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Mortality after near-miss obstetric complications in Burkina Faso: medical, social and health-care factors
Katerini T Storeng, Seydou Drabo, Rasmané Ganaba, Johanne Sundby, Clara Calvert & Véronique Filippi

Objective To investigate mortality in women in Burkina Faso in the 4 years following a life-threatening near-miss obstetric complication and to identify the medical, social and health-care related causes of death.

Methods In total, 1014 women were recruited after hospital discharge and followed for up to 4 years: 337 had near-miss complications and 677 had uncomplicated pregnancies. Significant differences in mortality between the groups were assessed using Fisher’s exact test. The medical causes of death were identified from medical records and verbal autopsy data; social and health-care related factors associated with death were identified from interviews with the deceased women’s relatives.

Findings In the 4 years, 15 (5.3%) women died in the near-miss group and 5 (0.9%) died after uncomplicated pregnancies (P < 0.001). More than half the deaths after a near miss, but none after an uncomplicated delivery, were pregnancy-related. Indirect factors contributed to many of these deaths, particularly human immunodeficiency virus infection. Relatives’ accounts suggested that the high cost and poor quality of health care, a lack of follow-up care and an unmet need for contraception contributed to the excess mortality in the near-miss group.

Conclusion Women in Burkina Faso who initially survived a near-miss obstetric complication had an increased risk of all-cause and pregnancy-related death in the ensuing 4 years. The likelihood of survival over the longer term could be increased by offering a continuum of care that addresses the indirect and social causes of death and supplements the emergency intrapartum obstetric care provided by current safe motherhood programmes.

Introduction
International discussions about maternal health in low-income countries tend to focus on maternal deaths. However, there is increasing concern that these deaths are only the tip of the iceberg in terms of the health effects of the poor availability and quality of maternity services. In addition, countries with high maternal mortality also have a large burden of pregnancy-related complications and associated disabilities. It is estimated that “for every woman who dies from a pregnancy-related cause, about 20 more – roughly 7 million women yearly – experience injury, infection, disease or disability”. Of growing interest are “near-miss” obstetric complications – complications so severe that they would probably have killed the woman had she not received timely medical care.

In low-income countries, near misses are often considered obstetric successes because ultimately the woman’s life was saved by a focused medical intervention. However, little is known about long-term outcomes following these complications. Recent studies document a substantial degree of physical and psychological morbidity in their aftermath and the high cost of emergency obstetric care has serious social and economic consequences. Although women’s lives are known to remain at risk for several months beyond the 42-day cut-off used in standard definitions of maternal death, few studies have examined survival beyond this period in women who experience severe obstetric complications.

To what extent does surviving a near-miss obstetric complication mean that a maternal death has actually been averted? Our aim was to investigate maternal mortality in the 4 years after hospital discharge following a near-miss complication in Burkina Faso. We used data from a longitudinal, mixed-methods, cohort study to describe patterns of mortality and analysed the medical, social and health-care related causes of death after near-miss complications. Finally, we considered the implications of our study findings for strategies that promote safe motherhood.

Methods
Study setting
Burkina Faso is an impoverished country in western Africa that is ranked 177th out of 182 countries in terms of human development; 81% of the population live on less than 2 United States dollars a day. The country’s scores on reproductive health indicators are among the worst in the world. The fertility rate is 6.2 children per woman. According to the most recent national census, the maternal mortality ratio is 307 per 100 000 live births, and the World Health Organization’s estimate is 560 per 100 000 live births. Burkina Faso’s district health system functions poorly and existing safe motherhood programmes do not address the availability of comprehensive obstetric care. Only 73.2% of births are assisted by a skilled birth attendant – a figure that hides significant regional and socioeconomic disparities. User fees for maternal health care, especially emergency care, are often unaffordable. In 2007, the health ministry introduced an 80% subsidy for facility-based delivery to reduce out-of-pocket expenditure, but its effect is still unclear.
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Data collection
We followed a cohort of 1014 women for 4 years after they were discharged from seven hospitals across Burkina Faso between November 2004 and March 2005. Women were recruited at hospital discharge to avoid exposure misclassification. Of the 1014 women in the cohort, 337 had experienced a near-miss obstetric complication: the pregnancy ended in a live birth in 199 cases, in a perinatal death in 74 and in a miscarriage, ectopic pregnancy or abortion in 64. For each woman who had a near miss, we recruited an average of two unmatched controls from the seven hospitals. Usually the next two women to have an uncomplicated live delivery, as confirmed by medical notes, were selected, though some hospitals recruited more controls than others. The total number of controls was 677.

