DOI: 10.1111/j.1471-0528.2010.02714.x
www.bjog.org

Oxytocin to augment labour during home births: an exploratory study in the urban slums of Dhaka, Bangladesh

AC Moran,[a,b] T Wahed,[a] K Afsana[c]

[a] Reproductive Health Unit, Public Health Sciences Division, International Centre for Diarrhoeal Disease Research Bangladesh, Dhaka, Bangladesh [b] Department of International Health, Johns Hopkins Bloomberg School of Public Health, Baltimore, MD, USA [c] BRAC Health Programme, BRAC, Dhaka, Bangladesh
Correspondence: Dr AC Moran, 502 12th Street NE, Washington DC 20002, USA. Email allisynmoran@gmail.com

Accepted 30 July 2010. Published Online 24 September 2010.

Objective In Bangladesh, the majority of women give birth at home. There is anecdotal evidence that unqualified allopathic practitioners (UAPs) administer oxytocin at home births to augment labour pain. The objective is to explore the use of oxytocin to augment labour pain during home births in an urban slum in Dhaka, Bangladesh.

Design Cross-sectional survey.

Setting KamrangirChar slum, Dhaka, Bangladesh.

Population Married women with a home birth or who experienced labour at home in the 6 months prior to the survey (n = 463) were interviewed. Twenty-seven UAPs were interviewed to validate women's responses.

Methods Bivariate and multivariate logistic regressions were used to identify significant predictors of oxytocin use.

Main outcome measures Reported use of oxytocin to augment labour pain.

Results Forty-six percent of women reported using medicine or other treatments to augment labour pain, 131 of whom reported using oxytocin (28% of total). Traditional birth attendants were the predominant decision-makers of when to use oxytocin. The medication was provided by a UAP who administered the drug via saline infusion or intramuscular injection. Higher education, lower parity, reported long labour (more than 12 hours), and knowledge of and positive attitudes towards oxytocin were significantly associated with oxytocin use after controlling for other factors. In the validation exercise, there was agreement about the use of oxytocin to augment labour in 22 of 27 cases (82%).

Conclusions About one-third of women used oxytocin to augment labour pain. This practice has implications for health education as well as future research to assess the impact on adverse maternal and neonatal outcomes.

Keywords Bangladesh, home delivery, oxytocin, urban slum.

Please cite this paper as: Moran A, Wahed T, Afsana K. Oxytocin to augment labour during home births: an exploratory study in the urban slums of Dhaka, Bangladesh. BJOG 2010;117:1608–1615.

Introduction

In Bangladesh, maternal mortality remains a significant public health issue, with a maternal mortality ratio of 320 per 100 000 live births.[1] Urbanisation is occurring at a rapid pace (7% per year),[2] and the majority of this growth is in urban slum settlements comprising poor populations. Although women in urban slums have access to skilled care, they are less likely to give birth in a facility than are women in nonslum urban areas (12.4 and 46.5%, respectively).[3]

The informal health sector, especially unqualified allopathic practitioners (UAPs), plays a significant role in providing health services to the poor.[4–8] These providers are close to the home, willing to make house calls, trusted by the community, have longer working hours and offer services at lower costs.[9,10] UAPs, comprising village doctors (VDs) and unlicensed drug sellers, have limited training of a few weeks to a few months from semiformal private institutions. Training is focused on common illnesses and diseases, and rarely includes labour or delivery. These training institutions are unregulated and do not follow a standard curriculum. Usually, VDs work out of unlicensed shops where they sell medications and drugs to treat common illnesses. They also perform home visits and advise on medicines available for purchase in their shops,

although they have little, if any, training in diagnosis, treatment or the dispensing of drugs.[5] The number of these unlicensed drug stores is growing rapidly; according to one study, there are about 80 000 unlicensed drug stores in the country.[11] VDs, operating out of these drug shops, are increasingly providing health care, especially in urban areas to the poor.[12]

According to Parkhurst and Rahman,[13] VDs are considered to be experts for pregnancy- and delivery-related complications during home deliveries. They are respected by the community and play an important role in referring women with complications to health facilities. There is anecdotal evidence that VDs are providing saline infusions and uterotonics (mostly oxytocin) to augment labour pain during home births. A study on the community-based distribution of misoprostol in Abhoynagar, Bangladesh found that 48% of women with home deliveries reported having an injection, although the type of injection was not specified (M. A. Quaiyum, pers. comm.).

