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AVERTING MATERNAL DEATH AND DISABILITY

# The effect of addressing demand for as well as supply of emergency obstetric care in Dinajpur, Bangladesh

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**Abstract**

*Purpose:* The Dinajpur SafeMother Initiative (DSI) was designed to test the impact of several interventions on use of obstetric services in government health facilities in Northwestern Bangladesh during 1998—2001. *Intervention:* Facility-based interventions included upgrading health facilities. The sub-district hospitals or Upazila Health Centers (UHCs) had earlier been upgraded to provide basic emergency obstetric care (BEmOC). This project undertook activities designed to improved the quality of care in the facilities which included team-building among providers, case reviews and a stakeholders' committee. CARE introduced a community mobilization intervention, which included birth planning, community support systems for funding, transportation, blood donation etc. for care of women with complications. *Methods:* The intervention area received all interventions. The only intervention in the comparison area was the upgrading of the health facilities to provide basic EmOC. There were no interventions in the control area. *Results:* Met need increased by 13% in comparison area but nearly 24% in intervention area. There was no substantial change in the control area. At the end of the project, knowledge of obstetric danger signs was much greater in intervention area than in the other 2 areas. *Conclusion:*

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We conclude, therefore, that the best results are achieved through a combination of facility improvement, quality of care activities and targeted community mobilization activities.


## 1. Introduction

The Dinajpur SafeMother Initiative (DSI) was a 3-year demonstration project developed in 1998 by CARE Bangladesh, in collaboration with UNICEF and the Government of Bangladesh (GoB). The purpose of the initiative was to identify barriers that women encounter in accessing emergency obstetric care (EmOC) services and to assess the effectiveness of targeted efforts in increasing utilization of these services. During the project period, DSI's main objective was to increase utilization of EmOC services from a met need for EmOC of 16% (baseline) to 50% in the intervention area.

### 1.1. Summary of the Bangladesh health system

Bangladesh is divided into six administrative divisions, 64 districts and 490 sub-districts or *upazilas*. Each district has a District Hospital (DH) that is supposed to offer comprehensive EmOC services and a Maternal and Child Welfare Center (MCWC) that is supposed to provide either basic or comprehensive EmOC services, depending on the district. The GoB is committed to decentralizing basic and comprehensive EmOC services through upgrading the existing health service system. UNICEF and UNFPA provide financial and technical support to upgrade the DH and MCWC facilities, respectively. Each district hospital serves a population of roughly 2.5 million people and are referral centers for sub-district Upazila Health Complexes (UHCs), which provide services to a population of approximately 200,000 people.

### 1.2. Previous activities to reduce maternal mortality

Maternal mortality is high in Bangladesh. The 1995 estimate was 600 maternal deaths per 100,000 live births [1]. Almost all (96%) deliveries occur at home [2]. To address persistently high levels of maternal mortality and morbidity, the Ministry of Health and Family Welfare (MoHFW) initiated a pilot project with UNICEF in 1994 in which District Hospitals were upgraded to provide comprehensive EmOC services and sub-district UHCs were upgraded to provide basic EmOC services in 11 districts of Bangladesh. These activities were followed by the upgrade of MCWCs at the district level with inputs from UNFPA. A review of the upgraded EmOC facilities in 1996 revealed that the use of EmOC services increased from 5% to 9% during the two-year period [3]. Further improvement in quality and increasing access to these services remains a challenge.

### 1.3. EmOC and use of UN indicators

Several key indicators have been developed to assess the availability and use of emergency obstetric care [4]. Two such indicators are central in assessing utilization of EmOC services and were therefore used as outcome measures in the DSI project. (1) The proportion of all live births taking place in EmOC facilities. (2) The proportion of all live births taking place at an EmOC facility should be at least 15% of all deliveries as it is estimated that 15% of all pregnant women experience obstetric complications requiring EmOC, because the 1st indicator does not specify whether institutional deliveries are normal or complicated, the 2nd indicator is a more precise measure of utilization with respect to EmOC. Met need for EmOC, defined as the percentage of women expected to have obstetric complications who actually receive care in an EmOC facility, should be at least 100% according to minimum acceptable levels. In Bangladesh, 5% of women with obstetric emergencies reached a medical facility [5].

## 2. Methods

### 2.1. Study areas

The project areas are in Dinajpur and Panchagarh, two districts in the northwestern region of the country, which have relatively high rates of obstetric death [6]. In addition to the intervention area, the study included both a comparison and a control area (see Table 1).