Trained lay interviewers made six follow-up visits: on day three after discharge, at 3 months, 6 months and 12 months, and in the third and fourth years after the end of the pregnancy. We investigated whether any woman not found for the interview had moved away or died. Interviews explored women’s health, reproductive history, socioeconomic status, experience of health care, and health-care costs. Medical information was extracted from routine hospital records at discharge and from reports of medical examinations conducted 6 and 12 months later. In parallel, anthropologists carried out a detailed follow-up of a subsample of 82 women: 64 had near misses and 18 had uncomplicated deliveries. Findings from the first year of follow-up have been reported elsewhere.

We used the verbal autopsy method to make detailed enquiries about any woman who died. This approach determines the cause of death by asking lay respondents about the signs exhibited and the symptoms experienced by the deceased and is used when data from routine information systems are incomplete. Generally, respondents were the woman’s husband, relatives who had participated closely in the woman’s care and, when possible, health workers. A physician conducted verbal autopsies at the end of the first year, and the anthropologist conducted interviews at the end of follow-up. Additionally, an open-ended in-depth interview or social autopsy was carried out to identify any social or health-care-related factors that could have contributed to the death.

Data analysis
The proportion of women who survived at each follow-up visit was calculated for women who experienced near misses and for those who had uncomplicated deliveries. We used Fisher’s exact test to determine whether the post-discharge mortality rate differed significantly between the two groups. We compared the marital status, age and parity at baseline of women who survived and who died within 4 years of follow-up in both the group of women who had uncomplicated deliveries and in the group that had near misses. We used the chi squared test to assess the association between baseline characteristics and death.

The most likely medical cause of death was assigned independently and agreed on by two clinical researchers on the basis of data from the verbal autopsy combined with additional information from medical records and reports of medical examinations (Table 1, available at: http://www.who.int/bulletin/volumes/90/6/11-094011). Comorbid conditions that may have contributed to the death were taken into account. In addition, we analysed records of the in-depth interviews thematically to derive non-medical causes of death. This analysis was guided by our knowledge of the social circumstances of women in Burkina Faso and the health systems they use, gained over the course of the study.

Moreover, two of the deceased women belonged to the anthropologists’ subsample and had participated in several interviews before their deaths.

Ethical approval
The study was approved by the ethics committees of the London School of Hygiene and Tropical Medicine, United Kingdom of Great Britain and Northern Ireland, and the Ministry of Health of Burkina Faso. Study participants gave their free and informed consent.

Results

Mortality

Fig. 1 shows the number of participants included at each stage of the study. Of the 1014 women recruited, 695 attended the final interview at the end of the 4-year follow-up and 20 had died. Post-discharge mortality was significantly higher among women who had a near-miss obstetric complication than among controls who had uncomplicated deliveries (P < 0.001).

Fig. 2 shows the proportion of women who survived at each follow-up visit. Six (1.9%) women in the near-miss group died within 1 year, and none died in the control group. The corresponding figures at the end of the 4-year follow-up period were 15 (5.3%) and 5 (0.9%) in the two groups, respectively.

No significant difference was found in age (P = 0.47) or parity at baseline (P = 0.42) between women in the near-miss group who died and those who survived and completed follow-up. However, women who died were more likely to be single at baseline (P = 0.001; Table 2). We could draw no such comparisons in the control group because of the small number of deaths.

Medical causes of death

Verbal autopsy data were available for 18 of the 20 deaths (Table 1). The relatives of the remaining two women could not be located.

In the near-miss group, 9 of the 15 deaths (60%) were pregnancy-related, compared with none in the control group (Table 1). Moreover, six of these nine pregnancy-related deaths occurred within 1 year of the near-miss obstetric complication or the end of the pregnancy. The most likely medical causes of these six deaths were: organ failure following septic abortion in one woman with a human immunodeficiency virus (HIV) infection; tuberculosis related to HIV infection in one woman with puerperal sepsis; anaemia with possible sepsis or immunity problems in one woman; probable anaemia in one; infection in one; and hypertension (i.e. eclampsia) in one. The remaining three pregnancy-related deaths in the near-miss group occurred within 42 days of a subsequent pregnancy: one was due to hypertension, one to septic abortion and one to haemorrhage following caesarean section suture complications. At least three of the nine women who died from a pregnancy-related cause were HIV-positive. The causes of the remaining six deaths in the near-miss group were: HIV infection in one, hypertension in one, possible infection related to tuberculosis in one, a suspected traffic accident in one and unknown due to insufficient data in two.