Oxytocics are life-saving obstetric drugs; however, their inappropriate use can result in serious adverse outcomes for women and their babies, including hyperstimulation of the uterus,[14] leading to precipitate labour, perineal tears, uterine rupture and fetal distress;[15,16] low blood pressure and an imbalance in serum electrolytes;[17] higher postpartum blood loss unless an oxytocic agent is given after delivery;[18] increased operative delivery, Apgar scores of <7 and the need for neonatal intensive care;[19] and impaired fetal oxygenation, fetal distress and asphyxia.[20,21] There is some evidence that intrapartum use of oxytocin can also lead to maternal death as a result of uterine rupture, soft tissue injury of the birth canal and amniotic fluid embolism.[22] The World Health Organization[23,24] recommends the use of oxytocics to augment labour when the woman and her baby can be closely monitored by a skilled professional in a health facility where caesarean section is available.

The use of oxytocics to augment labour pain during home deliveries by UAPs or auxiliary nurse–midwives via saline infusions or intramuscular injections has been documented in India.[20,25–27] In one study, there were significant differences in stillbirths (odds ratio [OR], 1.74; confidence interval [CI], 1.02–2.97) and neonatal deaths (OR, 1.52; CI, 1.06–2.20) among women who reported the home use of oxytocin versus women who did not report oxytocin during labour/delivery. Women who reported oxytocin use also stated that their babies were born very weak (OR, 1.96; CI, 1.56–2.93) and perceived having had a difficult postpartum period (OR, 2.13; CI, 1.56–2.46).[25] Anecdotal reports from Nepal and Pakistan also indicate that this practice is widespread, especially during home births.[25]

The objective of this study was to explore the use of oxytocin to augment labour pain during home births in an urban slum in Dhaka, Bangladesh, as part of the Manoshi programme. Manoshi is a 5-year project designed and implemented by BRAC, and funded by the Bill & Melinda Gates Foundation, to reduce maternal, neonatal, and child mortality and morbidity in the urban slums of Bangladesh. These findings will inform policy and programme decisions around the use of oxytocin and other uterotonics at the community level to ensure safe delivery and improved maternal outcomes.

Methods

This study was implemented in the KamrangirChar slum, Dhaka, Bangladesh, where the Manoshi programme has been working since March 2007. This slum was divided into seven segments, with a total population of 85 557. A quantitative cross-sectional study was conducted to assess intrapartum practices and behaviours.[28] Married women, aged 15–49 years, living in the KamrangirChar slum with a delivery at home or who underwent labour at home in the 6 months prior to the survey were eligible. Women who gave birth in a health facility or who did not undergo labour at home, who gave birth outside of the study area, or who died during delivery or in the immediate postpartum period were excluded.

The questionnaire was developed and pretested in a nearby slum area. Informal discussions with women, traditional birth attendants (TBAs) and other providers were conducted to obtain an overall understanding of their use of medicines to augment labour. The findings from these discussions were incorporated into the questionnaire. The questionnaire was then pretested on 15 women (women who reported using medicines to augment labour pain and those who reported not using medicines to augment labour pain in their last delivery). Questionnaires were finalised after pretesting. Throughout the data collection period, data collectors, supervisors and the study investigators met regularly to ensure data quality. Data were collected between September 2008 and March 2009. This article presents the results on the use of medicines to augment labour pain.

To validate the women's reports on the type of medication given during labour/delivery, all women who reported the use of medicine/oxytocin to augment labour pain were asked to provide the name and contact information of the provider. Ten percent of these providers were interviewed to validate the women's reports.

There are currently no accurate estimates of the proportion of women who receive oxytocin to augment labour pain during home births in Bangladesh. We therefore used an estimate of 50% to calculate the most conservative sample ($n = 384$). Given a nonresponse rate of 20%, we estimated that 480 subjects were required. As there was no household listing of women with recent deliveries in

KamrangirChar, the centre point of each of the seven segments was identified through informal discussions with Manoshi staff and community leaders. From this point, a bottle was spun and four trained male and female interviewers visited every household based on the direction of the bottle. In households in which eligible women were available, a structured interview was administered after obtaining consent. The structured questionnaire included information on demographic variables (age, education, parity, wealth, monthly household income, etc.), obstetric history, birth experience, use of medicines to augment labour pain, including oxytocin, reported delivery and neonatal complications, care-seeking behaviours and attitudes towards the use of medicines to augment labour. In addition, women were asked for detailed information on the providers who attended their delivery; this information was used for the validation interviews. A total of 463 interviews were completed. There were no refusals to participate, but, in two slum segments, we were unable to achieve the desired sample size given the inclusion criteria.

