

Consequences of Near-Miss Obstetric Complications in Burkina Faso: Initial Insights and Further Questions

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Introduction:

In recent years, safe motherhood evaluations and epidemiological studies have highlighted the usefulness of studying life-threatening maternal morbidity – or near-miss obstetric events – as a complement to maternal mortality, primarily because they are easier to measure and reveal additional information about protective risk factors on the pathway to survival (Filippi, Alihonou et al. 1998). Near-miss maternal events are complications in pregnant or recently delivered women that are so severe that they threaten the woman's immediate survival (Mantel, Buchmann et al. 1998). These complications include the main causes of maternal mortality including severe haemorrhage, infection, pregnancy-related hypertension, obstructed labour and complications related to unsafe abortion, and are often associated with emergency procedures such as hysterectomy and also with foetal death. "Near-miss" complications are extremely common: in Benin, near-miss events are estimated to be ten times more frequent than maternal deaths and in South Africa five times more common (Filippi, Alihonou et al. 1998; Mantel, Buchmann et al. 1998). While epidemiological estimates may indicate the magnitude of the problem, to date we know remarkably little about further problems experienced by women who survive such near-miss complications in the world's poorest countries. It is clear, however, that these events occur in specific socio-cultural contexts that place some women at disproportionate risk not only of experiencing a near-miss complication, but also of suffering from the health and social complications associated with surviving a severe obstetric emergency. Anthropologists have shown that infertility and pregnancy loss often associated with severe reproductive difficulties have adverse social consequences for women in diverse settings, especially where a woman's identity and value are defined by her fertility (Inhorn 1994; Bledsoe 2002).

In this study, we hypothesise that near-miss complications are likely to be associated with long-term health and social consequences. We also hypothesise that the determinants of near-miss events and the consequences experienced by women will depend in part on the type of near-miss complication experienced by the woman. In particular, we expect that there will be differences in the experiences of those women whose pregnancies

have ended in a live birth, and those whose pregnancies have ended in a stillbirth, miscarriage or abortion.

This paper reports on the early findings of an ongoing cohort study in Burkina Faso, which tries to address the determinants and consequences of near-miss morbidity. While it focuses on the analysis of the quantitative instruments, both the design of the quantitative instruments and the interpretation are very much informed by anthropological insights. We will examine some of the social and gender-related determinants of near-miss complications, as well as some of the early indications of economic and social consequences of such complications. In particular, we will present a comparative analysis of women who have experienced near-miss complications in the context of the birth of a living baby, with women who experienced a near-miss complication in the context of early pregnancy loss (due to miscarriage, abortion or ectopic pregnancy) or a stillbirth.

Methods

Study Setting

Burkina Faso is a landlocked Francophone country in West Africa. It is one of the poorest countries in the world ranking 95th among 95 countries for the United Nations Human Poverty Index and 175th out of 177 countries according to the Human Development Index (HDI) (United Nations Development Program 2004). In 2002, life expectancy at birth in Burkina Faso was 45.8, combined primary, secondary and tertiary education gross enrolment ratio was 22 percent and GDP per capita (PPP US\$) was 1,100 (United Nations Development Program 2004). Estimates of maternal mortality levels vary. According to one source, Burkina women's lifetime risk of maternal death is 1 in 9 and maternal mortality ratio (MMR), the number of maternal deaths per 100,000 live births, is about 1,400 (Hill, AbouZahr et al. 2001).

Recruitment

Recruitment of participants took place from seven national, regional and district-level maternity units in six socio-demographic areas: Ouagadougou; Bobo-Dioulasso; Tenkodogo; Dédougou; Nouna and Houndé. These include large urban and smaller peri-urban centres in the west, north-west and centre of the country and represent a variety of ethnic groups, in particular the Mossi, Bobo, Dioula, Peuhl, Bwaba and Dafing.

The recruitment of all participants living within 25 km to 30 km of the recruitment centres was carried out by specially trained midwives and doctors working in the hospitals between December 2004 and March 2005. The radius of 25-30km was applied to secure good access to *all* participating women's homes; the recruiting hospitals were far away from each other, and it was not feasible within our resources constraints to organise or pay for the follow-up of women living further away. It would also enable us to minimise

differences between near-miss and normal women. Women were recruited in hospitals because it is not possible to determine with sufficient accuracy if a woman had a severe obstetric complication if she had not used services (Stewart and Festin 1995; Ronsmans, Achadi et al. 1997; Filippi, Ronsmans et al. 2000). A total of 1020 women with and without near-miss complications accepted to participate in the study. There were only 12 refusals.

