

Maternal mortality in rural Gambia: levels, causes and contributing factors

G. Walraven,¹ M. Telfer,² J. Rowley,³ & C. Ronsmans⁴

A demographic study carried out in a rural area of the Gambia between January 1993 and December 1998 recorded 74 deaths among women aged 15–49 years. Reported here is an estimation of maternal mortality among these 74 deaths based on a survey of reproductive age mortality, which identified 18 maternal deaths by verbal autopsy. Over the same period there were 4245 live births in the study area, giving a maternal mortality ratio of 424 per 100 000 live births. This maternal mortality estimate is substantially lower than estimates made in the 1980s, which ranged from 1005 to 2362 per 100 000 live births, in the same area. A total of 9 of the 18 deaths had a direct obstetric cause – haemorrhage (6 deaths), early pregnancy (2), and obstructed labour (1). Indirect causes of obstetric deaths were anaemia (4 deaths), hepatitis (1), and undetermined (4). Low standards of health care for obstetric referrals, failure to recognize the severity of the problem at the community level, delays in starting the decision-making process to seek health care, lack of transport, and substandard primary health care were identified more than once as probable or possible contributing factors to these maternal deaths.

Keywords: Gambia; maternal mortality; maternal age; labour complications; risk factors; rural population.

Voir page 611 le résumé en français. En la página 612 figura un resumen en español.

Introduction

Maternal mortality levels are an important indicator of disadvantage within a country as well as between developing and developed countries. Over 99% of the annual global estimate of 585 000 maternal deaths occur in developing countries; a woman in sub-Saharan Africa who becomes pregnant is 75 times more likely to die as a result of this than a woman in Europe (excluding Eastern Europe) or North America (1). Reducing maternal mortality is therefore a high priority goal on the international health agenda. However, because measuring maternal mortality is a complex procedure, reliable estimates of the dimensions of the problem are not generally available and assessing progress towards the goal is difficult.

Much of the information about maternal mortality in developing countries is based on hospital data, which — especially in rural areas — are a poor reflection of the extent of the situation in the community (2). Community-based estimates require information on all deaths among women of reproductive age, the cause of the death, and also whether

the woman was — or had recently been — pregnant at the time of death. Registration of deaths is, at best, incomplete in many parts of the world, and prospective community-based studies need to be very large to be reliable. Other approaches have therefore been devised to overcome the absence of data such as “the sisterhood method” and “the reproductive age mortality survey”. The “sisterhood method” questions respondents in household surveys about deaths of their adult sisters during pregnancy, childbirth or the puerperium (3). The advantage of this method is that it requires a relatively small sample size and hence is less expensive and time-consuming than a prospective community-based survey. The disadvantage is that it does not provide current estimates but refers to a period approximately 12 years previously. In the absence of high quality vital registration data, the “reproductive age mortality survey”, in which all deaths of women of reproductive age are investigated, is considered the best approach (1). In this type of survey, deaths among women are identified using a variety of approaches including demographic surveillance, census data, health facility records, as well as interviews with community leaders, religious authorities, and cemetery officials. Subsequently, for each death both household members and health care providers are interviewed (verbal autopsy) and health facility records are reviewed to classify the cause of death.

Since 1982, the Medical Research Council Laboratories (MRC) have operated a continuous demographic surveillance system in 40 villages and hamlets in the Farafenni area of the Gambia. In the 1980s three studies used the surveillance system to

¹ Head, Farafenni Field Station, Medical Research Council Laboratories, PO Box 273, Banjul, The Gambia (email: gwalraven@mrc.gm). Correspondence should be addressed to this author.

² Public Health Adviser, Divisional Health Team North-Bank East, Department of State for Health, The Gambia; and US Peace Corps, Serrekunda, The Gambia.

³ Health Economist, Medical Research Council Laboratories, The Gambia.