To validate women's responses on oxytocin use, twenty-seven VDs were interviewed using a structured questionnaire. VDs were selected according to availability and attendance of a delivery within 6 months of the interview.

Data analysis

Data were reviewed for accuracy, consistency and completeness, and were entered into Oracle 10 g. Associations between demographic, reproductive and attitudinal variables, and the use of oxytocin to augment labour pain, were examined using Pearson's chi-squared and/or Fisher's exact test for categorical variables and Kendall's tau test for ordinal variables. Bivariate and multivariate logistic regressions were used to test for significant predictors of oxytocin use. All analyses were conducted using SPSS 11.5 (SPSS Inc., Chicago, IL, USA).

Demographic variables included age, parity, wealth quintile, household monthly income, woman's education and husband's education. Wealth status was analysed using principal component analysis, based on ownership of the household, durable goods and dwelling characteristics, and divided into quintiles.[29] Monthly household income was divided into quintiles based on the distribution of responses. Reproductive variables included a knowledge of medicines to augment labour, antenatal care and reported prolonged labour (more than 12 hours). Women were also asked a series of questions on their attitudes towards the use of medicines to augment labour, employing a three-point scale (disagree, 1; agree, 2; strongly agree, 3). Statements were re-coded as 'yes' if the woman agreed or strongly agreed and 'no' if the woman disagreed, and explored in the bivariate analysis. Only one item, the attitude that using oxytocin during labour shortened labour duration and facilitated delivery, was significantly associated with the use of oxytocin during labour, and included in the final model ($P < 0.05$). Age and parity, and women's and their husband's education, were correlated ($r = 0.7488$; $r = 0.4676$, respectively); therefore, only parity and women's education were included in the final model. Wealth status and monthly household income produced similar findings, and only wealth status was included in the final model. To analyse validation data, agreement between women's and VDs' reports was examined.

Results

Background characteristics

The background characteristics are presented in Table 1. The majority of women were in their twenties with two to three children. Two-thirds of women and 60% of their husbands had some education. The majority of women reported knowledge that saline infusions and/or injections could augment labour pain. Eighty-eight percent of women had at least one antenatal care visit and 32% reported having a long labour (more than 12 hours). All women underwent labour at home, with 88% giving birth at home and 12% giving birth in a health facility. Almost all women were assisted by a TBA at home (data not shown). Of the 463 deliveries, there were 465 babies. Ninety-nine percent of the deliveries resulted in a live birth. There were four stillbirths. Of the 461 women with live births, 3.5% reported that their baby had trouble breathing at birth ($n = 16$). Of these 16 babies with trouble breathing at birth, two died (13%) (data not shown).

Women were asked about their attitudes towards the use of medicines during delivery to augment labour. The majority of women agreed or strongly agreed with the statements that medicines speed up/shorten labour duration and facilitate delivery (83%), that medicines to speed up labour can prevent hospital delivery (77%), and that medicines to speed up labour reduce maternal suffering (75%) (data not shown).

Use of oxytocin to augment labour

Of the 463 women interviewed, 202 (46.3%) reported the use of medicine or treatments to augment labour pain and accelerate delivery. Of these, 114 reported using herbal, spiritual or homeopathic remedies (56%), and 131 reported using syntocinon (Bangladeshi brand name for oxytocin). The women who reported using syntocinon (28.3% of total) were included in the final analysis. Table 1 examines the relationship between demographic, reproductive and attitudinal variables, and the use of oxytocin to augment labour. Women with any education, fewer births, knowledge of oxytocin use and who perceived long labour reported a significantly higher usage of oxytocin.

Table 1. Percentage distribution of background characteristics by use of oxytocin at home to increase labour, KamrangirChar slum, Dhaka, 2008