#### 2.1.1. Intervention area

Birampur (153,000 population), is a sub-district of Dinajpur. UNICEF and the GoB supported the upgrade of the UHC to ensure the availability of

**Table 1** Project inputs by area

| | Facility interventions | | Community interventions | |
|---|---|---|---|---|
| | Upgrades | Quality of care | Birth planning | Community support |
| Intervention area | X | X | X | X |
| Comparison area | X | — | — | — |
| Control area | — | — | — | — |

basic EmOC services (as defined by the UN [4]). This included provision of necessary equipment and drugs, as well as staff training. CARE Bangladesh led the DSI intervention effort, which included community mobilization and facility-based quality of care (QoC) activities (see Boxes 1—4 below).

#### 2.1.2. Comparison area

Bochaganj (164,000 population) is a sub-district of Dinajpur. UNICEF and the GoB provided upgrades to the UHC for basic EmOC services, but no community mobilization or facility-based QoC interventions were implemented (Table 2).

#### 2.1.3. Control area

Debiganj (183,000 population) is a sub-district of Panchagarh district. This site received neither facility upgrades nor any DSI intervention activities.

### 2.2. Baseline data

From October 1998 to May 1999, investigators identified barriers to EmOC utilization through participatory methods, which included a quantitative population-based survey and a qualitative community-based study in all three project areas. Exit interviews with women with obstetric complications treated at the intervention area UHC, as well as a facility assessment of the intervention UHC, were conducted. Data were collected on women's knowledge, attitude, beliefs, and behaviors regarding maternal health in Bangladesh, as well as on the condition and functioning of the health facilities.

At baseline, use of health services, particularly EmOC services, was low. Only 2.4% of deliveries occurred at the facility in intervention area, while the figures were 7.2% and 4.5%, respectively for comparison and control areas. Over half the women surveyed stated "home" as their desired place for delivery and most deliveries occurred with untrained birth attendants. Practical realities were factors in low utilization of EmOC services. Families cited lack of access to reliable transportation and ready cash as major obstacles to reaching a health facility. Just over a third of husbands reported having saved some money for use in the event of an obstetric emergency.

Cultural practices and social norms in the study population also played a role in the ability to access maternal health services. Nearly 70% of women surveyed indicated the need to seek approval from other family decision-makers to use hospital services. This suggests more attention should be accorded to men than has been in past safe motherhood efforts. Finally, women cited the presence of predominantly male doctors and their perception that quality of services was poor as reasons for not delivering at a health facility.

The "Three Delays" model is the framework upon which project activities were developed for the intervention area [7]. The model asserts that there are three primary delays women face in being treated in an EmOC facility, any one of which can lead to maternal death or disability. Delay 1 is in the decision to seek EmOC. Delay 2 is in reaching the health facility, and the third delay is in receiving quality treatment at the health facility [8,9]. Each of the DSI interventions was designed to overcome one or more of these delays with the aim of improving access to and utilization of services.

### 2.3. Project interventions

#### 2.3.1. Facility interventions

*2.3.1.1. Upgrading facilities.* The sub-district level facilities known as Uzazila Health Complex (UHC),

Box 1
Components of facility upgrades (implemented before the DSI project started)

- Renovation of buildings
- Reorganization and regular supply of equipments, drugs and supplies
- Provision of training to doctors and paramedics
- Introduction of MIS tools for monitoring the performance of delivery and basic EmOC and referral cases

Box 2
Components of the quality of care intervention

- Providing prompt attention to emergencies (e.g., response time)
- Allowing easy access to women's services (e.g., posting of informational placards in facilities)
- Ensuring facility cleanliness
- Promoting respectful interpersonal communication between provider and client, and team approach to manage obstetric emergency.
- Developing gender sensitivity of providers
- Maintaining accurate record keeping so that data may be used for decision-making
- Developing stakeholder committee to solicit community opinions and suggestions in improving health service provision

31-bedded hospital, both at intervention and comparison areas were upgraded for providing basic EmOC services as part of GoB and UNICEF pilot initiative. The basic EmOC services include assisted vaginal delivery with vacuum extraction, manual removal of retained placenta and stabilize other complications, and referral. Please note that the up gradation of facilities was not part of the direct intervention of DSI, during design, the project has purposefully selected areas that have already been upgraded for basic EmOC.