Of the five deaths in the control group, one was caused by malaria and three by acquired immunodeficiency syndrome (AIDS); the cause of one death remained undetermined due to insufficient data.
HIV infection and tuberculosis to deaths in the two groups is notable.

By the end of follow-up, three of the seven babies born to women who had a near-miss complication and who subsequently died had also died. One of the babies died a few days before his mother, at the age of 28 days. This baby was probably born with intrauterine growth retardation. The other two died after their mothers: one from malnutrition at 5 months and one from an unknown cause at 15 months. No deaths occurred among the five babies born to women in the control group who subsequently died. These babies were older at the time of their mothers’ deaths and therefore less vulnerable.

**Health-care-related and social causes of deaths**

Relatives of the women who died within a year of a near-miss complication believed the women had been discharged prematurely. Correspondingly, 17% of these women had not fully recovered when discharged, according to medical records. Some left hospital because they could no longer afford to pay for care or to remain absent from their regular activities. Inadequate follow-up of unresolved health problems may have compounded the burden of premature discharge, as in the case of a 25-year-old woman who died of sepsis 7 months after an unsafe abortion (Box 1). As a whole, respondents noted that poor links between different parts of the health-care system (e.g. between a district hospital and a national hospital) delayed or prevented access to care.

Similarly, relatives of the three women in the near-miss group who died of pregnancy-related causes after a subsequent pregnancy identified a range of health-care-related contributing factors. None of these women received specific follow-up during antenatal care despite having had a near-miss complication in a recent pregnancy. The reason may be that in Burkina Faso no midwife and certainly no specialist normally participates in antenatal care, which is often delivered in a ritualistic way without addressing chronic ailments or risk factors. An unmet need for contraception, which is costly and poorly available, contributed to one of the maternal deaths because it led to an unwanted pregnancy. According to this woman’s husband, the new pregnancy exacerbated the hypertension that resulted in the near miss less than 2 years earlier (Box 2). Both relatives and health-

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**Fig. 1. Study participants, maternal mortality in the 4 years after pregnancy, Burkina Faso, 2004–2009**

<table>
<thead>
<tr>
<th>Stage</th>
<th>Eligible Women</th>
<th>Follow-up Lost</th>
<th>Deaths</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Approached for recruitment</td>
<td>1042</td>
<td>17</td>
<td>3</td>
</tr>
<tr>
<td>2. Medical records reviewed and attended interview</td>
<td>1014</td>
<td>11</td>
<td>3</td>
</tr>
<tr>
<td>3. Attended interview at 3 months</td>
<td>991</td>
<td>24</td>
<td>2</td>
</tr>
<tr>
<td>4. Attended interview or medical exam at 6 months</td>
<td>965</td>
<td>28</td>
<td>2</td>
</tr>
<tr>
<td>5. Attended interview or medical exam at 12 months</td>
<td>936</td>
<td>163</td>
<td>9</td>
</tr>
<tr>
<td>6. Attended interview in year 3</td>
<td>764</td>
<td>64</td>
<td>5</td>
</tr>
<tr>
<td>7. Attended interview in year 4</td>
<td>695</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Some women missed one interview but attended a later one, so were not counted as being lost to follow-up.

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**Fig. 2. Maternal survival after the end of pregnancy, by pregnancy outcome, Burkina Faso, 2004–2009**

- **Near miss**: A severe obstetric complication that would probably kill the woman without timely medical care.
- **Uncomplicated**: Standard pregnancy outcome.

Survival (%) over time:
- New miss: Survival begins at 100% and declines to 96% at 60 months.
- Uncomplicated: Survival begins at 99% and declines to 95% at 60 months.

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* A near-miss complication is a severe obstetric complication that would probably kill the woman without timely medical care.
care workers strongly believed that better care could have saved the woman, who died of haemorrhage following caesarean section suture complications. She was discharged from hospital prematurely – within 24 hours of the emergency caesarean section – and was left untreated overnight, then readmitted with heavy bleeding and an open caesarean section wound the following evening. She died the next morning.