Characteristic	Total (*n* = 463)	Use of oxytocin to augment labour/ delivery		*P**
		Yes (*n* = 131)	No (*n* = 332)	
Demographic				
Age (years)				
15–19	14.9	18.3	13.6	0.186
20–24	36.9	42.0	34.9	
25–29	26.1	23.7	27.1	
30–34	14.3	9.9	16.0	
35+	7.8	6.1	8.4	
Woman's education				
None	36.1	23.7	41.0	0.000
Any education	63.9	76.3	59.0	
Husband's education				
None	41.9	39.7	42.8	0.546
Any education	58.1	60.3	57.2	
Wealth quintile				
Poorest	19.9	19.8	19.9	0.709
Second	20.1	20.6	19.9	
Middle	20.1	21.4	19.6	
Fourth	20.1	16.0	21.7	
Richest	19.9	22.1	19.0	
Parity				
1	28.7	43.5	22.9	0.000
2–3	45.4	37.4	48.5	
4+	25.9	19.1	28.6	
Reproductive				
Antenatal care (any provider)				
Yes	87.7	88.5	87.3	0.576
No	12.3	11.5	12.7	
Delivery place				
Home	87.7	86.3	88.3	0.557
Facility	12.3	13.7	11.7	
Reported long labour (>12 hours)				
Yes	32.0	48.1	25.6	0.001
No	68.0	51.9	74.4	
Knowledge and attitudes				
Knowledge on saline/injection to increase labour				
Yes	79.7	94.7	73.8	0.000
No	20.3	5.3	26.2	
Attitude that using oxytocin during labour shortened labour duration and facilitated delivery				
Yes	82.9	90.8	79.8	0.005
No	17.1	9.2	20.2	
Total	100.0	100.0	100.0	

*Pearson's chi-squared was used to calculate the *P* values for all variables except 'Attitude that using oxytocin shortened labour duration and facilitated delivery'. This *P* value was calculated using Kendall's tau test for ordinal variables.

Among women who reported the use of oxytocin to augment labour, all but one received oxytocin from a VD. The reasons for using oxytocin were to increase labour pain (97.7%), to deliver the baby more hurriedly/easily (54.2%) and to increase the woman's energy (29.8%). Almost all women received either one (84.0%) or two (13.7%) doses of oxytocin, with only three women reporting receiving three doses. Eighty-six percent of women reported receiving oxytocin through saline infusions, and 20.6% reported receiving an intramuscular injection. We asked about decisions from both the family and health provider side. For the family, the husband (45.8%) and woman's mother/father (16.8%) were the most commonly cited decision-makers, whereas TBAs and VDs were the most commonly cited decision-makers on the health provider side (91.6 and 44.3%, respectively) (Table 2).

All women reported that the TBA performed an examination before oxytocin was administered. This check-up included an assessment of cervical dilation (94.7%) and descent of the baby's head (65.6%) via internal vaginal examination. The position of the baby (65.6%) and fetal movement (41.2%) were also verified. In general, VDs relied on information from the TBA's examination prior to giving oxytocin (88.5%). They also checked the woman's blood pressure (98.1%). Only one woman reported that the VD checked the fetal heart beat (1.9%). The first dose of oxytocin was given within 24 hours of the onset of labour pain for three-quarters of the women, and 45.8% of women reported receiving a second dose <1 hour after the first dose. For 50% of the women, the baby was born within 30 minutes of the last dose of oxytocin.

Nineteen women who reported using oxytocin were referred to a facility (14.5%). Self-reported reasons for referral included prolonged/obstructed labour (11), eclampsia/convulsions (3), premature rupture of membranes (2), failed induction (1) and others (2). Most women were referred to a government referral facility (6) or to a private hospital (13). Of the four women with stillbirths, one woman had used oxytocin during labour. Among the women with live births who reported oxytocin use, 4.6% reported that their baby had trouble breathing after birth, compared with only 3.0% of babies whose mothers did not report using oxytocin to augment labour.

Multivariate analysis

In the multivariate logistic regression, women with any education were two-fold more likely to use oxytocin (OR, 1.91; 95% CI, 1.12–3.27), and women with two or more deliveries were almost 70% less likely to use oxytocin (OR, 0.34; 95% CI, 0.20–0.57). Women with a knowledge of using saline/injections to augment labour were 9.5 times more likely to use oxytocin (OR, 9.5; 95% CI, 4.07–22.16), and those who reported a long labour were 2.4 times more

Table 2. Characteristics of oxytocin use at home, KamrangirChar slum, Dhaka, 2008 (n = 131)

