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'The clock keeps ticking' – the role of a community-based intervention in reducing delays in seeking emergency obstetric care in rural Bangladesh: a quasi-experimental study

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ABSTRACT

Objective: To explore the role of a community-based intervention in reducing delays in accessing emergency obstetric care (EmOC) in rural Bangladesh, and the factors associated with delayed decision making, reaching the health facility and receiving treatment.
Study design: Quasi-experimental study.
Methods: Multistage random sampling was used to select 540 villages, from which 1200 women who reported obstetric complications in March–April 2010 were interviewed.
Results: The median time taken to make the decision to access health care was significantly lower in the intervention areas compared with the control areas (80 vs 90 min). In addition, the median time taken to reach the health facility was significantly lower in the intervention areas compared with the control areas (110 vs 135 min). However, no difference was found in the median time taken to receive treatment. Multiple linear regressions demonstrated that the community intervention significantly reduced decision making and time taken to reach the health facility when accessing EmOC in rural Bangladesh. However, for women experiencing haemorrhage, the delays were longer in the intervention areas. Protective factors against delayed decision making included access to television, previous medical exposure, knowledge, life-threatening complications during childbirth and use of a primary health facility. Financial constraints and traditional perceptions were associated with delayed decision making. Complications during labour, use of a motorized vehicle and use of a primary health facility were associated with faster access to EmOC, and poverty, distance, transportation difficulties and decision made by male guardian were associated with slower access to EmOC.
Conclusions: The intervention appeared to reduce the time taken to make the decision to access health care and the time taken to reach the health facility when accessing EmOC. This study provides support for a focus on emergency preparedness for timely referral from the community.

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Introduction

Emergency obstetric care (EmOC) is crucial during life-threatening obstetric complications.[1–3] Direct maternal complications (haemorrhage, eclampsia, sepsis, unsafe abortion and obstructed labour) account for most deaths,[2–5] with an estimated figure of approximately 342,900 deaths per year worldwide.[6] Despite a decline in the maternal mortality rate in Bangladesh from 320 per 100,000 live births to 194 per 100,000 live births,[7] delays in accessing EmOC in serious maternal conditions continue to occur at household level due to delayed decision making, time taken to reach the health facility and time taken to receive skilled care at the health facility.[8–14]

In order to avert maternal deaths, global strategies have been undertaken to address delays including early detection of obstetric complications, commencing timely and effective referrals, and ensuring that women have access to life-saving EmOC.[4,8,12,15] The Government of Bangladesh, supported by the United Nations Children's Fund and the United Nations Population Fund, implemented an EmOC programme throughout the country in 1993 with the aim of strengthening all 59 district hospitals and 120 subdistrict health complexes to provide 24-h comprehensive EmOC (CEmOC) services.[16] Basic EmOC services include intravenous administration of antibiotics, oxytocics and anticonvulsants; assisted vaginal delivery; manual removal of retained placenta; and removal of retained products. CEmOC services include caesarean section and blood transfusion, as well as all basic EmOC services.[16,17]

Intervention

BRAC, the non-government organization, launched the Improving Maternal, Neonatal and Child Survival (IMNCS) project in 2006.[18,19] The project piloted in Nilphamari, an impoverished northern district, and was subsequently implemented in three northern districts of Bangladesh in 2008 and six other districts in 2010.[19] Its exclusive design focused on competency development of community health workers (CHWs); community empowerment; rendering homestead health services; and establishing referral linkages with government and non-government health facilities, including timely referral to appropriate EmOC centres. The CHWs offer a wide range of evidence-based homestead services that are free of charge. *Shasthya Kormi* (SK) confirms all expectant women in the community identified by a female health volunteer; *Shasthya Sebika* (SS) and registers for offering homestead antenatal care (ANC) as well as postnatal visits. ANC includes measuring blood pressure, checking uterine height, foetal position and heart sound, clinical anaemia or jaundice, and conveys health education. Further, newborn health workers (NHWs) accompanied by SS assist in safe delivery, newborn care, and supply of misoprostol tablets (400 μg) following childbirth to prevent postpartum haemorrhage. In addition to supervising the