Relatives regarded the women’s deaths as particularly tragic in light of the resources initially invested in saving them after the near miss and in treating subsequent associated health problems. Cost barriers disrupted referral chains for these women and impeded access to care for chronic health complaints, which may have indirectly or directly contributed to their deaths (Box 1). The cost barrier was particularly high for women with chronic health conditions. Lack of or inadequate treatment of pregnancy-related ailments, such as puerperal infection and anaemia, or of underlying infections or chronic conditions, such as hypertension, HIV infection, tuberculosis or malaria, appear to have contributed to several maternal deaths. These difficulties were exacerbated by social disadvantage, including a lack of social and material support, especially among single women.

Discussion

Our findings show that the limited availability and poor quality of maternal health-care services can lead not only to immediate death or longer-term disability or illness in women who experience a near miss from severe pregnancy complications, but also to an increased risk of death as long as 4 years after the event. Although targeted emergency care initially saved many women who experienced obstetric complications, those who had a near miss were significantly more likely to die within the

Table 2. Maternal mortality in the four years after pregnancy, by pregnancy outcome, age, parity and marital status, Burkina Faso, 2004–2009

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Uncomplicated pregnancy</th>
<th>Pregnancy outcome</th>
<th>Near-miss complication*</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Women alive at 4 yearsb</td>
<td>Women deceased at 4 years</td>
<td>Women lost to follow-upd</td>
</tr>
<tr>
<td>Age (years)</td>
<td>No. %</td>
<td>No. %</td>
<td>No. %</td>
</tr>
<tr>
<td>&lt; 20</td>
<td>90 18.7</td>
<td>0 0</td>
<td>37 19.6</td>
</tr>
<tr>
<td>20–24</td>
<td>135 28.1</td>
<td>0 0</td>
<td>71 37.6</td>
</tr>
<tr>
<td>25–29</td>
<td>117 24.3</td>
<td>4 80.0</td>
<td>45 23.8</td>
</tr>
<tr>
<td>≥ 30</td>
<td>139 28.9</td>
<td>1 20.0</td>
<td>36 19.1</td>
</tr>
<tr>
<td>Parity</td>
<td>No. %</td>
<td>No. %</td>
<td>No. %</td>
</tr>
<tr>
<td>0</td>
<td>NA NA</td>
<td>NA NA</td>
<td>NA NA</td>
</tr>
<tr>
<td>1–3</td>
<td>344 71.4</td>
<td>4 80.0</td>
<td>155 82.0</td>
</tr>
<tr>
<td>4+</td>
<td>138 28.6</td>
<td>1 20.0</td>
<td>34 18.0</td>
</tr>
<tr>
<td>Marital status</td>
<td>Married or in a relationship</td>
<td>No. %</td>
<td>No. %</td>
</tr>
<tr>
<td>Married or in a relationship</td>
<td>446 92.5</td>
<td>5 100.0</td>
<td>167 88.4</td>
</tr>
<tr>
<td>Single</td>
<td>36 7.5</td>
<td>0 0</td>
<td>22 11.6</td>
</tr>
</tbody>
</table>

NA, not applicable.

* A near-miss complication is a severe obstetric complication that would probably kill the woman without timely medical care.

b Data were missing on age for two women, on parity for one and on marital status for one.

c Data were missing on age for two women, on parity for two and on marital status for two.

d P-values were calculated using the chi squared test, where possible, for differences between women who died and those who were alive and completed follow-up.

Due to the small number of deaths among women with an uncomplicated delivery, it was not possible to calculate a P-value for the difference in age or marital status between women who died and those who survived.

e Data were missing on age for three women, on parity for two and on marital status for two.

Box 1. Example of a late pregnancy-related death after a near-miss complication,a Burkina Faso, 2005

The 25-year-old womanb moved from a rural village to a town to work in a bar. She became pregnant while in a relationship with a visiting bureaucrat. Her partner revealed he was married with children, pressured her to terminate the pregnancy and paid for an illegal abortion. She was hospitalized with a near-miss septic abortion after intense stomach aches resulting from the botched abortion, underwent manual vacuum aspiration for the incomplete abortion and was treated for infection before discharge. She suffered stigmatization, lost her income and job and became disillusioned. An unresolved abortion-related infection left untreated due to the cost of care resulted in another hospitalization 6 months after discharge. The woman’s brothers paid for her hospitalization for more than 1 month but were unable to afford prescribed referral to a tertiary hospital in a major city 170 km away. The woman died at her brothers’ home 7 months after the septic abortion. The brothers had substantial financial problems even 3 years after the woman’s death: they were in debt, had lost income and their farm’s yield was reduced because they had to sell some animals to cover the health-care costs.