Study design

The study is an on-going prospective cohort study, following women from the end of the pregnancy to one year postpartum. Women were contacted by the interviewer at the hospital and accompanied to their homes, while a health provider prepared a summary of their medical records. Then they are interviewed at home four times: within a week of discharge (the exit interview), and at 3, 6 and 12 months after the end of pregnancy. Health examinations will also be carried out at 6 and 12 months after the end of pregnancy. Repeated in-depth interviews and observations with a sub sample of 50 of the women and their husbands are taking place in parallel with the quantitative data collection. This paper presents data from the quantitative exit interview at home shortly after discharge and from the medical records of women. It is thus a preliminary analysis of baseline data, which will be later supplemented with follow-up data analyses. It considers only the women with near-miss complications; contrasts with the 'control' women with normal births will be presented in later reports.

Case definitions

The women with near-miss complications who are included in this study suffered from a variety of complications, including severe anaemia, massive bleeding, eclampsia, sepsis, uterine rupture, abortion and ectopic pregnancy.

Operational definitions were developed during a workshop in Burkina Faso, attended by obstetricians, midwives, public health doctors, epidemiologists and social scientists and are available on request. Women were classified as near-miss when they had signs of extreme clinical severity, such as signs of shock or a major obstetric intervention such as hysterectomy for bleeding. Three groups of near-miss women were distinguished: those with live births, still births and early pregnancy loss. The early pregnancy loss group included women who had experienced a near-miss event associated with induced abortion, miscarriage or ectopic pregnancy. These different causes of early pregnancy loss were treated within the same group since the numbers of subjects within each subgroup was insufficient for a more stratified analysis. Induced abortion was identified on the basis of WHO probabilistic criteria (WHO, 1996).

Instruments

The exit interview was conducted using a structured questionnaire, comprising standardised questions adapted for the Burkina Faso context. The questionnaire include questions extracted from the DHS questionnaire on marital status, contraception, reproduction, poverty (Institut National de la Statistique et de la Démographie (INSD) and Macro International 2000) and questions specifically developed for this study on the basis of anthropological fieldwork. The exit interviews were usually administered within a week of the end of the pregnancy.

Information from medical records were summarised in a structured instrument and included the woman's medical history, risk factors, signs and symptoms, treatments and medical interventions, mode of delivery and information on the baby's health status.

Statistical analysis

The analysis was conducted on the 336 women with near-miss complications. The percentage breakdown by socio-economic and other characteristics is presented for the three groups of women who experienced a near-miss complication, according to pregnancy outcome. Women who had near-miss complications and non-live births (stillbirths and early pregnancy loss) are compared with women who had near-miss complications with a live birth. Odds ratios for the impact of selected characteristics and risk factors are shown unadjusted and adjusted for socio-economic and other potential confounders¹. Adjusted odd ratios were obtained by multiple logistic regression. Adjustment for age in five year groups, gravidity as 1, 2-4 and above, martial status as single / with partner / monogamous and polygamous married, plus household electricity, radio and water source.

Results

Recruitment

Most women (61%) were recruited in Ouagadougou and Bobo-Dioulasso and their surrounding areas, because these recruitment sites serve as third level referral hospitals for surrounding health centres. The breakdown by type of near-miss differed strongly by hospital of recruitment ($p < 0.001$), with an excess of early pregnancy losses in Houndé, Nouna and Tenkodogo, centres that served smaller peri-urban populations within their general catchment areas (table 1). The majority (66%) of near-miss women had a live birth. The exit interviews were on average conducted within a week after delivery or the end of pregnancy.

Clinical characteristics of near-miss women

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About three-quarters (77%) of all women with near-miss complications were admitted in a near-miss condition – that is in a moribund condition on admission (table 2). Women with early pregnancy loss and stillbirth were more likely to be classified as near-miss on admission than were women who had a near-miss complication with a live birth (table 3).