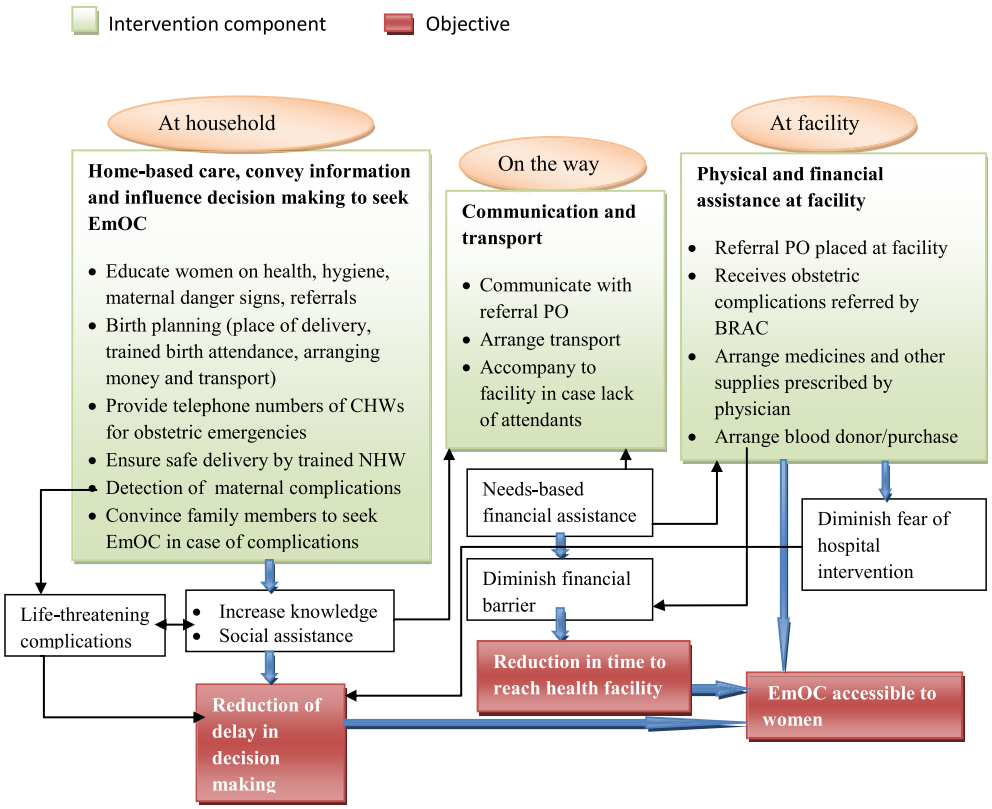

Fig. 1 – Strategies for offering maternity care and referral services to reduce delays in accessing emergency obstetric care (EmOC). NHW, newborn health worker; CHW, community health worker; PO, programme organizer.