a A near-miss complication is a severe obstetric complication that would probably kill the woman without timely medical care.

b Woman 4 in Table 1 (available at: http://www.who.int/bulletin/volumes/90/6/11-094011).
next 4 years than those who had an un-
complicated hospital delivery. Notably, 
these women had a higher risk of dying 
due to a pregnancy-related cause, whether 
associated with the initial near miss or 
with the complications of a subsequent 
pregnancy. Single women were at a 
particularly high risk, perhaps because 
of poor material and social support. In 
addition, an infant born to a woman 
who had a near miss and subsequently 
died was also at an increased risk of 
death. The risk was higher both after 
the mother’s death and before, as the mother 
may have been too sick or poor to pro-
troduce breast milk or to properly care for 
her infant. 28 By contrast, no women with 
an uncomplicated delivery died from a 
pregnancy-related cause, and the babies 
of those who did die survived. Although 
we lack survival data on women lost to 
follow-up, we observed that those who 
had a near miss were more often lost to 
to follow-up than those who did not. 
Consequently, unrecorded deaths were 
more likely among these women than 
among controls.

The verbal autopsy approach used 
in this study has well-known limita-
tions, including recall bias, since data 
are sometimes collected months or 
years after a death. 29-31 The validity and 
reliability of lay respondents’ reports 
of medical symptoms can also be pro-
blematic; their descriptions can be vague 
and non-medical and can point to a 
diagnosis that differs from the physi-
cian’s. Moreover, respondents cannot 
provide information on signs that are 
not detectable without laboratory test-
ing or clinical autopsy. Although verbal 
atuopsies cannot unequivocally identify 
the immediate cause of death or exclude 
competing causes, they can indicate the 
most likely contributing factors. In the 
absence of death registries, verbal autop-
sies provide the best means of identify-
ing the likely medical cause of death.

Women clearly remain at risk of a 
pregnancy-related death for longer than 
the 42 days used in standard definitions 
of maternal death. 32 Consequently, the 
contribution of pregnancy-related deaths 
to mortality among women of reproduc-
tive age is likely to be underestimated. In-
 deed, extending the definition to include 
all deaths within 3 months of delivery 
increases current estimates of maternal 
mortality in low-income settings by 10% 
to 15%. 36-38 Incorporating late maternal 
deaths within 1 year of the end of preg-
nancy would further increase the figure.

Current assessment methods may 
underrepresent indirect causes of mater-
nal death, which could be aggravated by 
pregnancy. 35 Our study showed that co-
morbid conditions, such as HIV/AIDS, 
and diseases of poverty, such as anaemia, 
contributed to late pregnancy-related 
deaths after a near miss. Except for direct 
obstetric complications, HIV infection 
was the most important contributor to 
pregnancy-related deaths in our study. 
This finding supports recent analyses 
that highlight the contribution of HIV 
infection to high maternal mortality 
rates in Africa. 24

Our analysis of the structural con-
straints that limited access to health 
care and reduced the quality of the care 
received by women in our study helped 
us to understand the broader circum-
stances leading to their deaths. The 
relatives of women who died highlighted 
various possible contributing factors: 
premature hospital discharge; poor 
postpartum follow-up; inadequately 
treated underlying conditions; unmet 
need for contraception; lack of appro-
priate antenatal care, and inadequate 
emergency obstetric care in subsequent 
pregnancies. 35 Although firm general 
conclusions about the health-care sys-
tem cannot be drawn without support-
ing data from health-care providers and 
other stakeholders, studies from Burkina 
Faso 11,18 and other high-mortality coun-
tries 36 support our informants’ reports 
that poor service supply and demand act 
as barriers to maternal health care, both 
during and after pregnancy.

**Policy implications**

Because most maternal and neonatal 
deaths occur around the time of de-


civery, 35 the maternal health strategy 
throughout the world has long empha-
sized intrapartum care. This includes 
skilled birth attendance for all women 
and emergency obstetric care to prevent 
maternal death from direct causes such 
as haemorrhage, obstructed labour, 
hypertension, infection and anae mia. 35

However, although good intrapartum 
care can ensure safe delivery, it does not 
suffice to prevent death in the aftermath 
of severe complications, sometimes over 
the long term.