⁴ Senior Lecturer, Maternal and Child Epidemiology Unit, London School of Hygiene and Tropical Medicine, London, England.

estimate the level of maternal mortality in the area (Table 1). In the first study, between April 1982 and March 1983, all pregnancies in the Farafenni area were followed prospectively and the maternal mortality ratio was estimated at 2362 per 100 000 live births (with wide confidence intervals due to small sample sizes) (4). In the second study, a reproductive age mortality survey of all deaths in women between April 1984 and March 1987, the maternal mortality ratio was estimated to be 1091 per 100 000 live births (5). The third study, a field trial conducted in the fall of 1987 using the sisterhood method in six of the villages in the Farafenni surveillance area, the maternal mortality ratio was estimated to have been 1005 per 100 000 live births in the mid-1970s (6).

contributing factors, we looked at “possible” and “probable” contributing factors, such as perception of symptoms, health-seeking behaviour (e.g. delays, constraints), and perceptions of traditional and western health care services.

Background

The study area

The study was conducted in the rural areas around the town of Farafenni on the north bank of the river Gambia, approximately 170 km inland from the capital, Banjul. Most of the study area lies in a narrow strip of land on either side of the North Bank Highway, no further than 22 km to the west and 32 km to the east of Farafenni. The area, which excluded the town of Farafenni and a 10-km area around the town, is flat Sudan savannah with seasonal rice cultivation and mangrove swamps near the river. The climate is sub-Saharan with a short rainy season during June–October.

In the early 1980s, medical facilities in the study area were limited to two dispensaries, one in Farafenni town staffed by a dispenser and a midwife, the other located in a large village (Ngayen Sanjal) east of Farafenni. Transportation was by bicycle, horse and donkey carts, with some bush taxis travelling on dirt roads. In 1983 a new health centre was opened in Farafenni town, staffed by two to four doctors, and essential obstetric services became increasingly available. In the second half of the 1980s, regular bus services were started between the larger villages and Farafenni on the North Bank Highway and ambulance services became available between Ngayen Sanjal dispensary, Farafenni health centre, and the referral hospital in the capital Banjul. Telephone services were installed in the larger villages in the early 1990s. The results of an analysis conducted in January 1999 in the two health facilities in the study area are summarized in Table 2 and Table 3. Over the last 15 years there has been a marked change in the place of delivery. Between 1982 and 1998 the proportion of women delivering in a health facility increased from 4.6% to 18.0%.

In 1983 a primary health care (PHC) programme, which incorporated a strong mother and child health (MCH) component, was introduced into the study area. This programme included the

Table 1. Maternal mortality in the Farafenni study area: comparison of present and past estimations

Year	Data source	No. of maternal deaths	No. of live births	Maternal mortality ratio	95% confidence interval
1975 ^a	Sisterhood method			1005	
1982–83	Prospective pregnancy follow-up	15	635	2362	1322–3896
	PHC villages	11	383	2872	1434–5139
	Non-PHC villages	4	252	1587	433–4064
1984–87	Reproductive age mortality survey	20	1834	1091	666–1684
	PHC villages	13	1159	1122	597–1918
	Non-PHC villages	7	675	1037	417–2137
1993–98	Reproductive age mortality survey	18	4245	424	251–670
	PHC villages	14	2633	532	291–892
	Non-PHC villages	4	1612	248	68–635

^a This survey was conducted in 1987 but as a retrospective estimate it refers to about 12 years prior to the data collection.

In the present reproductive age mortality study, we investigated all deaths of women aged 15–49 years that occurred between January 1993 and December 1998 in the 40 MRC study villages and hamlets, with the aim of estimating the level of maternal mortality, its causes, and contributing factors. As for the

Table 2. Situation analysis for health facilities in Ngayen and Farafenni, the Gambia

	Ngayen Sanjal Dispensary	Farafenni Health Centre
Catchment area population	14 766	84 899
No. of deliveries in 1998	106	1 129
No. of referrals to FFHC in 1998	34	–
No. of caesarean sections	–	29
No. of instrumental deliveries	–	27
No. of maternal deaths	0	5
No. of neonatal deaths	1	10
No. of stillbirths	2	81

Table 3. Services available and constraints in health facilities in Ngayen and Farafenni, the Gambia