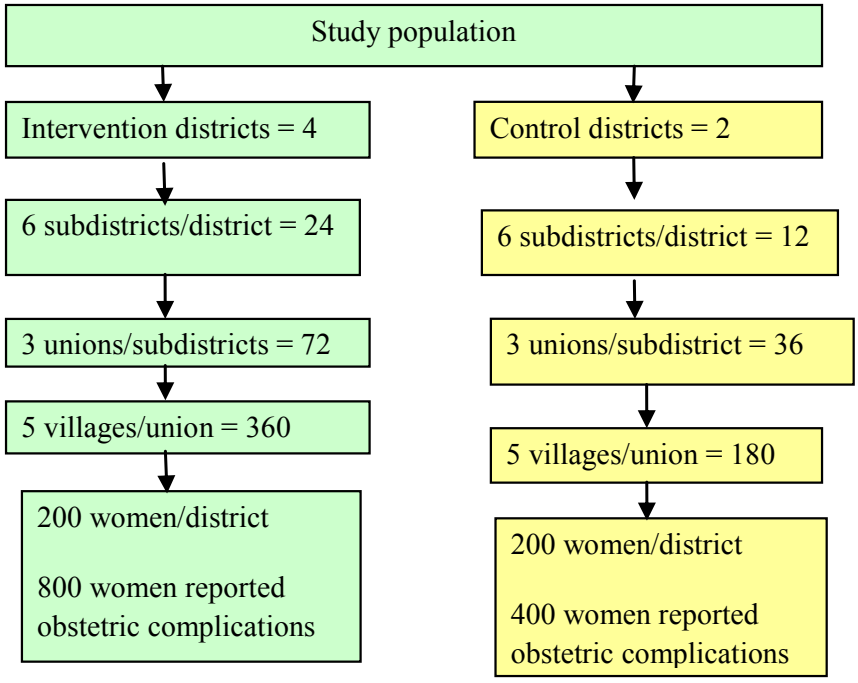

Fig. 2 – Study population and sampling technique.

CHWs' field activities, programme organizers (POs) pay home visits to talk about the birth plan and emergency preparedness (Fig. 1), and send women to appropriate EmOC facilities after communication with referral POs via telephone in the case of obstetric complications. Referral POs are male cadres at subdistrict and district public health facilities to accelerate the receipt of EmOC.[1,17,18] Such community-based health interventions are crucial for saving lives during obstetric emergencies by overcoming barriers in accessing EmOC.[1,8] The present study aimed to explore the role of the IMNCS intervention in reducing delays in accessing EmOC services, and the factors associated with such delays.

Methods

Study setting and design

A quasi-experimental study was undertaken employing quantitative methods. The study compared four intervention districts (Nilphamari, Rangpur, Gaibandha and Mymensingh) with two control districts (Netrokona and Naogaon) of rural Bangladesh. In total, the study area included 540 villages (population 8,291,643). The study area has an agrarian economy, half of the respondents live below the poverty level, and the population is predominantly Muslim (99%). On average, women get married and conceive their first infant at 15 and 17 years of age, respectively. Women are occupied principally in home making and child rearing. The average level of education is four years of schooling.[20] In Bangladesh, the preferred place for childbirth is at home (71%), and only 29% of all cases with maternal complications seek professional emergency care from a health facility.[7]

Both the intervention and control groups received BRAC's core interventions of education, water and sanitation, microfinance assistance, essential health care (basic and curative), health and nutrition education, family planning, immunization, pregnancy care and vitamin A supplementation. In addition, the intervention group received intensive maternity care with referral services during obstetric emergencies through the BRAC IMNCS project. The control group received all government health services (family planning, ANC and delivery services) but did not receive BRAC maternity care and referrals.

Study population and sampling

According to the Bangladesh Maternal Health Services and Maternal Mortality Survey in 2001, approximately 64% of women in Bangladesh reported delayed decision making when seeking EmOC.[21] Assuming that this proportion is reduced to 49% by implementation of the IMNCS intervention, the required sample size was calculated with significance of 0.05, power of 0.80 and non-response of 0.02. In total, 1200 women reported obstetric complications, and 200 women from each district were selected using multistage random sampling. Districts were stratified into subdistrict, union and village; subsequently, six subdistricts were selected from each district, three unions were selected from each subdistrict, and five villages were selected from each union (Fig. 2).

Women from the intervention and control areas who were referred for obstetric complications (Table 1) in January–February 2010 were included in the study, and women who were referred for previous caesarean section, vomiting and other non-maternal medical causes were

Table 1 – Index of maternal complications and diagnostic symptoms.