Our study findings on the indirect 
causes of maternal death, the weaknesses 
in the health-care system and the social 
and structural barriers to health care 
suggest the need for a more compre-
hensive, life-cycle approach to women's 
health. The solution may be longer and 
more differentiated clinical man-
agement, including family planning. 
Moreover, we also found that underly-
ing chronic health problems increase 
the risk of maternal death. The solution 
may be integrated health care, with in-
tegration across the entire reproductive 
cycle (i.e. family planning, pregnancy 
and delivery care, and postpartum care) 
and across different vertical treatment 
programmes, and with integration of 
specialist and generalist care.

It has become evident in recent 
years that a well-functioning health-care 
system and the provision of a continuum 
of care are essential for achieving the 
United Nations Millenium Develop-
ment Goals pertaining to health. For 
instance, international policy-makers 
postulate a continuum of care for ma-
ternal, neonatal and child health that
Involves integrating health care for these different groups across time and place. Such a continuum would include postpartum care as a priority and provide links between reproductive and sexual health-care services and maternal health care. In addition, ways of simultaneously addressing the social and economic determinants of health are receiving increasing attention.

Despite these policy changes and the greater priority afforded to maternal health both internationally and nationally, achieving a comprehensive continuum of care remains challenging. For example, few health-care services address the specific needs of women in the year following childbirth. More often, safe motherhood programmes in low-income countries, including Burkina Faso, are implemented vertically and focus almost exclusively on obstetric care. In addition, ways of simultaneously integrating health care for these women with economic and social determinants of health is involved in the study.

A number of factors are required for tackling excess mortality even 4 years later, due to a combination of medical, social and health-care-related factors. Current safe motherhood programmes emphasize emergency intrapartum obstetric care that targets the direct causes of maternal mortality. These programmes are insufficient for tackling excess mortality over the longer term. Survival in this period requires the introduction of a comprehensive continuum of care that addresses the indirect and social causes of death.

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**Competing interests:** None declared.
Durante esos cuatro años, fallecieron 15 (5,3%) mujeres. Las entrevistas con los familiares de las mujeres fallecidas permitieron identificar las causas médicas, sociales y sanitarias del fallecimiento. Los factores indirectos, en particular la infección con el virus de la inmunodeficiencia humana, contribuyeron a muchos fallecimientos. Las entrevistas con las familias de las mujeres fallecidas permitieron identificar los factores sociales y sanitarios vinculados con el fallecimiento. Durante esos cuatro años, fallecieron 15 (5,3%) mujeres del grupo con embarazos con complicaciones y cinco (0,9%) del grupo con embarazos sin complicaciones (P <0,001). Más de la mitad de los fallecimientos después de una complicación obstétrica grave estuvieron relacionados con el embarazo, pero ninguno después un parto sin complicaciones. Factores indirectos, en particular una infección con el virus de la inmunodeficiencia humana, contribuyeron a muchos de esos fallecimientos. Las explicaciones de las familias sugirieron que los altos costes y la baja calidad de la asistencia sanitaria, la falta de un seguimiento y las necesidades desatendidas en materia de anticoncepción contribuyeron a esa elevada mortalidad en el grupo con complicaciones obstétricas graves. Las mujeres en Burkina Faso que inicialmente sobrevivieron a una complicación obstétrica grave presentaron un riesgo mayor de fallecer en los cuatro años siguientes. La probabilidad de supervivencia a largo plazo podría aumentar si se ofreciera una asistencia continua y de calidad, con programas de prevención y educación en materia de salud reproductiva y anticoncepción.
References


Table 1. Women who died within four years of the end of a pregnancy, Burkina Faso, 2004–2009

