highest
Population	15,435,869	619,447	2,604,704
No. of annual expected births	307,174	12,327	51,834
No. of expected complications <sup>a</sup>	46,076	1849	7775
No. of births at EmOC facilities (% of expected births)	35,866 (11.7%)	1311 (4.1%)	5333 (43.3%)
No. of complications treated (met need)	12,277 (26.7%)	706 (12.2%)	2804 (51.3%)
No. of cesarean-sections done (% of expected births)	4099 (1.3%)	233 (0.6%)	1067 (2.9%)
No. of maternal deaths (overall case fatality rate)	201 (1.6%)	4 (0.6%)	21 (4.4%)
No. of comprehensive EmOC facilities (no. needed)	32 (34)	1 (2)	6 (5)
No. of basic EmOC facilities (no. needed)	20 (123)	0 (13)	6 (13)

<sup>a</sup> 15% of expected births.

comprehensive, while 1 (10%) DH and 19 (38.8%) UHCs were providing BEmOC services in 2002.

Table 1 shows demographic and EmOC information of the division including variation among districts. Total population of the division was about 15.5 million. Out of about 300,000 annual expected births in the division, 35,866 (11.7%) were delivered at the EmOC facilities. More than 12,000 pregnancy complications were treated and almost 4100 CS were done at the EmOC facilities, while the total number of maternal deaths recorded was 201. Met need and CS as a proportion of all expected births in the division were 26.7% and 1.3%, respectively. About 11% women who came to the EmOC facilities for delivery had CS. Only 20 facilities were providing BEmOC services, while the need for the whole division was 123.

Table 2 shows the process indicators of the division compared with baseline data. The number of CEmOC and BEmOC facilities per 500,000 population in 2002 was 1.04 and 0.64, respectively, compared to 0.23 and 0.67 in the baseline survey. There was about a 3.5-fold increase in the number of CEmOC facilities per 500,000 population in the division after the intervention. Similarly, compared with the baseline data there was 119% increase in institutional deliveries, 141% increase in met need and 151% increase in CS as a proportion of all expected births in the division. All these differences were significantly higher than the baseline data ( $p < 0.001$ ). Overall CFR was 1.6%, which is about 51% less than the baseline ( $p < 0.001$ ).

#### 4. Discussion

Reducing maternal mortality is complex requiring a broad range of interventions. Key strategies for reduction of maternal mortality include availability and accessibility of EmOC services, promotion of family planning, skilled attendance at birth, development of a community support system and behavioral change communications on 5 danger signs [13,20]. Over the decades Bangladesh has continued to struggle with attempts to reduce maternal mortality. Intensified efforts in the field of traditional birth attendant training and focus on increasing ANC have not brought about the desired outcome. Based on these attempts, increasing availability of EmOC services has now been recognized as the key intervention to reduce maternal mortality.

This study included data from all categories of government health facilities providing EmOC services in Khulna division. Study findings indicate that, compared to the baseline survey, there were significant improvements in coverage and utilization of EmOC services after the interventions. Coverage for CEmOC facilities has reached the minimum UN standards of 1 facility per 500,000 population, while coverage for BEmOC remained the same (0.64 per 500,000 population). This indicates huge unmet need for BEmOC facilities in the division.

As a whole there was more than a 2-fold increase in utilization of EmOC services for delivery, pregnancy complications and CS during this short period

**Table 2** Comparison of Khulna division EmOC process indicators after the intervention with those at baseline

Process indicators	Baseline	2002	Percent change (%)	<i>p</i> -value
No. of CEmOC facilities (no. per 500,000 population)	7 (0.2)	32 (1.0)	+352.1	—
No. of BEmOC facilities (no. per 500,000 population)	20 (0.7)	20 (0.6)	—3.0	—
No. of births at EmOC facilities (% of all expected births)	133,920 (5.3) <sup>a</sup>	35,866 (11.7)	+119.1	<0.001
No. of complications treated (met need)	4922 (11.1)	12,277 (26.6)	+141.0	<0.001
No. of cesarean-sections done (% of all expected births)	1600 (0.5)	4099 (1.3)	+150.9	<0.001
No. of maternal deaths (case fatality rate)	1444 (3.3) <sup>a</sup>	201 (1.6)	—51.5	<0.001

<sup>a</sup> National figures for all government facilities. Data for division not available.

of time, although most of the indicators are still far from reaching the minimum UN standards. There is significant improvement of met need (from 11% to 27%) in the division compared with the baseline. 27% met need means 73% pregnant women with complications still remain in the community and do not utilize the EmOC services. Maternal mortality cannot be substantially reduced unless these women are brought to the EmOC facilities for care. The data also show wide inter-district variation in utilization of services. The highest proportion of institutional delivery and met need was found in Meherpur (43%) and Kushtia districts (51%), respectively, while these indicators were lowest in Bagerhat (4%) and Satkhira districts (12%). All these findings may indicate further research to find who are the underserved, what are their socio-demographic characteristics and to look at the positive factors influencing institutional delivery and utilization of EmOC services during obstetric complications to design an appropriate intervention.

Although CS rate of all the expected births in the division increased significantly (from 0.53% to 1.33%), it is still too low to meet the minimum UN standards. The baseline survey showed that more than 55% of the CS was done in private sector facilities although they treated only 25% of pregnancy complications and proportion of CS of all the institutional deliveries was 27% (public 18.6% and private 42.6%). In this study the CS rate of all the births in the government EmOC facilities was 11.4%.