Complications	Reported symptoms and identification of complication
Pregnancy-induced hypertension	• Antenatal card or doctor's prescription documented antenatal BP ≥140/90[a] mmHg • Severe headache • Neck pain • Blurred vision • Pain in abdomen • Swelling of face/hands/legs/genital organs
Prolonged labour	• True labour pain at regular intervals for more than 12 h (dawn to dusk/night) • Watery vaginal discharge during labour pain, with/without light vaginal bleeding • Non-progressing labour as cervix was not opening or opening very slowly with regular uterine contraction or foetus was not descending due to abnormal position • Normal foetal position but adequate uterine contraction was absent; uterotonics were needed to deliver the baby
Obstructed labour	• True labour pain persisted at regular intervals for more than 18 h (dawn to dusk/night) • Watery vaginal discharge during labour pain, with/without light vaginal bleeding • Despite adequate uterine contraction with dilated uterine os, foetal part arrested at certain point in birth canal • Foetal size/head/other part was larger than maternal pelvis; birth attendant managed to see but could not bring the baby out • Labour induction/uterotonics failed to assist in vaginal delivery • Surgical intervention (caesarean section) required
Haemorrhage/excessive bleeding	• Any spout of bleeding after 28 weeks of pregnancy • Excessive bleeding during pregnancy or during labour • Large blood clot expelled from genital tract • Excessive bleeding like tap water after delivery with or without placental delivery
Retained placenta/product	• Placenta not expelled 30 min after delivery of the baby • Part of placenta delivered, leaving retained product inside the uterus
Eclampsia	• Convulsion in pregnancy/delivery/after delivery • Fell unconscious • Tongue bite, frothy discharge from mouth • BP ≥140/90[a] mmHg on antenatal care card or doctor's prescription • Pain in abdomen, severe headache, blurred vision • Swelling of face/hands/legs/genital organs
Malpresentation	• Foetal part (other than head) came first during the process of normal delivery
Puerperal pyrexia	• Fever within first 10 days after delivery • Offensive vaginal discharge • Pain abdomen

BP, blood pressure.

[a] The authors were not able to consider another BP cut-off to identify pre-eclampsia (an increase of 30 mm Hg in systolic pressure or 15 mm Hg in diastolic pressure) as the women were not followed from the beginning of their index pregnancy.

excluded. Women were selected at random from the programme registers in the intervention group and from a list of obstetric complications in the control group. This inventory of complications was extracted from a household survey, conducted prior to the study, as documentation in the control areas was unavailable.

Data collection

Data were collected in March–April 2010. Trained female interviewers carried out structured interviews at doorsteps, and respondents were asked about their symptoms to understand the nature of complications (Table 1) and time of onset. Further questions were asked to ascertain the complication, using medical records and doctor's prescriptions where available. In cases where medical records were unavailable, the person who accompanied the woman during the obstetric emergency was interviewed.

Explanatory variables

Socio-economic status was assessed by woman's years of schooling, knowledge, wealth index and traditional perceptions. Indicators of wealth were measured including source of drinking water, source of water used for cooking and household work, sanitation, list of household assets and material used for housing. Five maternal danger signs were included in the questionnaire set by the Government of Bangladesh to increase awareness, and knowledge was measured by scoring. Reproductive indicators included age at marriage and first conception, previous medical exposure, and number of children. Obstetric indicators included number of antenatal consultations, birth preparedness, outcome of conceptions, perinatal complications and life-threatening complications. The main issues of the IMNCS intervention were identification of complications and receipt of IMNCS assistance; other issues included male decision making, transportation difficulties, use of a motorized vehicle and use of primary health facilities. For analysis, all independent variables were dichotomized as yes (1) or no (0). However, few variables (knowledge, level of health facilities, extent of intervention and distance) were continuous. Delayed decision making and time taken to reach the health facility to seek EmOC were considered as continuous dependent variables (Table 2).

Outcome variables (continuous)

Estimated times for each delay were based entirely on the reports of women and their family members (when the woman was unconscious) using clocks and traditional techniques (e.g. position of sun, Muslim prayer times). The interviewers asked further questions to increase the accuracy of estimated times.

Data analysis

The median time taken to make the decision to access health care, to reach the health facility and to receive treatment were calculated and compared between the intervention and control areas. Pearson's Chi-squared and independent *t*-tests were performed to compare the baseline characteristics of the two groups of respondents. Multiple linear regression analyses were performed to estimate the independent effect of the IMNCS intervention on delays in accessing EmOC services after simultaneous adjustment of possible predictors (Table 2).

Results

Table 3 shows the background characteristics of the respondents. The women in the intervention group were more likely to be poor and to conceive at a younger age compared with the women in the control group. Hospital attendance for regulation of menstruation was two-fold higher in the intervention group. Attendance at four or more antenatal visits was three-fold higher in the intervention group, and these women were better prepared for birth (e.g. knowledge of the CHW's telephone number) compared with the women in the control group. However, pre-identification of blood donors in case of an emergency was rare in both groups (Table 3).