Characteristic	% (n = 131)
Reason for oxytocin	
To increase labour pain	97.7
To increase energy of mother	29.8
Easier to give medicine at home	0.8
To deliver the baby hurriedly/easily	54.2
To prevent hospital delivery/hospital cost/cost for caesarean section	3.8
To reduce maternal suffering	3.8
Number of doses given	
1	84.0
2	13.7
3	2.3
Type of TBA check-up before giving oxytocin	
How much the cervix was dilated	94.7
Descent of baby's head	65.6
The position of the baby (mal position)	65.6
Fetal movement	41.2
To check intrapartum complications (fever, bleeding, etc.)	13.0
Type of VD check-up before giving oxytocin (n = 105)	
Measurement of blood pressure	98.1
Measurement of temperature	4.8
The position of the baby (mal position)	3.8
Fetal heart beat	1.9
How many hours taken to give first dose of saline/injection after labour pain start (hours)	
<12	56.5
12.1–24	23.7
24.1–36	8.4
36+	9.2
Don't know	2.3
How many hours taken to deliver after last dose (hours)	
<1	68.7
1.01–2	14.5
2+	16.8

TBA, traditional birth attendant; VD, village doctor.

Table 3. Unadjusted and adjusted odds ratios of using oxytocin to increase labour at home, KamrangirChar slum, Dhaka, 2008

Characteristic	Unadjusted OR	95% CI	Adjusted OR	95% CI
Demographic				
Woman's education				
None	1.00		1.00	
Any education	2.24**	1.42–3.54	1.91*	1.12–3.25
Parity				
1	1.00		1.00	
2–3	0.41**	0.25–0.65	0.34**	0.20–0.59
3+	0.35**	0.20–0.61	0.35**	0.18–0.68
Wealth quintile				
Poorest	1.00		1.00	
Second	1.03	0.55–1.96	1.02	0.50–2.10
Middle	1.09	0.58–2.06	0.84	0.41–1.73
Fourth	0.74	0.38–1.44	0.68	0.33–1.43
Richest	1.17	0.62–2.20	0.87	0.42–1.80
Reproductive				
Antenatal care (any provider)				
No	1.00		1.00	
Yes	1.12	0.60–2.10	0.62	0.30–1.28
Perceived labour pain >12 hours				
No	1.00		1.00	
Yes	2.69**	1.77–4.11	2.44**	1.52–3.90
Knowledge and attitudes				
Knowledge on saline/injection to increase labour				
No	1.00		1.00	
Yes	6.29	2.83–13.99	9.50**	4.07–22.16
Attitude that using oxytocin during labour shortened labour duration and facilitated delivery				
No	1.00		1.00	
Yes	2.51**	1.31–4.81	2.94**	1.44–6.00

CI, confidence interval; OR, odds ratio.
*P < 0.05.
**P < 0.01.

likely to use the medicine (OR, 2.4; 95% CI, 1.52–3.90). Positive attitudes about oxytocin use were also significantly associated with oxytocin use (OR, 2.9; 95% CI, 1.44–6.00) (Table 3).

Validation of women's reports

In the validation exercise, twenty-seven VDs were interviewed. Of these 27 VDs, 25 reported that they remembered the woman and her delivery. Of these 25 cases, there was agreement between the VD and the woman on the administration of oxytocin to augment labour in 22 cases (88%). Of the three cases in which disagreement occurred, women reported receiving oxytocin from the VD while the VD reported refusal to give oxytocin and referral to the health facility in two cases. In the third case, the woman reported receiving oxytocin, and the VD reported giving only a saline infusion.

Discussion

Almost one-third of women in KamrangirChar slum who had a trial of labour at home used oxytocin to augment labour pain in an effort to accelerate delivery. Women with any education and of lower parity were more likely to use oxytocin, controlling for other factors. These findings are similar to those of other studies in India, where the use of oxytocin at home births varies from 15 to 69%.[20,25,26,30–32] In addition, women who reported a long labour (more than 12 hours) and with a knowledge of and positive attitudes towards oxytocin were significantly more likely to

use oxytocin to augment their labour pain. Fifteen percent of women who used oxytocin at home were referred to a health facility. Among women who reported the use of oxytocin to augment labour, there was one stillbirth and six cases in which the baby had trouble breathing at birth.

We did not see an association between the use of oxytocin and wealth status. We ran the analysis replacing wealth status with monthly household income, but this variable was also not significant. In south India, women who are from higher wealth quintiles are more likely to use oxytocin to augment labour.[26] In this urban population, this association was not significant, which may be a result of the fact that all households are relatively poor.