*2.3.1.2. Quality of care*. Improving the quality of care (QoC) in health facilities directly addresses the third delay. And by shortening the distance families have to travel to reach a functioning facility, it reduces the second delay. Finally, by improving the reputation of the health facility in the community, improving QoC can also help reduce the first delay. Before the implementation phase, between January 1999 and July 1999, DSI obtained information about current QoC issues from all three subdistricts using a quantitative community-based survey, client exit interviews with women who were treated for obstetric complications, and case reviews of maternal deaths and "near misses" at both the health facility and community levels. From these results, DSI staff identified 9 objectives of QoC to be addressed.

Once the objectives of the QoC intervention were identified, a health facility assessment (HFA) at the UHC in the intervention area was conducted to identify infrastructure, supply, and capacity issues. DSI staff then organized discussions between clinicians and community leaders to address community perceptions about health services. The findings of the HFA, community discussions, and the case studies of maternal deaths mentioned

Box 3
Components of the birth planning intervention

| Message | Objective |
|---|---|
| Know what to expect. | Women and their families should know what to expect during pregnancy, childbirth, and the postpartum period. |
| Know the danger signs. | Women and their families should know and be able to recognize danger signs for the woman during pregnancy, childbirth, and the postpartum period. |
| Identify a trained birth attendant. | The woman and her family should discuss who will assist with the delivery. They should select someone who is trained, and everyone should know who the person is so that when labor begins, she can be contacted. |
| Prepare for a clean delivery. | The woman and her family should ensure a clean delivery by providing a clean dry cloth, clean surface, clean blade, and thread. They should encourage the trained traditional birth attendant (TBA) to use hygienic practices. |
| Identify the facility from which to seek services. | The woman and her family need to know which service facility to go to if a given complication arises. |
| Plan for complications. | The woman and her family must develop contingency plans to cover the costs of transportation to EmOC services. |

Box 4
Components of community support intervention

- Planning for emergency funds
- Planning for emergency transportation
- Promotion of involvement of men and other decision makers
- Identification and mobilization of potential blood donors to support during emergency
- Establishing referral linkages with appropriate referral facilities

earlier were shared with UHC staff individually and in small groups and suggestions on improving service provision were solicited. DSI then helped UHC managers and service providers prioritize QoC issues specific to the health facility and identified potential facilitators among UHC staff who then worked with CARE to develop training modules on these key QoC issues. Facilitators organized training sessions for all staff in the facility during which team norms, an action plan for QoC, and a monitoring plan were developed. Service providers met each month to review progress made on the identified quality of care issues. During these meetings, staff members were encouraged to raise problems in implementation of the action plan for discussion and problem solving. Occasional exit interviews and case studies were presented regularly to assess any changes in client perspectives. CARE staff were based at the UHC to provide on-site training and support as needed to facility providers and managers.

Since community perceptions rarely factored in to how services were designed and provided before the Dinajpur SafeMother Initiative was implemented, CARE also assisted in the formation of a stakeholder committee to solicit community opinions and suggestions in improving health service provision. The committee consisted of eleven community members, including elected Union Parishad women members, dynamic leaders from various communities, active TBAs or village doctors, respected religious leaders, leaders from other sectors such as educational institutions, community-based organizations, etc., as well as ten selected UHC staff. The stakeholder committee met every two months and formed sub-committees that regularly monitored UHC cleanliness and client perceptions of services, as well as reviewed maternal death or "near miss" cases. At the national level, CARE, UNICEF, and the GoB reviewed the stakeholder committee's operations as part of their semi-annual reviews of UHC services.

### 2.3.2. Community interventions

Community mobilization activities for the DSI project were implemented during a two-year period from May 1999 to June 2001.

*2.3.2.1. Birth planning (BP).* Birth planning aims to overcome the delays in decision-making by providing women and families with ability to identify danger signs of pregnancy. BP also addresses the delay in reaching a health facility by encouraging the development of contingency plans such as saving money for transportation costs or having available transportation in case of an obstetric emergency.