In the intervention group, approximately 97% of obstetric emergencies sought EmOC, compared with only 52% in the control group. Three-quarters of all maternal complications occurred during childbirth, rather than during the antenatal (14%) or postnatal (10%) periods. Approximately 72% of obstetric emergencies were referred to EmOC health facilities by IMNCS CHWs in the intervention areas. Two-thirds of all reported complications were identified by IMNCS CHWs, and one-third were identified by the woman, relatives or informal health providers. In the control areas, most complications were identified by informal health providers and relatives; more than 50% were never referred for skilled care. In the control areas, 50% of women used a motorized vehicle [microbus/ambulance/human hauler (local 10-seater small vehicle)/motor bike] compared with 38% in the intervention areas (50% used non-motorized transport, such as van rickshaws, and 12% went by foot).

The time taken to make the decision to access professional care and the time taken to reach the health facility were significantly lower in the intervention areas compared with the control areas. The median time for decision making was 80 vs 90 min, and the median time to reach the health facility was 110 vs 135 min, respectively (Fig. 3).

Decision making time differed with experienced complication

Table 4 shows the median time taken to make the decision to access health care for various complications. A common complication was prolonged labour, and the time taken to make the decision to seek EmOC was similar in the intervention and control groups. In three categories (headache/blurred vision/oedema, fever and high blood pressure), large differences in the time taken for decision making were seen between the intervention and control groups, with slower decision making found in the control group. However,

Table 2 – Explanatory variables used in linear regression modelling of delayed decision making and time taken to reach health facility when seeking emergency obstetric care.

Explanatory variables	Operational definitions
Sociodemographic factors	
Access to television	Does respondent have their own television? Yes = 1, no = 0
Financial constraints	Did economic limitations cause delay in decision making? Yes = 1, no = 0
Traditional perception (fear of medical intervention)	Did fear of medical intervention cause delay in decision making? Yes = 1, no = 0
Reproductive and obstetric factors	
Previous medical exposure	Yes = 1, no = 0
Perinatal complications	Did obstetric complications arise during childbirth? Yes = 1, no = 0
Life-threatening complications (which give women less time to survive)	Yes (haemorrhage, eclampsia, retained placenta with haemorrhage) = 1, no (other complications) = 0
Awareness	
Knowledge of maternal danger signs	Composite index of five danger signs expressed as continuous numbers
Gender role in decision making	
Decision made by husband/male guardian	Yes = 1, no (made by female members/self) = 0
IMNCS intervention	
Intervention areas	Intervention area = 1, control area = 0
Extent of intervention	Extent of implementation in years
Complications identified by IMNCS CHWs	Yes = 1, no = 0
IMNCS assistance in seeking emergency obstetric care	Received assistance from IMNCS intervention during obstetric emergency? Yes = 1, no = 0
Level of health facility	
Care sought at primary health facility	Yes = 1, no = 0
Difficulty in arranging transport	Yes = 1, no = 0
Use of motorized vehicle	Yes = 1, no = 0 (used manual transport or foot)
Distance to health facility	Distance travelled to seek professional care (in km)

IMNCS, Improving Maternal, Neonatal and Child Survival; CHW, community health worker.

decision making was faster in the control group compared with the intervention group for cases of haemorrhage, eclampsia and prolapsed foetal part.

Time taken to reach the health facility

In the intervention areas, the median distance that women travelled to reach an *upazila* health centre was 7 km, and the maximum distance was 18 km. The median time taken was 105 min in the intervention group and 120 min in the control group. The median time taken to reach tertiary facilities was 120 min (25 km) in the intervention areas and 150 min (24 km) in the control areas. The distance from the woman's home to the facility was lower in the intervention group for all formal facilities. Informal health providers were closer to the woman's home in the control areas. In the intervention areas, more than 80% of referred women sought care from different levels of public hospitals, predominantly *upazila* health centres and tertiary teaching hospitals. In the control areas, 50% of women used public facilities (Table 5).