The knowledge of the use of oxytocin to augment labour and positive attitudes towards oxytocin use were pervasive in this community. As a result of the cross-sectional nature of the data, we cannot assess whether knowledge and attitudes towards oxytocin use developed before or after the woman's delivery, which is a limitation of this study. Therefore, these results should be interpreted with caution because of reverse causality. Another potential limitation of this study is recall bias if interviewed women were not able to recall the type of medicine they received. We tried to minimise this bias by limiting the recall period to 6 months, as well as validating responses for 10% of the survey respondents. There may have been some selection bias as women with higher education may have been more likely to remember/recognise oxytocin. We could not explore associations between oxytocin use and maternal deaths, as maternal deaths were excluded from the sample. Finally, because of the difficulties in mapping urban slum populations, we were unable to systematically identify all births (live and stillbirths) in the study area. Consequently, the four stillbirths reported in this study are less than that expected.[33] There are many limitations to accurately capturing stillbirth rates,[34] and this study was not designed to measure associations between oxytocin use and adverse health outcomes.

The findings from this study indicate that oxytocin administered at home to augment labour pain is relatively common in the urban slums of Bangladesh. A recent literature review of home-based birth has demonstrated that oxytocin use to augment labour is common in South Asia, but does not exist in sub-Saharan Africa.[35] The high level of agreement in the validation exercise suggests that women can reliably report medications given during labour and delivery. The apparent willingness of women, TBAs and VDs to openly discuss oxytocin use to augment labour suggests no awareness that this is a discouraged practice in home settings. On the contrary, respondents were very open about discussing oxytocin use, which indicates that there may be limited knowledge about the potential adverse outcomes of this practice. Unfortunately, we did not ask whether oxytocin had been used in previous deliveries, but women may be using oxytocin for multiple deliveries.

These findings have implications for the development and testing of health education messages for women, family members, TBAs and VDs relating to the potential harmful effects of oxytocin use to augment labour pain during home births, and the evaluation of the effectiveness of these messages in changing behaviours. Additional qualitative research is needed to assess the basis of the norm around oxytocin use, how it has developed and has changed over time, the dynamics around decision making for the use of oxytocin during home deliveries, and the knowledge and/or experiences with adverse outcomes and how these experiences shape future behaviour. In addition, it is essential to examine the association between the use of oxytocin and adverse maternal and neonatal outcomes. This is especially important in slum areas in which neonatal and infant mortality is higher than in rural areas.[3] It is also important to test the chemical potency of the oxytocin being administered, as we did not examine how VDs stored the drugs in this study.

Oxytocin and other uterotonics are invaluable obstetric medicines when used appropriately. They are effective at preventing and treating postpartum haemorrhage at home (in the form of misoprostol) and by skilled providers at home or in a facility (in the form of injectable oxytocin and/or ergometrine).[36–40] However, no evidence is available from controlled trials about the clinical benefit of labour augmentation with oxytocin, even in facility settings, other than the acceleration of the second stage,[41,42] nor is there any evidence regarding the benefit of administration of oxytocin to augment labour during home births by UAPs. This practice can only result in adverse outcomes for both the woman and her child. Therefore, it is crucial to start anti-oxytocin campaigns to prohibit its use during childbirth at the home level. The Government of Bangladesh currently plans to scale up misoprostol to prevent postpartum haemorrhage at the community level, and it will be crucial to monitor whether misoprostol is also used to augment labour during home births.

Disclosure of interests

The authors have no competing interests.

Contribution to authorship

AM contributed to the finalisation of the study protocol, ensured ethical approval, supervised and managed data collection and entry, conducted the majority of data analysis and drafted the manuscript. TW supervised all data collection, entry and cleaning and conducted preliminary data analysis. She also conducted the literature review and provided feedback and input into the final manuscript. KA contributed to the development and finalisation of the

study protocol, gave insights into the implementation of the study and reviewed the manuscript.

Details of ethics approval

This study was approved by the Ethical Review Committees of the International Centre for Diarrhoeal Disease Research Bangladesh on 14 September 2008, Reference number 2008-030. All respondents gave written informed consent prior to enrolment in the study.

Funding

Funding for this study was provided by the Bill & Melinda Gates Foundation as part of a subcontract from BRAC to the International Centre for Diarrhoeal Disease Research Bangladesh. The corresponding author was supported by PATH's Oxytocin Initiative to draft and finalise the manuscript.