The concept of preparing for a delivery is almost absent in many cultures. Preliminary data in the DSI study revealed that 61% of pregnant women's families had no plan to manage obstetric emergencies. Although some behavior change communication messages (such as danger signs or symptoms of complications) were already being presented to pregnant women through the GoB health program, the messages were not effective in addressing obstetric complications. This was because the

**Table 2** Comparison of pre- and post-intervention data

| | Pre-intervention | Post-intervention | Change (% points) | *P*-value | 95% confidence limits |
|---|---|---|---|---|---|
| *Percentage of total births in facilities* | | | | | |
| Intervention area | 2.4% | 20.5% | +8.1 | <.01 | 7.2—9.0 |
| Comparison area | 7.2% | 12.5% | +5.3 | <.01 | 4.1—6.5 |
| Control area | 4.5% | 5.0% | +0.5 | 0.35 | 4.23—5.72 |
| *Met need for EmOC Services* | | | | | |
| Intervention area | 16.0 | 39.8 | +23.8 | <.01 | 19.2—28.5 |
| Comparison area | 12.5 | 25.5 | +13.0 | <.01 | 8.9—17.1 |
| Control area | 11.1 | 12.1 | +1.0 | 0.69 | 8.9—14.6 |

information focused mostly on antenatal and delivery care and was only provided to women who came for ANC visits.

Birth planning is a process through which pregnant women and relevant family members are provided with messages to construct both a plan for normal delivery and a plan if complications should arise. Six BP messages were developed based on gaps in knowledge, which were identified through baseline data and emphasized emergency preparedness and danger signs (see Box 3).

These messages were incorporated into an EmOC poster, pictorial birth planning cards, pictorial flash cards that included other important health messages, and a brochure for literate community leaders. Traditional birth attendants, GoB and NGO fieldworkers, and village doctors were trained to disseminate BP messages and materials during home visits, group discussions at village-level satellite clinics, and village meetings. Based on the observations of field workers, the amount of materials distributed, and interviews with women, we believe that during the two years of the project, an estimated one third to one-half of pregnant women received BP cards and information, most of them in their home, while the rest received them at satellite clinics. In addition to pregnant women and their family members, community and religious leaders also received BP messages to create greater community awareness.

*2.3.2.2. Community support system (CmSS).* A community support system addresses 2 of the 3 delays by providing women and their families with various forms of support to respond to emergencies. Community awareness about the danger signs (symptoms) of complications during pregnancy or delivery facilitates the decision to seek EmOC, while having a community emergency fund allows for the transportation of a woman to the health facility and provides a means of payment for services (Box 5).

Due to sporadic efforts to foster community participation in Bangladesh, a systematic attempt to achieve effective participation, particularly in health issues, has been largely ignored. Along with birth planning, therefore, DSI established a community support system (CmSS) in selected villages within the intervention area. A CmSS is intended to provide support to pregnant women during an obstetric emergency through collective efforts of the community. The main objectives of a CmSS are to foster timely referral of women with obstetric complications to an appropriate EmOC facility; to promote an enabling environment in the community; and to create awareness among the community about danger signs of obstetric complications as well as services available at various facilities.

Based on distance from the UHC, community interest, and impressions of levels of obstetric complications and maternal deaths, CARE selected 120 out of 189 villages in the intervention area. A total of 133 CmSS were established in these villages. Each village underwent a community diagnosis, which involved resource mapping, interviews of key stakeholders (i.e., school teachers, TBAs, local elites, and political and religious leaders), and focus group discussions to gather information on maternal deaths.

CARE conducted at least 40 in-depth interviews with consenting families from selected villages that recently experienced a maternal death to understand what factors may have contributed to the death. The findings of these community diagnoses, along with the case studies, were then shared with the community members and key stakeholders mentioned earlier. From among these stakeholders, a few volunteers in each village were identified and trained by CARE to facilitate community meetings in which general facts about

Box 5
Process of establishing community support intervention

- Select village
- Conduct community diagnosis
- Share the findings with community
- Discuss potential solutions with key stakeholders
- Identify community facilitators
- Prepare facilitators
- Hold a village meeting led by community facilitators
- Hold discussions and identify actions to form CmSS
- Implement activities to form CmSS
- Disseminate information about CmSS
- Follow up/monitor/evaluate CmSS

maternal mortality in Bangladesh and the individual community diagnosis were shared. The purpose of these meetings was to foster a community commitment to prevent maternal deaths in the village by enabling members to understand the importance of not allowing women to die from lack of intervention.