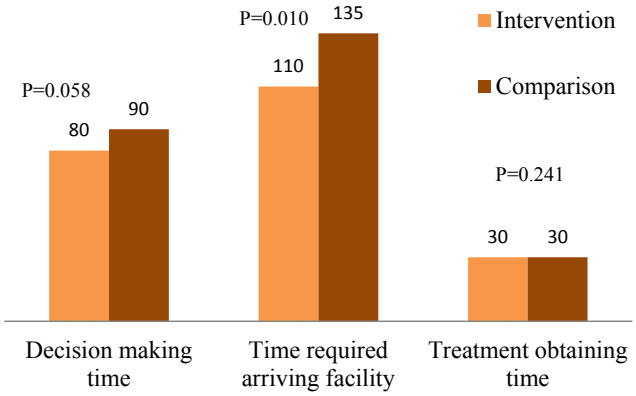

Fig. 3 – Median time required for decision making, to reach health facility and to receive treatment (min).

Time taken to receive treatment

The median time taken to receive treatment at the health facility was 30 min in both the intervention and the control areas, despite the presence of referral POs at the facilities in the intervention areas.

Table 3 – Background description of respondents (%).

	Intervention group $n = 800$ (%)	Control group $n = 400$ (%)	*P*-value
Sociodemographic			
Mean (±SD) age (years)	22.8 ± 5.6	23.2 ± 5.7	0.217
Mean (±SD) education (years)	4.7 ± 3.7	4.5 ± 3.6	0.530
Wealth quintile			
Poorest	62.0	56.5	0.022
Middle	20.5	19.3	
Richest	17.5	24.3	
Reproductive history			
Mean (±SD) age at marriage (years)	15.2 ± 2.4	15.9 ± 2.4	0.000
Mean (±SD) age at first conception (years)	17.2 ± 2.9	17.8 ± 2.8	0.000
Mean (±SD) number of children ever born	2.5 ± 1.8	2.4 ± 1.7	0.582
Obstetric history			
Attended at least four antenatal appointments	71.5	27.0	0.000
Outcome of conception (at the time of survey)			
Live birth	95.6	95.0	0.665
Still birth	8.9	6.2	0.264
Menstruation regulation	8.6	4.7	0.038
Abortion	6.4	10.5	0.076
Inter-uterine death	4.5	3.0	0.588
Birth preparedness[a]			
Planned place of delivery (home)	95.5	91.0	0.002
Contacted birth attendant	86.1	75.4	0.000
Money deposited	52.9	15.3	0.000
Knew CHW's telephone number	81.9	10.0	0.000
Pre-arranged transport	35.1	11.7	0.000
Pre-arranged blood	2.7	1.2	0.146
Mean (±SD) number of maternal danger signs recalled	2.78 ± 1.3	1.55 ± 1.1	0.000

CHW, community health worker; SD, standard deviation.
[a] Multiple responses considered.

Table 4 – Median time (min) taken to decide to seek care by type (%) of complication.

Complications	Intervention group		Comparison group	
	%	Median time	%	Median time
Prolonged labour	43.4	90	44.2	90
Obstructed labour	10.4	82	16.0	72
Haemorrhage	12.8	90	10.2	80
Severe headache, blurry vision, hand or feet oedema	6.5	90	7.8	225
High fever with smelly vaginal discharge	3.2	110	0.8	2960
High blood pressure	8.8	60	2.5	127
Eclampsia (fits)	7.4	65	3.8	47
Prolapsed foetal part	2.6	50	3.0	47
Retained placenta	4.9	50	11.7	60
n	800	774	400	207

Table 5 – Distribution of respondents that sought care and median time taken to reach different health facilities.

[a]Sought care from	Intervention group				Control group				*P*-value
	%	Median distance (km) and time (min)			%	Median distance (km) and time (min)			Mann–Whitney
		First facility distance	Final contact distance	Time		First facility distance	Final contact distance	Time	
UHC	48.4	7	18	105	26.6	8	–	120	
DH/MCWC	11.8	10	7.5	130	15.5	14	8	135	
Specialized tertiary	21.1	10	25	120	9.2	22	24	150	
Private sector	17.7	10	18	130	44.9	12	10	150	
Informal health providers	0.5	6	26	215	2.4	3	–	95	
NGO clinics	0.5	8.5	–	110	1.4	12	2	120	
Crude median distance	–	8	–	–	–	11	–	–	0.000
Crude median distance	–	–	22	–	–	–	10	–	0.004
Crude median time	–	–	–	110	–	–	–	135	0.000
n	774	774	178		207	207	34		

NGO, non-government organization, UHC, Upazila Health Centre; DH, District Hospital; MCWC, Maternal and Child Welfare Centre.
[a] Multiple responses considered. Respondents who were treated at home were excluded from this analysis.