Acknowledgements

This research study was funded by BRAC's Manoshi Project which received grants from the Bill & Melinda Gates Foundation. The International Centre for Diarrhoeal Disease Research Bangladesh acknowledges with gratitude the commitment of BRAC and the Bill & Melinda Gates Foundation to the Centre's research efforts. The authors acknowledge Dr Malay Kanti Mridha for his assistance with the original protocol and pretesting of the questionnaire, and Taslima Amin, Nasrin Akter, Monoz Kumar Edbor and Nilufa Akter for data collection, data entry and data cleaning. They would also like to thank Dr Cynthia Stanton for her comments on previous drafts of the manuscript. They also acknowledge all respondents who participated in this study, and the BRAC Manoshi programme, especially the field workers, who were invaluable to the successful completion of this study. ■

References

1 National Institute of Population Research and Training (NIPORT), Mitra and Associates, Macro International. *Bangladesh Demographic and Health Survey 2007*. Dhaka and Calverton, MD: National Institute of Population Research and Training, Mitra and Associates, and Macro International, 2009.

2 Centre for Urban Studies, Measure Evaluation, National Institute of Population Research and Training (NIPORT), United States Agency for International Development (USAID). *Slums of Urban Bangladesh Mapping and Census 2005*. Dhaka: Centre for Urban Studies, 2006.

3 National Institute of Population Research and Training (NIPORT), MEASURE Evaluation, International Centre for Diarrhoeal Disease Research, Bangladesh (ICDDR,B), and Associates for Community and Population Research (ACPR). *2006 Bangladesh Urban Health Survey*. Dhaka, Bangladesh and Chapel Hill, NC, USA: NIPORT, MEASURE Evaluation, ICDDR,B, and ACPR, 2008.

4 Ahmed SM. *Exploring Health-Seeking Behaviour of Disadvantaged Populations in Rural Bangladesh*. Stockholm: Karolinska Institutet, 2005.

5 Ahmed SM, Hossain MA, Chowdhury MR. Informal sector providers in Bangladesh: how equipped are they to provide rational health care? *Health Policy Plan* 2009;24:467–78.

6 Harding A. Introduction to private participation in health services. In: Harding A, Preker AS, editors. *Private Participation in Health Services*. Washington, DC: The World Bank; 2003. pp. 11, 100.

7 Kumar S. Much health care in rural India comes from unqualified practitioners. *Br Med J* 2004;328:975.

8 Patil AV, Somasundaram KV, Goyal RC. Current health scenario in rural India. *Aust J Rural Health* 2002;10:129–35.

9 Darmstadt GL, Syed U, Patel Z, Kabir N. Review of domiciliary newborn-care practices in Bangladesh. *J Health Popul Nutr* 2006;24:380–93.

10 Radwan I. *Private Health Services for the Poor – A Policy Note*. Washington DC: The World Bank, 2005.

11 Drishipath. *Fake Drugs Flood Bangladesh*. http://www.sos-arsenic.net/english/environment/fake-med.html, 2004. Last accessed 22 August 2010.

12 Bangladesh Health Watch. *Health Workforce in Bangladesh: Who Constitutes the Healthcare System? The State of Health in Bangladesh 2007*. Dhaka: James P Grant School of Public Health, BRAC University, 2008.

13 Parkhurst JO, Rahman SA. Non-professional health practitioners and referrals to facilities: lessons from maternal care in Bangladesh. *Health Policy Plan* 2007;22:149–55.

14 Bidgood KA, Steer PJ. A randomized control study of oxytocin augmentation of labour. 1. Obstetric outcome. *BJOG* 1987;94:512–7.

15 Dhaifalah I, Santavyb J, Fingerova H. Uterine rupture during pregnancy and delivery among women attending the Al-Tthawra Hospital in Sana'a City, Yemen Republic. *Biomed Pap Med Fac Univ Palacky Olomouc Czech Repub* 2006;150:279–83.

16 Hertog Cd, Groot ANJAd, Dongen PWJv. History and use of oxytocics. *Eur J Obstet Gynecol Reprod Biol* 2001;94:8–12.

17 Smith J, Merrill D. Oxytocin for induction of labor. *Clin Obstet Gynaecol* 2006;49:594–608.

18 Phillip H, Fletcher H, Reid M. The impact of induced labour on postpartum blood loss. *J Obstet Gynaecol* 2004;24:12–5.

19 Oscarsson M, Amer-Wåhlin I, Rydhstroem H, Källén K. Outcome in obstetric care related to oxytocin use. A population-based study. *Acta Obstet Gynecol Scand* 2006;85:1094–8.

20 Iyengar SD, Iyengar K, Martines J, Dashora K, Deora K. Childbirth practices in rural Rajasthan, India: implications for neonatal health and survival. *J Perinatol* 2008;28:23–30.