Services available	Ngayen Sanjal Dispensary	Farafenni Health Centre
	Two delivery beds	Three delivery beds/6 postnatal beds Adjacent maternity waiting home with 8 beds
	Two midwives to cover all shifts MCH services available every Wednesday	One full-time obstetrician MCH services provided routinely 6 days a week
	Basic delivery services available every day	Handling of emergency obstetric cases possible, except termination of pregnancy
	Facility has own ambulance, referral possible 24 hours	Ambulance referrals to the referral hospital in Banjul take ca. 5 hours (available 7 days a week, but no referrals between 20:00 and 08:00)
	Average referral time to Farafenni Health Centre, 45 minutes	
	Basic electricity (solar panel) and water available	
	Basic equipment and supplies for delivery available	
Constraints	No inpatient facilities	Emergency blood transfusion takes 1 hour to 1 week
	All complications must be referred	Shortage of staff, especially laboratory, pharmacy, anaesthesia
	No laboratory facilities (no haemoglobin or VDRL (syphilis test) available) Shortage of essential drugs	Drug availability: generally good, but shortage of essential drugs (iron/folate, ergometrine injections, tetanus toxoid) occurred within the previous 12 months Electricity and water supply not reliable
	No telephone service at the facility (telephone in village) No clinical management guidelines/ protocols are available	Equipment and supplies in labour ward unsatisfactory: missing supplies, broken equipment Equipment and supplies in emergency obstetric theatre unsatisfactory: missing supplies, broken equipment Referrals not possible at night due to ferry crossing No clinical management guidelines/ protocols are available

identification and training of a traditional birth attendant (TBA) in each PHC village. Within the study area, 15 of the 40 villages were sufficiently large (population, ≥ 400) in 1983 to be designated as PHC villages, and they continue to be the only PHC villages in the area. The “maternal” component of the MCH programme provides antenatal care, screening for high-risk pregnancies, and a referral system for high-risk pregnancies and labour complications (5). A survey of women in the study area who delivered between October 1997 and September 1998 found that 98.7% had received antenatal care, with the mean number of visits being 3.5. However, the first visit of those who presented was relatively late, at an average of 5.7 months into the pregnancy. Routine services such as measuring the women’s weight,

height and blood pressure, and performing abdominal palpation were provided, but the women received little or no information about the results of these routine examinations or about why they were carried out. Another shortcoming was that few women received education on the important health issues surrounding pregnancy and delivery, such as danger signs (6). A 1997 Safe Motherhood Needs Assessment Survey identified a lack of continuing education and supervision of primary care health workers in the Gambia (7).

Study population

The census performed at the beginning of the demographic surveillance in 1981 gave a total population of 12 313. The study population on

31 March 1998 was 16 116, a growth rate of 1.8% per annum. This is much lower than the natural increase rate of 2.7%, indicating the important role played by out-migration from the study area. The three main ethnic groups in the study area together account for >99% of the population (Mandinka 42.4%, Wolof 36.0%, and Fula 20.7%). On 31 March 1998 there were 3736 women aged 15–49 years in the surveillance area (2393 in PHC villages and 1343 in non-PHC villages).

Villagers living in the study villages are subsistence farmers, with the main crops cultivated being millet, groundnuts, and rice. The population is poor; in 1996 less than 10% of compounds owned bicycles, two-thirds possessed a radio, 35% owned some form of cart, and less than half slept on iron or wooden beds (8). Although there is an obvious difference in the ethnic composition of the villages and the size of the villages, there are few major differences between the PHC and non-PHC villages in terms of income, education and wealth (8).

A 1998 survey revealed that the total fertility rate was 6.8 births per woman, mean birth intervals were 33 months, and only 8% of women were currently using contraception (traditional or modern). Just over 3% of the women had formal schooling and the age at first marriage was 15 years. Polygamy was common, with 54% of the women being in unions with one or more co-wives (9).

Methods

Definitions

Maternal mortality was defined as the death of a woman while pregnant or within 42 days of termination of pregnancy, from any cause except accidents and intentional injuries. Maternal deaths were subdivided into direct and indirect deaths.