Influence of the IMNCS intervention on delays

In the intervention areas, eight out of 10 women received IMNCS assistance for social and financial support while seeking EmOC services. IMNCS CHWs played a crucial role during referral by motivating family members to make critical decisions (42%), accompanying the women to hospital (40%) and arranging transport (11%). Women received financial aid to buy medicines (38%) and arrange blood (3%) (table not shown, multiple responses considered).

Factors associated with delayed decision making and delay in reaching health facility

Tables 6 and 7 show an inverse association between delayed decision making and living in the intervention areas, and delay in reaching the health facility and living in the intervention areas. Access to a television, knowledge about maternal complications, previous medical exposure, life-threatening complications during childbirth and seeking care from primary health facilities were found to reduce the time taken for decision making. Financial constraints, traditional perceptions and male decision making were found to increase the time taken for decision making.

Economic limitations, distance and transportation difficulties were positively associated with a delay in reaching the health facility. Complications during childbirth, use of a motorized vehicle and use of primary health facilities were associated with reaching the health facility more quickly (Table 7).

Discussion

This study explored the time taken for decision making, reaching the health facility and receiving treatment for EmOC. Differences between the intervention and control groups were assessed in order to ascertain the role of IMNCS in reducing delays in receiving EmOC.

In Bangladesh, only one-third of cases sought skilled care from a facility while experiencing obstetric complications, and two-thirds of cases took more than 6 h to decide to access care.[7] This study revealed that twice as many cases sought EmOC in the intervention areas compared with the control areas. The intervention improved access to EmOC, as shown by the reduced times taken to decide to seek professional care and to arrive at facilities. This point is particularly important because referred women benefit from all components of the intervention despite relative poverty in the intervention areas. Another study in Bangladesh showed that similar activities in urban areas had the same effect.[1]

This study showed that women commonly experience obstetric complications during labour. The median time taken to decide to seek professional care was 80 min in the intervention areas and 90 min in the control areas, but this varied with type of complication. The longest delay in decision making was seen for postpartum infection. In other life-threatening conditions, decision making ranged between 47 and 90 min. The decision to access care was made most quickly (47 min) in the case of eclampsia or prolapse of a foetal part. Both government and non-government interventions have increased the ability of individuals to judge the severity of obstetric complications, thus reducing the time taken to decide to seek EmOC. Other studies have shown that life-threatening obstetric emergencies modify the effect of delayed decision making.[1,2,5,12,14] In the case of haemorrhage, this is of particular concern because of the potential speed of progression to death (e.g. in postpartum haemorrhage). Delayed decision making is overshadowed by critical health service delays. The inability of subdistrict health facilities to deal with obstetric complications due to lack of emergency

Table 6 – Factors associated with delays in decision making (adjusted linear regression).

Predictors	B	Standard error	β	P-value
Socio-economic factors				
Access to television	−0.191	0.090	−0.076	0.035
Financial constraints	0.493	0.064	0.230	0.000
Traditional perception (fear of medical intervention)	0.543	0.190	0.148	0.000
Reproductive and obstetric factors				
Previous medical exposure	−0.267	0.109	−0.072	0.015
Perinatal complications	−0.545	0.081	−0.231	0.000
Life-threatening complications	−0.229	0.057	−0.137	0.000
Awareness				
Knowledge of maternal danger signs	−0.040	0.017	−0.077	0.017
Gender role in decision making				
Decision made by husband/male guardian	0.118	0.065	0.054	0.070
IMNCS intervention				
Intervention district	−0.232	0.091	−0.092	0.010
Complication identified by IMNCS CHWs	−0.023	0.005	−0.147	0.000
IMNCS assistance in seeking emergency obstetric care	−0.328	0.074	−0.139	0.000
Level of health facility				
Primary health facility	−0.202	0.063	−0.097	0.001