The most important underlying obstetric diagnoses were haemorrhage followed by anaemia and dystocia. Women who had near-miss complications with early pregnancy loss were more likely to have near-miss haemorrhage than the other two groups. Women with near-miss complications and stillbirths were more likely to have rupture of the uterus and puerperal infections than were women with near-miss complications with live births. The Caesarean section rate was 34% among women who reached the third term of pregnancy, and the intervention was more frequent among women with near-miss complications and live births (39%) than among women with a near-miss complication and a stillbirth.

Among women with near-miss complications and early pregnancy loss, 25% were classified with a confirmed or probable induced abortion; the remaining 75% of the women in this group were diagnosed with a spontaneous abortion or ectopic pregnancy.

Demographic and marital characteristics of near-miss women

The mean age of women was around 25-26 years and there was no significant difference in age between the three groups of women. Approximately one third of women had experienced one pregnancy. Women with near-miss complications and early pregnancy loss were less likely to be primigravid than were women with near-miss complications and live births. About 42% of near-miss women with live births and 56% of near-miss women with non-live births had no education.

Women who experienced near-miss complications of early pregnancy loss were more likely than women in the other two groups to be single rather than married. Also, within this group, married women were more likely to be in a polygamous marriage, but arranged marriage was approximately equally distributed. There were no significant differences in marital status between women who experienced a near-miss complication with live births or stillbirths.

Male partners of women with near-miss complications and early pregnancy loss were more likely to be involved in the decision to refer the woman to the recruitment centre. Women with near-miss complications and stillbirth were more likely to have been referred by a health worker and from another facility than were women with near-miss complications and live births.

Economic characteristics of near-miss women

Type of household water source is strongly associated with near-miss stillbirth and early pregnancy loss. Borehole water in particular is much more common

among these two groups than among near-miss women with live birth and the significance remains after adjustment. There were no significant differences between type of near-miss and amount of food during pregnancy and presence of latrine after adjustment.

Near-miss women with early pregnancy loss report more involvement in decision making about spending but this difference is only borderline significant after adjustment (unadjusted OR=4.51, 95% 1.33-15.34; adjusted OR= 4.63, 95% CI 0.94,22.81) .

The mean reported cost of treatment was lower for women with near-miss complications with early pregnancy loss than it was for women with near-miss complications and live birth (P=0.004). Women with near-miss complications and early pregnancy loss and stillbirth were more likely to report difficulties in paying for treatment, but this effect disappears after adjustment for confounders.

Psycho-social status of near-miss women

Women with near-miss complications and stillbirths were more likely to report finding the delivery difficult than were women with a near-miss complication and a live birth

Women who experienced a near-miss complication with an early pregnancy loss were much more likely to attribute the event to family problems and poor medical supervision than were women who experienced a near-miss complication with live birth.

Women with near-miss complications and stillbirth were less likely than women with near-miss complications and live births to cite return to work and sufficient money as very important in recuperating from the pregnancy. Women with near-miss complications and early pregnancy loss were more likely than women with near-miss complications and live births to consider friends with whom to talk as very important in aiding recuperation following a pregnancy, even when controlling for marital status and other socio-economic variables. Women in both groups with non-live births were more likely to report having had an unhappy relationship with their male partner during the pregnancy, although the associations were of borderline significance and became non-significant after adjustment.

Finally, near-miss women with early pregnancy loss were more than six times more likely to want another child than near-miss women with a live birth after adjustment. Near-miss women with a stillbirth have also reported an increased desire for another child but this is borderline significant.

Induced abortion

The numbers were too small to support meaningful analysis of abortion categorised as induced/probably induced and miscarriage, although in

univariate analyses, women with induced/probably induced abortion were more likely than women with miscarriage to be single (OR=10.50, 95% CI 1.47, 74.86, P=0.003) and were less likely to have attended a prenatal consultation (OR=0.18, 95% CI 0.03, 0.92, P=0.04). (Data not shown)

Discussion

Our analysis compares women who have experienced near-miss complications associated with three different types of pregnancy outcome: live birth, stillbirth and early pregnancy loss due to miscarriage, ectopic pregnancy or induced abortion. The analysis shows clear socio-economic and psychosocial differences between women with non-live births and women with live births, as indicated by gravidity, source of household water, education and marital status. Those women who had near-miss complications associated with early pregnancy loss showed the most pronounced differences in comparisons with women who had experienced a near-miss complication with a live birth. Although the analysis is based on base line data collected shortly after the end of pregnancy, we expect that follow-up analyses will reveal continuing differences in the consequences experienced by women in these three groups, as indicated in initial differences in psychological stresses. It remains to be explored in more details why the experience of women with near-miss complications and early pregnancy loss and those who had a near-miss complication with a live birth differ to the extent found here.