Direct deaths were those resulting from obstetric complications during the pregnancy, labour or puerperium, or from interventions, omissions or incorrect treatment, or from a chain of events resulting from any of these. Indirect deaths were those resulting from a previously existing disease, or a disease that developed during the pregnancy not due to obstetric causes, but which was aggravated by the physiological effects of pregnancy.

There are two different measures of maternal mortality that are used interchangeably: the *maternal mortality ratio* (maternal deaths per 100 000 live births) and the *maternal mortality rate* (maternal deaths per 100 000 women in the reproductive age group). We chose the maternal mortality ratio because it specifically measures the risk of dying during pregnancy, whereas the maternal mortality rate measures the combined risk of becoming pregnant and of dying during pregnancy. The *proportional maternal mortality rate* expresses the proportion of

deaths in the reproductive period due to pregnancy-related causes.

Data collection and analysis

Data from the longitudinal surveillance system were used to identify the number of deaths in 15–49-year-old women and of live births between January 1993 and December 1998. The principal source of the registration of residents, migrants, births and deaths in the Farafenni study area census is a set of files that are updated at least every 3 months. The surveillance system has been in existence since 1981.

The maternal mortality questionnaire incorporated a verbal autopsy and a section on contributing factors. The verbal autopsy questionnaire included an open section to record the respondent's verbatim account of the deceased's final illness and a closed section to probe for specific symptoms and signs. The questions on contributing factors were newly constructed, and the reviewers were asked to specify whether any of the listed factors, structured in pre-defined categories, had either 'probably' or 'possibly' contributed to the death. The maternal mortality questionnaire was translated into and from the three local languages and piloted on women aged 15–49 years who died in 1992.

The questionnaire was administered by an experienced field worker and at least one of the authors (*M.T.* or *G.W.*) to persons who were present during the final illness and death of the woman. All interviews were conducted in the period from July 1998 to March 1999, and took place not less than 6 weeks and at most 5 years after the death. All persons, including traditional birth attendants and neighbours, who had knowledge of the woman's illness and death were asked to participate in the interview. If these persons were living in different places, more than one interview was conducted and the sets of responses were reviewed together. During the verbal autopsy, families were asked to produce any health cards or records, such as antenatal cards or death certificates. These cards, when available, were photocopied and returned.

The verbal autopsy component was reviewed independently by two physicians working in the Gambian obstetric services, while the contributing factors component was reviewed by one of the obstetricians, also a public health physician, and an additional public health physician. The causes of maternal deaths were classified in accord with WHO guidelines (10). Another physician, a leading expert in the field of maternal mortality, reviewed all deaths that had been classified as maternal by at least one of the obstetricians. A classification of the cause of death was considered as satisfactory if at least two of the three physicians were in agreement.

The 95% confidence intervals for maternal mortality ratios were calculated assuming a Poisson distribution.

Results

Between January 1993 and December 1998, a total of 74 deaths were recorded that involved women aged 15–49 years. For each of these women we were able to interview one or more persons who were present during the final illness. A total of 18 of these deaths were classified as maternal by at least two of the physicians; the proportional maternal mortality rate was therefore 25.7%. Over the same period there were 4245 live births, which gives a maternal mortality ratio of 424 per 100 000 live births. A total of 14 of these dead women lived in PHC villages (maternal mortality ratio: 532 per 100 000 live births (14/2633)), and four lived in non-PHC villages (maternal mortality ratio: 248 (4/1612)). Of these 18 maternal deaths, 9 occurred in two of the larger PHC villages. Table 1 summarizes the results from this study and compares them with previous estimates.

The probable causes, as classified by at least two of the reviewers, and some features of these 18 maternal deaths are shown in Table 4. Nine of them were classified as having a direct obstetric cause; haemorrhage was the largest causative factor, accounting for 6 deaths (2 of them postpartum were due to prolonged labour/atonic uterus, 1 to retained placenta, and 3 to an undetermined cause). Four of these deaths were postpartum (2–9 hours after delivery), while the other two occurred during delivery. Other direct causes were early pregnancy deaths (2), and obstructed labour (1). There were two additional deaths in this survey that might have been ectopic pregnancies, but they have not been included in the present study because of uncertainties about them. The nine indirect obstetric deaths were classified as caused by anaemia (4), hepatitis (1), and unknown reason (4).