IMNCS, Improving Maternal, Neonatal and Child Survival; CHW, community health worker.

medicines, blood supplies and qualified staff affects the decision-making process in low-income settings.[10,17]

Factors that increased the time taken to access services were poverty, traditional perceptions, geographical distance, difficulties in arranging transport and male decision making. Exposure to the IMNCS intervention, life-threatening complications during childbirth, access to a television, better knowledge about maternal danger signs, use of a motorized vehicle and use of a primary health facility reduced the time taken to access services. This confirms previous findings.[2,4,10,11,22] The likelihood of deciding to access health care quickly increased with previous medical exposure, consistent with other studies.[2,5] Predictors such as age and educational attainment of the respondents, husbands' education, women's income, antenatal care and parity did not affect the time taken for decision making or the time taken to reach the health facility. This might be due to the fact that the majority of women had the same sociodemographic status. These findings are in contrast to the results of other studies.[2,4,10,11,22,23] Delays in the time taken to reach the health facility were influenced by multiple factors, including financial inability to access care, problems in availing logistical support such as transportation and geographical distance, some of which can be over-ridden by using a motorized vehicle and having facilities close to the community. This is supported by other studies.[2,4,5,9,10,14] The providers of IMNCS played a crucial role in overcoming these barriers by addressing delays in decision making and time taken to reach the health facility.

Table 7 – Factors associated with delay in reaching health facility (adjusted linear regression).

Predictors				
Economic factor				
Financial constraints	0.182	0.033	0.150	0.000
Period of complication				
Perinatal	−0.095	0.037	−0.071	0.011
Gender role in decision making				
Decision made by husband/male guardian	0.068	0.034	0.055	0.047
Logistic factors				
Difficulty in arranging transport	0.255	0.038	0.187	0.000
Use of motorized vehicle	−0.125	0.038	−0.105	0.001
Reaching primary health facility	−0.082	0.037	−0.069	0.028
Distance of first contact	0.021	0.002	0.389	0.000
IMNCS project				
Extent of intervention	−0.135	0.008	−0.149	0.000

IMNCS, Improving Maternal, Neonatal and Child Survival.

No difference was found in the time taken to receive treatment in the intervention and control areas, despite the assistance of the referral POs. A previous study in Bangladesh reported similar findings.[24] The referral POs do not appear to have any effect in reducing the time taken to receive treatment because of their limited ability to influence hospital events. However, they played an important role in the decision-making process as people in the intervention areas were aware of their presence in hospitals, and their assistance was both physical (in terms of arranging medicine/blood) and financial (in terms of influencing family members to seek EmOC).

Strengths and limitations

In the absence of a standard time for defining delays, median times for decision making and referral were used in this study, rather than defining any specific cut-off. As the data were not normally distributed, the median was used instead of the mean to measure time. Despite all efforts, it was particularly difficult to capture the time required for treatment at facilities.

Recall bias could not be ruled out, but was minimized by limiting the recall period to two months. Estimation of time may not have been accurate as many of the families were compelled to seek skilled care from multiple facilities. Additionally, respondents were found to make bunching the waiting times (time required to receive treatment) in hospitals, usually quoting 'half an hour'. These inaccuracies were minimized by probing and obtaining several viewpoints from accompanying family members.

Conclusion and recommendations

The IMNCS intervention appears to play an important role in reducing delays in decision making and time taken to reach the health facility to access EmOC services. However, no difference in the time taken to receive treatment at EmOC facilities was noted between the intervention and control areas.

This study indicates that delayed decision making during obstetric emergencies, especially fever and haemorrhage, needs to be addressed. Less attention was paid to prompt action in the case of fever, severe headache, blurry vision and oedema. Behaviour change communication, blood grouping during the antenatal period and ensuring birth preparedness for support during obstetric emergencies is necessary. Issues related to delays in receiving treatment were not identified in this study, and further research is recommended.

Author statements

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Ethical approval

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Competing interests

Authors declare that they have no competing interests.

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