Once community members understood the importance of establishing a CmSS, they discussed what they saw as the best means for supporting women in pregnancy and childbirth. In order to sustain the CmSS, each community formed an executive committee with seven to fifteen members, while all households within the catchment area of the CmSS were deemed members of the general committee. Specific functions of each CmSS varied from village to village according to its needs, but all included emergency funds for EmOC, emergency transportation in case of referral to another health facility, a list of team volunteers to accompany women to facilities or to provide financial support, and a list of volunteers who will be available to donate blood in case of emergency. CARE and the GoB staff jointly visited each CmSS regularly (bimonthly) to ensure that it was functioning properly and to provide support when weaknesses were identified. CARE's participation diminished, however, as the executive committee of a CmSS matured.

## 3. Results

### 3.1. Facility interventions: impact on UN indicators

#### 3.1.1. Intervention area

This area initially had the lowest percentage of women delivering in medical facilities at baseline, but also had the greatest increase. The increase was statistically significant. In terms of met need, this was initially the highest among the 3 areas, and once again showed the greatest increase which was statistically significant. Because the confidence limits of the increase in percentage points are higher than for the comparison area and do not overlap with them, we conclude that the impact of the multiple interventions was greater than the impact of the single intervention.

#### 3.1.2. Comparison area

This area showed statistically significant increases in both the percentage of women delivering in medical facilities and in met need.

#### 3.1.3. Control area

The increases in both UN indicators were not statistically significant in this area.

### 3.2. Community interventions

Knowledge of obstetric complications was also measured at baseline and after the intervention. However, changes in the survey design between baseline and post-intervention, baseline data on knowledge could not be directly compared to post-intervention statistics. Knowledge of BP messages was measured only post-intervention.

#### 3.2.1. Intervention area

44% of women in this area knew >3 of the 5 danger signs, and 12% knew none of the danger signs even when prompted. Only 19% of women in this area knew >3 BP messages, indicating that more work in this area is required. 35% of women in this area knew none of the BP messages, however, in 2001, 35 women were referred from the intervention area UHC to the district hospital. Of these, 13 women knew the 6 BP messages and 11 had their BP card in hand.

#### 3.2.2. Comparison area

Only 4% of this group knew >3 of the danger signs and almost half of the respondents (46%) knew none even when prompted. More than two-thirds of the women in this area knew none of the BP messages.

**Table 3** Prompted knowledge of danger signs and birth planning messages, 2001 (post-intervention)

| Area | Knew >3 (%) | Knew 1 or 2 (%) | Knew none (%) |
|---|---|---|---|
| *Knowledge of danger signs* | | | |
| Intervention | 45 | 43 | 12 |
| Comparison | 4 | 50 | 46 |
| Control | 6 | 74 | 20 |
| *Knowledge of birth planning messages* | | | |
| Intervention | 20 | 45 | 35 |
| Comparison | 2 | 26 | 72 |
| Control | 1 | 19 | 80 |

### 3.2.3. Control area

6% of women in this group knew >3 of the symptoms, and 20% knew none even when prompted. Eighty percent of women in this area knew none of the BP messages(see Table 3).

The establishment of community support systems in villages had an impact on behavior. A total of 133 CmSS groups had been established by the end of the project period. On average, 39% of village households participated in a CmSS. Fifteen of the CmSS groups purchased a rickshaw-van to transport women during obstetric emergencies and 13 established bank accounts to maintain their funds. Out of 150 women who experienced an obstetric emergency during the study period, 62 used the resources of a CmSS. Out of these individuals, 52 women made use of money from the emergency fund, 23 were accompanied to the health facility, and 23 used the transportation system.

## 4. Discussion

Although studies have addressed the use of EmOC services, the Dinajpur SafeMother Initiative is the first to measure the effect of QoC and community mobilization activities on EmOC utilization.

Evaluation of EmOC utilization rates in the 3 study areas shows that both the intervention and the comparison areas had increased utilization when compared with the control area. This provides evidence to support the fundamental importance of upgrading health facilities to increase the availability of EmOC services. The intervention area, which also had intensive QoC and community mobilization interventions, saw a much greater increase than did the comparison area. We conclude, therefore, that the best results are achieved through a combination of facility improvement, quality of care activities and targeted community mobilization activities.

Because of the study design and the interconnectedness of the QoC and community mobilization activities, it is not possible to disaggregate the effect of each intervention on EmOC utilization rates. While it is likely that the activities created a synergistic effect to increase use of EmOC services, it is also plausible that one of these activities was the primary catalyst for the increase in utilization at the UHC in the intervention area.