<table>
<thead>
<tr>
<th>Case</th>
<th>Date of end of pregnancy</th>
<th>Woman’s age and no. of pregnancies at study recruitment</th>
<th>Marital status at recruitment</th>
<th>Pregnancy outcome, known medical condition</th>
<th>Time of woman’s death after the end of pregnancy</th>
<th>Time of woman reported as lost to follow-up</th>
<th>Status of index child at last interview</th>
<th>No. of pregnancies since index pregnancy</th>
<th>Medical cause of death</th>
<th>Status of index child at last interview</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>26 January 2005</td>
<td>26 years, first pregnancy</td>
<td>Single</td>
<td>Complication, live birth</td>
<td>Year 4 interview</td>
<td>2 years and 5 months</td>
<td>Alive</td>
<td></td>
<td>Hypertension, possible HELLP syndrome</td>
<td>Alive</td>
</tr>
<tr>
<td>2</td>
<td>21 December 2004</td>
<td>36 years, second pregnancy</td>
<td>Married</td>
<td>Complication, early pregnancy loss, haemorrhage, infections</td>
<td>Year 3 interview</td>
<td>Unknown - 1 year</td>
<td>Alive</td>
<td></td>
<td>Septic abortion with general infection complicated by organ failure, maternal death in new pregnancy</td>
<td>Alive</td>
</tr>
<tr>
<td>3</td>
<td>13 March 2005</td>
<td>30 years, first pregnancy</td>
<td>Single</td>
<td>Complication, live birth</td>
<td>Year 2 interview</td>
<td>1 year and 2 months</td>
<td>Alive</td>
<td></td>
<td>Septic abortion with general infection complicated by organ failure, maternal death in new pregnancy</td>
<td>Alive</td>
</tr>
<tr>
<td>4</td>
<td>14 February 2005</td>
<td>32 years, first pregnancy</td>
<td>Single</td>
<td>Complication, early pregnancy loss, sepica abortion, infections</td>
<td>Month 3 interview</td>
<td>1 year and 2 months</td>
<td>Alive</td>
<td></td>
<td>Septic abortion with general infection complicated by organ failure, maternal death in new pregnancy</td>
<td>Alive</td>
</tr>
<tr>
<td>5</td>
<td>17 March 2005</td>
<td>30 years, fourth pregnancy</td>
<td>Married</td>
<td>Complication, live birth</td>
<td>Year 3 interview</td>
<td>1 year and 2 months</td>
<td>Alive</td>
<td></td>
<td>Hypertension, possible HELLP syndrome</td>
<td>Alive</td>
</tr>
<tr>
<td>6</td>
<td>26 March 2005</td>
<td>34 years, eighth pregnancy</td>
<td>Single</td>
<td>Complication, early pregnancy loss, infections, HIV/AIDS</td>
<td>Month 3 interview</td>
<td>35 days</td>
<td>Alive</td>
<td></td>
<td>Septic abortion with general infection complicated by organ failure, maternal death in new pregnancy</td>
<td>Alive</td>
</tr>
<tr>
<td>7</td>
<td>15 December 2004</td>
<td>33 years, second pregnancy</td>
<td>Married</td>
<td>Complication, early pregnancy loss, sepsica abortion, infections</td>
<td>Year 3 interview</td>
<td>2 years and 12 months</td>
<td>Alive</td>
<td></td>
<td>Septic abortion with general infection complicated by organ failure, maternal death in new pregnancy</td>
<td>Alive</td>
</tr>
<tr>
<td>8</td>
<td>26 January 2005</td>
<td>32 years, fifth pregnancy</td>
<td>Single</td>
<td>Complication, early pregnancy loss, infections, HIV/AIDS</td>
<td>Month 3 interview</td>
<td>Between 1 and 2 years</td>
<td>Alive</td>
<td></td>
<td>Septic abortion with general infection complicated by organ failure, maternal death in new pregnancy</td>
<td>Alive</td>
</tr>
<tr>
<td>9</td>
<td>2 March 2005</td>
<td>40 years, sixth pregnancy</td>
<td>Married</td>
<td>Complication, early pregnancy loss, infections, HIV/AIDS</td>
<td>Year 4 interview</td>
<td>Around 4 years</td>
<td>Alive</td>
<td></td>
<td>Septic abortion with general infection complicated by organ failure, maternal death in new pregnancy</td>
<td>Alive</td>
</tr>
<tr>
<td>10</td>
<td>25 February 2005</td>
<td>32 years, sixth pregnancy</td>
<td>Married</td>
<td>Complication, early pregnancy loss, infections, HIV/AIDS</td>
<td>Year 3 interview</td>
<td>1 year and 6 months</td>
<td>Alive</td>
<td></td>
<td>Septic abortion with general infection complicated by organ failure, maternal death in new pregnancy</td>
<td>Alive</td>
</tr>
</tbody>
</table>
### Mortality after obstetric near misses in Burkina Faso  