Eight women died during pregnancy, two during labour, and eight postpartum (i.e. >1 hour after the delivery of the placenta and within 6 weeks after delivery). Eleven women died at either Farafenni health centre or at the referral hospital, and another two women were in contact with the health centre before their death. None of the four liveborn babies involved is still alive. Hospital and health centre records were searched for women who were admitted during their illness or at death; only two were recovered and these provided little additional information.

A low standard of care for obstetric referrals, failure to recognize the severity of the problem, delay in starting the decision-making process to seek health care, substandard primary care, and lack of transport were identified more than once as probable or possible contributing factors to these maternal deaths (Table 5 and Table 6). The unavailability of blood transfusion services at the referral level was regarded as a probable contributing factor (under the heading of substandard obstetric referral care) in five of the maternal deaths.

Discussion

The results of this survey suggest that there has been a major reduction in maternal mortality in this part of rural Gambia over the last 15–20 years. Although it is impossible to be certain, the decline is probably related to a combination of increased availability of essential obstetric care, improved transport, and increased communication.

Verbal autopsies have been widely used to determine the levels and causes of maternal deaths, and are an attractive method in countries where vital registration systems are weak. The accuracy of these estimations, however, is very dependent on having access to information on the persons who died. Demographic surveillance systems are one way of collecting such information, but they are expensive and labour-intensive, and the pattern observed in research situations may not always be representative of that in broader geographical areas. Sometimes other sources of data on women's deaths, such as routine registration systems or census data, may be a good alternative. Deaths due to non-obstetric causes are difficult to recognize and classify correctly through verbal autopsy, especially pregnancy-related deaths, which may lead to underreporting (11). In the present study, there was a high level of agreement between the reviewing physicians with all three agreeing on the 18 deaths classified as maternal. In addition, it is often difficult to provide an accurate estimation of age at death, even in demographic surveillance areas. Since demographic surveillance in the Farafenni area began only in 1981, and is therefore relatively recent, ascertainment of the ages of older women might have been imprecise. We investigated the 13 female deaths in the 50–54-year age group between 1993 and 1998, and it was reassuring to find that none of these deaths was classified as maternal. The different definitions of maternal death with regard to maternal age will affect comparisons between studies. We also investigated 8 deaths in the 12–14-year age group. One girl aged 14 years was diagnosed as a direct maternal death due to postpartum haemorrhage, but we excluded this case from our analysis in order to be able to make a comparison between this estimate and the earlier ones.

Induced abortions are often performed clandestinely and are an important cause of death in many areas, but there were no such deaths in our survey. Induced abortion may be rare in the Farafenni area because marriages at an early age and childbearing are the norm in this society, premarital pregnancies are few, and continued fertility and motherhood are regarded as a woman's main source of security (9, 12).

Since the methodology used in the present survey is comparable to that employed in the 1984–87 survey and differs little from that used in the 1982–83 survey, we are reasonably confident that there has been a major improvement in the level of maternal mortality in this rural area of the Gambia over the last 15–20 years. An evaluation of the PHC programme in the Farafenni area showed that maternal mortality fell in the PHC villages in the first three years after the start of the programme (1984 to 1987), with a decline to about half the level recorded during the pre-intervention year (1982–83) (Table 1).