21 Merrill DC, Zlatnik F. CME: Oxytocin for induction and augmentation of labor. *Contemporary Ob/Gyn* 2000;6:120–31.

22 Zheng QL, Zhang XM. Analysis of 39 cases of maternal deaths caused by incorrect use of oxytocin. *Zhonghua Fu Chan Ke Za Zhi* 1994;29:276–7, 316–7.

23 World Health Organization. *Care in Normal Birth: A Practical Guide*. Geneva: World Health Organization, 1996.

24 World Health Organization. *Induction and Augmentation of Labour. Managing Complications in Pregnancy and Childbirth: A Guide for Midwives and Doctors*. Geneva: World Health Organization, 2003.

25 Jeffery P, Das A, Dasgupta J, Jeffery R. Unmonitored intrapartum oxytocin use in home deliveries: evidence from Uttar Pradesh, India. *Reprod Health Matters* 2007;15:172–8.

26 Sharan M, Strobino D, Ahmed S. Intrapartum oxytocin use for labor acceleration in rural India. *Int J Gynecol Obstet* 2005;90:251–7.

27 van Hollen C. Invoking vali: painful technologies of modern birth in south India. *Med Anthropol Q* 2003;17:49–77.

28 Wahed T, Moran AC, Iqbal M. Intrapartum care seeking and practices of unqualified allopathic practitioners in Kamrangir Char Slum in Dhaka. *BMC Pregnancy Childbirth*; in press.

29 Ahsan KM, Streatfield PK, Ahmed SM. *Manoshi: Community Health Solutions in Bangladesh – Baseline Survey in Dhaka Urban Slums*. Dhaka: International Centre for Diarrhoeal Disease Research Bangladesh and BRAC, 2007.

30 Caleb L. *Women's Health in the Postpartum Period and the Influence of Infant Gender on Postpartum Practices in a Low-Income Community in Delhi, India*. Baltimore, MD: Johns Hopkins School of Hygiene and Public Health, 1995.

31 Jeffery P, Jeffery R, Lyon A. *Labour Pains and Labour Power: Women and Childbearing in India*. London: Zed Books, 1989.

32 Matthews Z, Ramakrishna J, Mahendra S, Kilaru A, Ganapathy S. Birth rights and rituals in rural south India: care seeking in the intrapartum period. *J Biosoc Sci* 2005;37:385–411.

33 Stanton C, Lawn JE, Rahman H, Wilczynkda-Ketende K, Hill K. Stillbirth rates: delivering estimates in 190 countries. *Lancet* 2006;367: 1487–94.

34 Lawn JE, Gravett MG, Nunes TM, Rubens CE, Stanton C, GAPPS Review Group. Global report on preterm birth and stillbirth (1 of 7): definitions, description of the burden and opportunities to improve data. *BMC Pregnancy Childbirth* 2010;10(Suppl. 1):S1.

35 Flandermeyer D, Stanton C, Armbruster D. Uterotonic use for home births in low-income countries: a literature review. *Int J Gynaecol Obstet* 2010;108:269–75.

36 Villar J, Gulmezoglu AM, Hofmeyr GJ, Forna F. Systematic review of randomized controlled trials of misoprostol to prevent postpartum hemorrhage. *Obstet Gynecol* 2002;100:1301–12.

37 Hofmeyr J, Walraven F, Gulmezoglu AM, Maholwana B, Alfirevic Z, Villar J. Misoprostol to treat postpartum hemorrhage: a systematic review. *BJOG* 2005;112:547–53.

38 Derman RJ, Kodkany BS, Goudar SS, Geller SE, Naik VA, Bellad MB, *et al.* Oral misoprostol in preventing postpartum hemorrhage in resource-poor communities: a randomized controlled trial. *Lancet* 2006;368:1248–83.

39 Prata N, Sreenivas A, Vahidnia F, Potts M. Saving maternal lives in resource-poor settings: facing reality. *Health Policy* 2009;89:131–48.

40 World Health Organization. *WHO Recommendations for the Prevention of Postpartum Hemorrhage*. Geneva: World Health Organization, 2007.

41 Royal College of Obstetricians and Gynaecologists (RCOG). *Induction of Labour. National Evidence-Based Clinical Guideline Number 9*. London: RCOG Press, 2001 [www.rcog.org.uk].

42 Harrison K, Read MD, Woodman NM. Current practice for induction of labour in the United Kingdom: time for a review? *J Obstet Gynaecol* 2003;23:138–42. (Reprinted in *MIDIRS Midwifery Digest* 2003;13:350–3.)