<table>
<thead>
<tr>
<th>Case</th>
<th>Date of end of pregnancy</th>
<th>Woman's age and no. of pregnancies at study recruitment</th>
<th>Marital status at recruitment</th>
<th>Pregnancy outcome, known medical condition</th>
<th>Time woman reported as lost to follow-up</th>
<th>Time of woman's death after the end of pregnancy</th>
<th>Medical cause of death(^a)</th>
<th>Status of index child at last interview</th>
<th>No. of pregnancies since index pregnancy</th>
</tr>
</thead>
<tbody>
<tr>
<td>11</td>
<td>15 March 2005</td>
<td>26 years, eighth pregnancy</td>
<td>Married (polygamy)</td>
<td>Near-miss complication, live birth, anaemia</td>
<td>Month 3 interview</td>
<td>2 months</td>
<td>Anaemia, possible immune problems, possible sepsis, (late pregnancy-related death)</td>
<td>Dead at 5 months</td>
<td>0</td>
</tr>
<tr>
<td>12</td>
<td>7 March 2005</td>
<td>30 years, fourth pregnancy</td>
<td>Married (polygamy)</td>
<td>Near-miss complication, early pregnancy loss, haemorrhage, infections, organ failure</td>
<td>Year 3 interview</td>
<td>3 years</td>
<td>Caesarean complication involving haemorrhage, sepsis, failure and subsequent infection, maternal death in new pregnancy</td>
<td>NA</td>
<td>2</td>
</tr>
<tr>
<td>13</td>
<td>23 December 2004</td>
<td>29 years, fourth pregnancy</td>
<td>Married (polygamy)</td>
<td>Uncomplicated birth</td>
<td>Year 4 interview</td>
<td>Between 3 and 4 years</td>
<td>Malaria</td>
<td>Alive at verbal autopsy in 2010</td>
<td>0</td>
</tr>
<tr>
<td>14</td>
<td>25 December 2004</td>
<td>38 years, seventh pregnancy</td>
<td>Married (polygamy)</td>
<td>Near-miss complication, perinatal death, infections</td>
<td>Year 3 interview</td>
<td>2 years and 1 month</td>
<td>Chronic infection possibly related to tuberculosis, sepsis, renal failure</td>
<td>NA</td>
<td>0</td>
</tr>
<tr>
<td>15</td>
<td>10 January 2005</td>
<td>26 years, second pregnancy</td>
<td>Cohabiting (polygamy)</td>
<td>Uncomplicated birth</td>
<td>Year 3 interview</td>
<td>2 years and 4 months</td>
<td>Sepsis with chronic infection or immune dysfunction, possibly related to HIV infection</td>
<td>Alive at verbal autopsy interview</td>
<td>0</td>
</tr>
<tr>
<td>16</td>
<td>19 January 2005</td>
<td>17 years, first pregnancy</td>
<td>Single</td>
<td>Near-miss complication, perinatal death, anaemia</td>
<td>Month 6 interview</td>
<td>4 months</td>
<td>Infections (late pregnancy-related death)</td>
<td>NA</td>
<td>0</td>
</tr>
<tr>
<td>17</td>
<td>19 February 2005</td>
<td>25 years, second pregnancy</td>
<td>Married</td>
<td>Near-miss complication, live birth, sepsis, HIV+</td>
<td>Month 3 interview</td>
<td>40 days</td>
<td>Possible anaemia (late pregnancy-related death)</td>
<td>Dead at 15 months</td>
<td>0</td>
</tr>
<tr>
<td>18</td>
<td>23 February 2005</td>
<td>29 years, fourth pregnancy</td>
<td>Married</td>
<td>Uncomplicated birth</td>
<td>Year 4 interview</td>
<td>Unknown, 1–3 years</td>
<td>Tuberculosis or possible HIV infection</td>
<td>Alive at year 2 interview</td>
<td>0</td>
</tr>
<tr>
<td>19</td>
<td>10 March 2005</td>
<td>27 years, third pregnancy</td>
<td>Married</td>
<td>Uncomplicated birth</td>
<td>Year 4 interview</td>
<td>3 years and 11 months</td>
<td>Coma, possible eclampsia (late pregnancy-related death)</td>
<td>Alive at verbal autopsy interview</td>
<td>1</td>
</tr>
<tr>
<td>20</td>
<td>22 February 2005</td>
<td>18 years, first pregnancy</td>
<td>Cohabiting (polygamy)</td>
<td>Near-miss complication, live birth, pre-eclampsia</td>
<td>Month 6 interview</td>
<td>Unknown, within 6 months</td>
<td>Alive at verbal autopsy interview</td>
<td>Alive at verbal autopsy interview</td>
<td>0</td>
</tr>
</tbody>
</table>

AIDS, acquired immunodeficiency syndrome; HIV, human immunodeficiency virus; NA, not applicable.

\(^a\) The medical cause of death was determined from verbal autopsy data, medical records and reports of medical examinations.

\(^b\) A near-miss complication is a severe obstetric complication that would probably have killed the woman had she not received timely medical care.