Table 4. Main features of the 18 maternal deaths

No.	Age (years)	Parity	Antenatal clinic visits	Probable cause of death	Person assisting at delivery	Place of death	Time of death	Pregnancy outcome
1	24	0	3	Direct, haemorrhage, undetermined	Relative	During transport	5 hours postpartum	Live birth, died
2	39	8	5	Direct, haemorrhage, prolonged labour	Nurse	Hospital	During labour	Died, undelivered
3	40	6	Yes, don't know	Direct, haemorrhage, retained placenta	Relative	Home	2 hours after delivery	Live birth, died
4	25	4	Yes, don't know	Direct, haemorrhage, atonic uterus	Nurse	Hospital	9 hours postpartum	Stillbirth
5	24	1	Yes, don't know	Direct, haemorrhage, undetermined	Relative	Home	5 hours postpartum	Live birth, died at 2 months
6	21	0	Yes, don't know	Direct, haemorrhage, undetermined	Nurse	Health Centre	Died during labour at 8 months	Died undelivered
7	39	8	6	Direct, obstructed labour, sepsis	Doctor	Hospital	4 days postpartum	Twins, 1 live birth (died), 1 stillbirth
8	20	0	0	Direct, early pregnancy death, undetermined	NA ^a	Hospital	3 months of amenorrhoea	NA
9	42	?	0	Direct, early pregnancy death, undetermined	NA	Home	Unknown duration of amenorrhoea	NA
10	25	2	4	Indirect, anaemia	NA	Health centre	8 months pregnancy	NA
11	29	6	Yes, don't know	Indirect, anaemia	NA	Health centre	5 months pregnancy	NA
12	23	1	0	Indirect, anaemia	NA	Health centre	Unknown duration of amenorrhoea	NA
13	37	3	Yes, don't know	Indirect, anaemia	Doctor	Health centre	48 hours postpartum	Stillbirth
14	35	3	Yes, don't know	Indirect, hepatitis	Trained TBA	Home	4 weeks postpartum	Stillbirth
15	23	3	0	Indirect, undetermined	NA	Home	7 months pregnancy	NA
16	31	3	Yes, don't know	Indirect, undetermined	Trained TBA	Home	2 weeks postpartum	Stillbirth
17	30	5	0	Indirect, unknown	NA	Hospital	2 months of amenorrhoea	NA
18	20	2	1	Indirect, undetermined	NA	Health centre	3 months of amenorrhoea	NA

^a NA= not applicable.

Table 5. Causes of and contributing factors to the 18 maternal deaths

No.	Probable cause of death	Contributing factors ^a	
		Probable	Possible
1	Direct, haemorrhage, unknown	Substandard obstetric referral care (3) Delay in reaching health care facility (1) Delay in getting to see professional health staff (1) Substandard primary care (1)	
2	Direct, haemorrhage, prolonged labour	Lack of transport (1) Substandard obstetric referral care (3)	Lack of transport (2)
3	Direct, haemorrhage, retained placenta	Delay in starting decision-making process (1) Lack of transport (1)	Substandard primary care (2)
4	Direct, haemorrhage, atonic uterus	Substandard obstetric referral care (3)	
5	Direct, haemorrhage, undetermined	Not recognizing severity (1)	Delay in starting decision-making process (1)
6	Direct, haemorrhage, undetermined	Substandard obstetric referral care (3)	Delay in starting decision-making process (2) Delay in getting to see professional health staff (1) Substandard antenatal care (1)
7	Direct, obstructed labour, sepsis	Substandard obstetric referral care (3)	Delay in reaching health care facility (1) Delay in getting to see professional health staff (1)
8	Direct, early pregnancy death, undetermined	Substandard obstetric referral care (1)	Substandard obstetric referral care (1)
9	Direct, early pregnancy death, undetermined	Not recognizing the severity of the problem (2) Other perception of the disease (1)	
10	Indirect, anaemia	Substandard obstetric referral care (3) Substandard primary care (2)	
11	Indirect, anaemia	Substandard obstetric referral care (2) Substandard primary care (1)	Substandard primary care (1) Not recognizing the severity of the problem (1) Lack of knowledge of treatment possibilities (1)
12	Indirect, anaemia	Substandard obstetric referral care (1)	Substandard obstetric referral care (1)
13	Indirect, anaemia	Substandard primary care (1)	Lack of transport (2) Delay in reaching health facility (2) Substandard obstetric referral care (2)
14	Indirect, hepatitis		Substandard obstetric referral care (2) Not recognizing the severity of the problem (1) Delay in starting decision-making process (1)
15	Indirect, undetermined		Substandard primary care (2)
16	Indirect, undetermined	Not recognizing the severity of the problem (2) Substandard primary care (1) Substandard obstetric referral care (1)	Substandard primary care (2)
17	Indirect, undetermined	Delay in starting decision-making process (2) Substandard obstetric referral care (1)	Substandard obstetric referral (1)
18	Indirect, undetermined	Delay in starting decision-making process (1) Substandard obstetric referral care (1)	Other perception of the disease (2) Not recognizing the severity of the problem (2) Substandard obstetric referral care (1)

^a Figures in brackets indicate the number of reviewers identifying a factor.