The sample

The sample included in the study may underestimate the range of severity of consequences of near-miss morbidity, since only those women living in relatively close proximity to health centres were included. It is possible that the social and economic determinants and consequences for women living in more remote areas with poorer access to health care will differ substantially from those experiences by women in our sample. The study found only 16 women with a near-miss complication attributed or probably related to an induced abortion. We assume that this is an underestimate of the proportion of the group of women who experienced near-miss complication with early pregnancy loss and that a proportion of the women classified as having had a miscarriage had in fact had an induced abortion. This is supported by the finding that miscarriages seldom lead to life threatening events (Faser 2001). Because induced abortion is illegal in Burkina Faso, it is likely that such events are underreported.

Determinants

There is a strong association with water from a borehole for being in the near miss group with non-live births which remains after adjustment for potential confounders. This may reflect lower socioeconomic status and/or greater distance from hospital in these communities with consequent later arrival at

the hospital. We have not data on general environmental aspects but boreholes are drilled in rural areas where other sources of water are problematic and this would indicate more difficult access.

The finding that women with near-miss complications related to early pregnancy loss are more likely to be recruited in the small urban centres may indicate that primary or secondary prevention of severe complications in early pregnancy is more effective in the largest towns in the country.

It may seem counterintuitive that women with early pregnancy losses are more likely to have experienced a pregnancy than women with a live birth. It may be related to biological mechanisms with miscarriages being more common in high rank pregnancies.

Polygamy and arranged marriage show a definite relationship with the occurrence of near-miss complications (data not shown). The fact that associations with these indicators of low marital status are apparent between different types of near-miss is noteworthy, and requires further investigation.

Male partners of women with near-miss complications and early pregnancy loss were more likely to have been involved in the decision to seek treatment at a hospital than were the partners of near-miss live birth cases. This may reflect that male partners are instrumental in making decisions about induced abortion or more generally uptake of care, although the small number of women with ascertained induced abortion included in the sample is too small to verify the former hypothesis. The role of male partners in health seeking patterns, both those pertaining to abortion and to other pregnancy events, warrants further investigation. In the case of near-miss complications and early pregnancy loss, health workers were less likely to have been involved in referral than were women with near-miss complications and live births. However, many women in the early pregnancy loss group appear to have had a miscarriage and these may have delayed seeking care at the hospital while waiting for the situation to resolve itself. More simply, these women were less likely to be enrolled on the health system (antenatal care) because enrolment tends to occur late in pregnancy and miscarriage or termination early in pregnancy. This is reinforced by the finding that women with near-miss complications and early pregnancy loss were less likely to have used antenatal care services.

Women who experienced a near miss complication with a stillbirth were in a more critical state when arriving at the hospital than were near-miss women with a live birth. For instance, they were more likely to have uterine rupture, which is related to lengthy labour. There are clear indications in our data that this may be related to lengthy referrals, as these women are also more likely to have been referred from another facility and by a health worker.

Early indications of possible consequences

It is known that the experience of a near-miss complication is associated with high costs borne by the woman and her family, especially in contexts where user fees finance health services, as is the case in Burkina Faso. In neighbouring Benin, for example, women who experience near-miss complications and their families spent up to 26% of the average annual household expenditure on hospital care (Borghini, Hanson et al. 2003; Filippi, Brugha et al. 2004). In-depth interviews in the immediate post-partum period with women who have experienced near-miss complications revealed not only substandard hospital care, but also the complex social factors surrounding the management of the events, such as the husband's role in negotiating care-seeking (Béhague, Kanhonou et al. under review). This research, along with our own epidemiological and anthropological research, is revealing that such high costs are associated not only with immediate difficulty paying for the treatment of complications and the accumulation of debt, but also to economic and social difficulties, sometimes due to the affected woman being blamed for overstressing the financial capabilities of their families.