Bangladeshi society is patriarchal and traditionally men are considered superior to women. This is reinforced by religious, economic and social norms. Thus, women's mobility and access to services is restricted and depends on males such as husbands, relatives or in-laws. Several studies indicate that the barriers to utilization of services during pregnancy complications are not only related to the availability of health care facilities, they are also largely related to socio-cultural norms, lack of women's decision-making power within the family, lack of awareness about the danger signs and availability of services, distance and lack of availability of suitable transport, cost of treatment, lack of emergency drugs and perceived low quality of care at the facilities [4,21–25]. Awareness of danger signs of pregnancy is low among Bangladeshi women [5]. Improvement of community awareness of danger signs and services available at the facilities including community mobilization for arrangement of transport are critical to improving utilization of services. Studies in Bangladesh and other resource-constrained countries have shown some success in utilization of services through

community and social mobilization [26,27]. Specific interventions such as making the facilities women-friendly may also contribute to increased levels of utilization.

Availability of EmOC services depends on many factors, such as presence of trained service providers, motivation of the EmOC team, support from the facility manager, availability of emergency drugs and maintenance of equipment. Round-the-clock (24/7) quality of care is important to increase utilization and save women's lives during complications. Development of participatory planning at the local level using "Appreciative Inquiry" or by other methodology may help motivate the staff to provide EmOC services and use evidence-based target specific technologies (e.g., partograph, active management of third stage of labor, infection prevention practices, magnesium sulfate for management of eclampsia, etc.) to ensure quality of care.

Most of the maternal deaths occur in poor families with no formal education, access to information or sufficient resources to transfer patients and seek care at EmOC facilities. A study in Bangladesh found that mothers in the wealthiest households are more than twice as likely to receive ANC as mothers in the poorest households [5]. It is therefore a challenge to support the poor to avail themselves of services when needed. The Bangladesh government with the technical assistance from the World Health Organization has recently launched a pilot project to improve health seeking behavior and utilization of services by the poor pregnant women through a voucher scheme [28]. Under the project, pregnant women, through vouchers, will receive ANC, PNC, delivery care and care for pregnancy complications. A small amount of funds will also be provided for transportation. Other safe motherhood projects should look for similar innovative options, such as micro health insurance scheme. Poor pregnant women may be encouraged to buy a pregnancy insurance scheme with a one time payment that is affordable and acceptable to them to receive free services, such as ANC, PNC (including iron-folate tablets), necessary laboratory investigations, normal delivery care and subsidized care for complications. Such a human rights-based approach may contribute to improving the quality and accountability of the EmOC services. There is a limited experience in Bangladesh with health insurance schemes by the Bangladesh Rural Advancement Committee, a local NGO, and International Labor Organization [personal communication with Dr. Munir Ahmed, Bangladesh Rural Advancement Committee]. However, the challenge would be to implement the scheme in the government setting.

One of the concerns of the EmOC program is to ensure timely availability of suitable transport to transfer patients with obstetric emergencies to the EmOC facilities. Most of the facilities (DHs and UHCs) in Bangladesh have functioning ambulances. One of the problems of accessing ambulances is the lack of communication between the community and the health facilities where ambulances are located. Experiences in Uganda, Malawi, Kenya, Sierra Leone and Ghana showed that the use of communication technology increased the number of referrals and reduced transport delays from 6 to 3 h [29]. Use of modern communication technology, such as cell phones, may be considered in Bangladeshi setting. Nowadays, cell phone services are available in most of the rural areas. Cell phones may be provided to link the DHs and UHCs with the community for calling ambulances from these facilities. This may result in increased and timely referral of women with complications. Moreover, early information may help the hospital staff to be better prepared for treatment of obstetric emergencies. Cell phones may also be used by the primary level facilities (UHCs and Family Welfare Centers) to consult the doctors trained in EmOC for initial management and referral of obstetric complications.

Government of Bangladesh is providing Skilled Birth Attendant training, supported by WHO and UNFPA, to a cadre of grass-root level government health workers to provide ANC and PNC, to conduct home delivery and refer complications to EmOC facilities. Studies show that maternal mortality cannot be substantially reduced without linkage between the Skilled Birth Attendants and the EmOC facilities [20]. It is therefore important to develop referral linkage between the Skilled Birth Attendants and functional EmOC facilities.

Findings of this study should be interpreted cautiously as this study reflects the contribution of only the public sector. The baseline survey found that private sector facilities contributed about 36% of the institutional births, 27% met need and 56% CS. When adjusted for the private sector facilities, proportion of births at EmOC facilities, met need and CS of all the expected births were 18.2%, 36.5% and 3.0%, respectively. One of the limitations of this study was that unified MIS registers were not provided to the non-designated UHCs and their staff were not trained. Therefore, misclassification might have occurred in defining pregnancy complications and subsequent recording on the registers. Moreover, data from these facilities were collected from the Civil Surgeon's (District Health Manager) office without checking the facility registers.

## 5. Conclusion and recommendations

EmOC interventions were found to be effective in improving the EmOC process indicators in Khulna division. However, most of the process indicators were still far below the recommended UN standards. Findings of this study indicate the need for continuous support for the EmOC program to achieve the Millennium Development Goal of 75% reduction of maternal mortality [30].

Specific recommendations include:

- efforts should be continued to keep the CEmOC facilities functional 24/7 with an increase in number of CEmOC facilities in some districts
- increase the number of BEmOC facilities to reach the minimum UN standards
- community mobilization should be directed to understanding the danger signs and increasing utilization of services where facilities are functional
- further research to identify the positive factors for utilization of services, especially during pregnancy complications
- continuous monitoring and periodical assessment of the process indicators to assess the overall situation from time to time. The EmOC interventions may also consider innovative approaches, such as health insurance scheme and modern communication technology to facilitate referrals.

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