Aside from an increase in utilization, there were other positive intervention outcomes, which were not quantifiable, yet important. For example, the regular use of data in the facilities, including death and "near miss" reviews, allowed service providers to better understand patient needs and the importance of providing timely and quality care. The team approach adopted by DSI further increased overall facility performance and empowered lower level staff members. In addition, stepwise implementation of stakeholder committees sensitized providers to the importance of community involvement and enabled community members to be active participants in decision-making. Finally, educational activities such as Birth Planning allowed women and their families to recognize danger signs and to seek care appropriately.

The DSI results also prompted government, UN agencies, and non-governmental organizations to visit the project site and to plan scaling-up activities. In 2000, the Government of Bangladesh asked CARE to replicate the DSI model in 16 subdistricts of the Sylhet division. This intervention, known as Nirahpad Ma (literally *Safe Mother*), was implemented from January 2001 to June 2003 and its final evaluation showed that met need for EmOC in the intervention area had been increased from 12% to 48%. In addition, other CARE country offices are using the experience of DSI to design their own maternal and newborn health initiatives.

Nevertheless, there remains a host of challenges. Some of the obstacles to birth planning, for example, include involving men who continue to be key decision-makers in the family; attributing healthy maternal outcomes to BP efforts; and dealing with understaffing of health personnel responsible for birth planning activities. While the community participatory process was strengthened through the creation of CmSS groups, governance of the CmSS and its potential for sustainability is a major concern. Many irregularities among CmSS groups were found in the organizing of meetings. In addition, limiting the scope of the CmSS to maternal health issues was a barrier to mass participation in some villages as it may have seemed irrelevant to some families. Some community support systems may have failed due to weak governing structures or lack of participation within villages.

In terms of quality of care, staffing during nights and weekends varied from facility to facility. Many service providers do not live nearby further prolonging delay in treating complications. There was frequent turnover of key personnel. Finally, sustaining high staff morale and commitment amidst difficult working conditions proved difficult.

More research is needed to determine whether these activities have benefits for the larger community that go beyond increasing utilization of EmOC services. In addition, although EmOC utilization levels have increased, it is unclear how much these services are being accessed by the poor. A poverty-disaggregated analysis of service utiliza-

tion may provide a better understanding of utilization patterns and assist in developing future initiatives. In resource-poor countries, we must ultimately decide whether such activities, taken together, yield a favorable cost—benefit ratio for the communities in question.

## 5. Conclusion

The Dinajpur SafeMother Initiative increased utilization of EmOC services in the intervention area through its QoC and community mobilization activities. Despite the gradual withdrawal of DSI staff following the final evaluation in 2001, referral and facility utilization rates did not drop significantly in the intervention area in 2002. Interest in the study findings led to scaling-up in Bangladesh. Many elements have been adapted from DSI to government national maternal health program such as community support system and birth planning messages. In particular, several components have also been adopted from the CARE birth planning card into the national card to be used for country-wide government maternal health program. The sustainability of DSI efforts should be monitored over the next few years through the monitoring of process indicators.

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## References

[1] World Health Organziation, UNICEF and UNFPA. Maternal Mortality in 1995: Estimates Developed by WHO, UNICEF, UNFPA. Geneva: World Health Organization; 2001.
[2] Paul BK, Rumsey DJ. Utilization of health facilities and trained birth attendants for childbirth in rural Bangladesh: an empirical study. Soc Sci Med 2002;54:1755–65.
[3] Directorate General of Health Services, Obstetrics and Gynecology Society of Bangladesh, UNICEF. EOC project review report; 1997.
[4] UNICEF, WHO, UNFPA. Guidelines for monitoring the availability and use of obstetric services, New York; 1997.
[5] Ahmed Y, Mostofa G. Baseline survey for assessment of EOC services in Bangladesh. Dhaka: Bangladesh Institute of Research for Promotion of Essential Reproductive Health Technologies (BIRPERHT); March 1995.
[6] Rahman MH, Akhter HH, Chowdhury MEE, Yusuf HR, Rochat RW. Obstetric deaths in Bangladesh 1996—1997. Int J Gynaecol Obstet 2002;77:161–9.
[7] CARE, UNICEF, and Government of Bangladesh. Dinajpur SafeMother Initiative: Detailed Implementation Report; October 2002.
[8] Thaddeus S, Maine D. Too far to walk: maternal mortality in context. Soc Sci Med 1994;38(8):1091–110.
[9] Maine D. Safe motherhood programs: options and issues. New York: Columbia University, Center for Population and Family Health; 1991.