The mean cost of treatment for near-miss complications of women associated with early-pregnancy loss is less than that associated with near-miss complications and live birth. This could be because of costs associated with the types of high-tech procedures (e.g. caesarean section and hysterectomy) performed for women with pregnancies at term, but not performed for women whose pregnancy terminates early. It could also be due to the severity of the complication and the length of the recovery, as well as the added cost of treatment for the child for those women who had a live birth.

Women with a near-miss complication and stillbirth were more likely to report difficulties paying for treatment. However this effect disappears after adjustment for socio-economic confounders. This supports the hypothesis that these women were poorer than the other women in the sample.

Because the instrument we used is unable to pick up on subtle differences in payment behaviour it is difficult to reach conclusions about the impact of cost. However, this will be studied further in the follow-up study.

Psycho-social well-being

Perhaps not surprisingly, there are indications that women who have experienced a near-miss complication with a non-live birth (stillbirth or early pregnancy loss) may experience different psycho-social predispositions and problems than women who have experienced similar complications but have given birth to a living child. For instance, these women are more likely than the other women in the sample to report problems with partners during pregnancy. It is possible that the poor relationship during pregnancy can help to explain why the negative birth outcome occurred; a less satisfactory relationship with a male partner during pregnancy may also be associated with less support and less access to health services, especially if men control decision-making and finances relating to health care. The findings may also, however, reflect that the group of women with non-live birth outcomes

includes women with induced abortion. There is reason to assume that induced abortion indicates that the relationship between the woman and her partner during the pregnancy is unsatisfactory to the woman, but, as a result of the small number of women in the sample with induced abortion, it is difficult to reach conclusions about the role of factors relating to induced abortion. Since the question about the quality of the marital relationship during pregnancy was posed to women following the end of the pregnancy, it could also be a retrospective attribution due to the fact that she was disappointed with the way in which the pregnancy ended.

The strong desire for another child expressed by those women in the sample who experienced early pregnancy loss could be explained by a desire among these women to replace the lost child with a new pregnancy, or by psychological factors, such as a desire to prove continued fertility. The reported difference in desired future fertility between the women with near-miss complications and early-pregnancy loss versus those who had a live birth may also be attributed to initial fear of giving birth in those women who had a very traumatic birth experience.

Conclusions

Our main conclusion following the analysis of baseline data is that there were important differences between women who experienced a near-miss complication associated with a live birth compared with women whose pregnancies did not produce a live baby. This may be related to the cultural and social primacy of successful reproduction in Burkina Faso. One implication for the clinical classification of near-miss complications is that a stillbirth indicates the severity of a near-miss complication, and that near-miss women must be differentiated not only in terms of diagnosis but also in terms of outcomes of their pregnancy.

The analysis of the baseline findings is limited by the facts that the different recruitment groups are heterogeneous; for instance, the group of women who have experienced near-miss complications associated with early pregnancy loss includes women whose complications have different aetiology and it is impossible to establish with sufficient accuracy whether a woman's pregnancy termination was spontaneous or induced. This clearly has implications for the interpretations of the findings, particularly those relating to the social ramifications of early pregnancy loss. The fact that women who live in rural areas outside of the recruitment catchment zones are not included in the study is a further limitation, as is the impossibility of ascertaining the exact costs associated with treatment of complications, or how these are negotiated.

Despite these limitations, this paper highlights several interesting findings and raises many questions. These relate, among other things, to the role of men in negotiating care-seeking and in the psycho-social health of women who

experience complications. These are issues which further epidemiological analyses and anthropological findings will hopefully elucidate.

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Tables

Table 1: General characteristics of cases (by type of near-miss)

Characteristic		Type of near miss		
		live birth (n=215)	stillbirth (n=57)	early pregnancy loss (n=64)
Recruitment				
Median interval between birth/abortion & interview		8 days	7 days	4 days
Hospital	Bobo Dioulasso	23.7%	14.0%	18.8%
	Ougadougou (2 centres)	43.7%	45.6%	25.5%
	other	32.6%	40.4%	54.7%
Demographic				
Mean age		25.5	25.6	26.0
Gravidity, first pregnancy		40.0%	31.6%	26.6%
No education		42.3%	52.6%	56.2%
Marital status	Married mono	14.0%	19.3%	34.4%
	Married poly	51.6%	50.9%	32.8%
	Partner	21.4%	21.0%	10.9%
	Single	13.0%	8.8%	21.9%
Arranged marriage (married women only)		34.0%	37.5%	37.2%
Socio economic status				
Water from borehole		9.3%	29.8%	20.3%
Electricity at home		37.7%	26.3%	32.8%
Radio at home		78.6%	70.2%	75.0%
Woman involved in spending decisions		21.0%	17.5%	25.0%
Insufficient food at home during pregnancy		5.1%	10.5%	10.9%
No latrine		15.8%	22.8%	25.0%
Psycho-social aspects during pregnancy				
Sufficient food during pregnancy		94.9%	89.5%	89.1%
Planned pregnancy		62.8%	66.7%	59.4%
Partner happy with pregnancy		79.4%	70.2%	74.6%
Relationship with partner during pregnancy happy		92.1%	83.0%	84.3%
Sadness during pregnancy		42.3%	40.4%	43.8%
Respondent's report of problems during pregnancy	Frequent urinary problems	11.6%	17.5%	20.3%
	Genital problems	33.0%	40.4%	10.9%
	Hypertension	16.0%	15.8%	3.2%
Delivery and amount paid				
How was the delivery	OK	51.64%	29.41%	n/a
	Difficult	33.80%	49.02%	n/a
	Very difficult	14.55%	21.57%	n/a
Complications stated as due to	Family problems	1.0%	3.7%	9.1%
	Poor medical supervision	2.9%	0%	9.1%
Who made decision to go to final facility	Self	13.04%	7.41%	10.91%
	Partner	18.36%	11.11%	34.55%
	Self & partner	2.90%	0.00%	1.82%

Characteristic		Type of near miss		
		live birth (n=215)	stillbirth (n=57)	early pregnancy loss (n=64)
	Health worker	51.2%	68.5%	32.7%
	Own family	5.1%	5.3%	7.8%
	Partner's family	8.4%	1.1%	7.8%
Mean amount spent on hospital stay (CFA) ⁽¹⁾		47762	36033	39936
Mean amount spent on transport (CFA) ⁽²⁾		3057	3079	1669
Difficulty finding money to pay for hospital stay		36.7%	40.4%	40.6%
Did you or your family spend all savings (if any)		38.0%	43.2%	35.9%
Did you or your family go into debt (if known)		27.6%	39.5%	37.1%
Did you receive any help (cash or in-kind)		69.1%	77.4%	52.7%
Psycho-social status postpartum:				
Feeling unwell today		28.8%	26.3%	36.5%
Hospital discharge too early		1.9%	3.5%	7.8%
Want another child		62.4%	68.5%	80.0%
Factors considered important for recovery	Relationship with partner	82.5%	92.1%	88.9%
	Return to work	59.5%	38.6%	51.6%
	Friends with whom to talk	69.3%	64.3%	84.4%
	Sufficient money	97.7%	87.7%	98.4%

(1) only 56% of respondents responded to this question

(2) only 57% of respondents replied to this question with a monetary amount

Table 2: Clinical characteristics of cases

Characteristic		Near-miss live birth n=215	Near-miss stillbirth n=57	Early pregnancy loss N=64
Near miss Anemia		22.3%	31.6%	28.1%
Near-miss Hypertension		27.0%	17.5%	0.0%
Near-miss Haemorrhage		32.1%	31.6%	75.0%
Near-miss Dystocia		18.4%	17.5%	0.0%
Near-miss Infection		8.4%	19.3%	10.9%
Type of early pregnancy loss	Induced	n/a	n/a	12.5%
	Probably induced	n/a	n/a	12.5%
	Miscarriage	n/a	n/a	43.7%
	Ectopic pregnancy	n/a	n/a	26.6%
	Insufficient information	n/a	n/a	4.7%
Near miss on admission		68.1%	85.2%	87.3%
Woman completely recovered		85.2%	75.44%	79.69%
Departure	Discharged	98.1%	94.74%	98.44%
	Internal transfer	0.9%	3.51%	0.00%
	Against medical advice	0.9%	1.75%	1.56%
Intensive care		7.0%	5.26%	3.13%
Caesarean section		38.6%	15.79%	0.00%

Table 3: Odds ratios for characteristics of near-miss abortion and near-miss stillbirth compared with near-miss live birth

Characteristic	Stillbirth		Early pregnancy loss	
	unadjusted OR (95% CI)	adjusted OR (95% CI)	unadjusted OR (95% CI)	adjusted OR (95% CI)
Young age (15-19 yrs cf. age 20+)	n/s	n/s	n/s	n/s
Primigravid cf. gravidity 2-4	n/s	n/s	0.55 (0.28, 1.09)	0.30 (0.11, 0.82)
Single cf. married or living with partner	n/s	n/s	1.87 (0.91, 3.84)	3.61 (1.40, 9.27)
Polygamous cf. monogamous marriage	n/s	n/s	3.88 (1.82, 8.24)	3.61 (1.51, 8.67)
Arranged marriage (married women only)	n/s	n/s	n/s	n/s
Water from borehole cf. any other source	4.14 (1.95, 8.81)	4.76 (2.06, 11.0)	2.49 (1.15, 5.38)	2.18 (0.88, 5.43)
Near miss on admission	3.26 (1.38, 7.68)	3.43 (1.40, 8.43)	4.42 (1.78, 11.0)	4.78 (1.79, 12.8)
Were you referred from any other facility	2.05 (1.09, 3.83)	2.17 (1.04, 4.55)	0.61 (0.34, 1.08)	n/s
Partner involved in decision to refer	0.42 (0.17, 1.06)	n/s	1.85 (1.00, 3.42)	2.07 (1.00, 4.29)
Health worker involved in decision to refer	2.39 (1.25, 4.57)	2.49 (1.21, 5.15)	0.47 (0.26, 0.84)	0.45 (0.23, 0.87)
Relationship with partner happy during pregnancy	0.42 (0.18, 1.04)	n/s	0.46 (0.18, 1.17)	n/s
Respondent's report of problems during pregnancy				
Frequent urinary problems	n/s	n/s	1.94 (0.92, 4.07)	2.20 (0.94, 5.15)
Genital problems	n/s	n/s	0.25 (0.11, 0.59)	0.28 (0.11, 0.69)
Hypertension	n/s	n/s	0.17 (0.04, 0.75)	0.19 (0.04, 0.90)
Delivery difficult or very difficult cf. OK	2.56 (1.31, 5.02)	2.95 (1.39, 6.26)	na	na
Complications stated as due to				
Family problems	4.84 (0.63, 37.0)	n/s	11.0 (1.98, 61.2)	16.7 (1.91, 145)
Poor medical supervision	n/s	n/s	2.95 (0.83, 10.5)	6.33 (1.65, 24.3)
Haemorrhage (near-miss)	n/a	n/a	6.34 (3.21, 12.6)	7.57 (3.59, 16.0)
Infection (near-miss)	2.62 (1.15, 5.98)	4.27 (1.64, 11.1)	n/s	n/s
Ruptured uterus	6.79 (1.53, 30.1)	n/s	n/s	n/s
Caesarean section	0.30 (0.14, 0.65)	0.31 (0.14, 0.70)	-	-
Difficulty in payment	n/s	n/s	n/s	n/s
Feeling unwell today	n/s	n/s	n/s	n/s
Discharge too soon	n/s	n/s	4.47 (1.14, 17.5)	n/s
Want another child	n/s	2.38 (0.96, 5.89)	2.66 (0.21, 5.34)	6.60 (2.53, 17.2)
Factors considered important for recovery				
Relationship with partner	0.41 (0.17, 0.95)	0.30 (0.11, 0.80)	n/s	n/s
Return to work	0.43 (0.23, 0.79)	0.44 (0.23, 0.85)	n/s	n/s
Friends with whom to talk	n/s	n/s	2.39 (1.14, 5.03)	3.48 (1.51, 8.03)
Sufficient money	0.17 (0.05, 0.58)	0.11 (0.03, 0.44)	n/s	n/s

(n/s=not significant at P<0.1)

Odds ratios were adjusted for age, gravidity, level of education, marital status including polygamy, household electricity, radio in home, household water source, and sufficient food during pregnancy.