Greenwood et al. concluded that TBAs may have had an effect on maternal mortality by encouraging pregnant women to attend an antenatal clinic, and by referring those with a complication before the date of delivery and accompanying them to the nearest health centre (5). Subsequently, the effectiveness of strategies for reducing maternal mortality by focusing on antenatal care and training of TBAs has been challenged (13).

In the present survey the level of maternal mortality decreased in both the PHC villages with trained TBAs and the non-PHC villages without trained TBAs, with no significant difference between the two sets of villages. Antenatal clinics were well established by 1983, and to our knowledge there were no important differences in this service between 1984–87 and 1993–98. A survey on health-seeking behaviour in women from the study area who delivered between October 1997 and September 1998 found no significant differences between PHC and non-PHC villages in terms of the numbers attending antenatal care or delivering at a health facility (6). Largely, the high level of maternal mortality in the PHC villages is explained by the two larger villages, which accounted for 9 out of the 18 maternal PHC deaths. The village with the highest mortality (Bambali) is the most isolated village in the study area; located 32 km to the east of Farafenni, it is far from the main road, telephone connections and the health facility. Transportation from Bambali is still very limited.

A study carried out in three African countries to validate verbal autopsies — by comparing them with reference hospital diagnoses — showed that although verbal autopsy may not be so useful for estimating individual indirect causes of death, certain direct causes (abortion, obstructed labour, sepsis, and haemorrhage) were determined with a high level of specificity, and reasonable-to-good sensitivity (14). Overall, indirect obstetric deaths can be reported as non-maternal because the non-obstetric cause tends to dominate the picture. For verbal autopsies with special attention given to maternal deaths, as in the present survey, underestimation of indirect causes should be less of a problem.

Four deaths were classified as due to postpartum haemorrhage in our survey, with relatives spontaneously reporting massive bleeding in these

women. All four died within 9 hours of delivery. Two died at home, one during transport, and one in hospital. It is thought that a major reason why so many women die is not only the frequency of postpartum haemorrhage, but the rapidity of death once haemorrhage starts, estimated at 2 hours (compared with 10 hours for eclampsia and 3 days for obstructed labour) (15). At present, postpartum haemorrhage is a condition where the health care worker (e.g. the TBA) in the village has not had much to offer (16). A recently proposed drug for its prevention is misoprostol (17), which is administered orally, stable and relatively cheap. It could become an important life-saving strategy in rural settings in developing countries, and if proven to be safe and effective, its greatest potential would be in home births.

The risk of death due to postpartum haemorrhage is increased when a woman is anaemic. Anaemia in this survey was identified as an important indirect cause of death. Routine administration of iron and folic acid to all pregnant women visiting antenatal clinics is recommended standard treatment practice in the Gambia. However, the lack of success of anaemia reduction programmes is attributed to the unpleasant side-effects of iron supplementation, the misguided perception of health workers that anaemia is not a serious problem, and the short period of iron and folate supplementation due to late first consultation for antenatal care and/or poor availability of medication. Options for improving iron and folate supplementation include reduction in the frequency of administration to less than once daily and use of formulations that delay iron release in the stomach to decrease the gastrointestinal side-effects. In many countries, malaria is an important contributing factor to anaemia in pregnancy. The prevention of malaria has been shown to be effectively addressed by community-based chemoprophylaxis distribution schemes (18, 19).

In this survey, one death (1/18 or 6%) was classified as resulting from obstructed labour, and there were no deaths from eclampsia or septicaemia. In the two surveys that generated data from the 1980s (4, 5) in the PHC villages (no data are available for the non-PHC villages), five deaths (5/24 or 21%) were due to these three causes. These changes may reflect better access to health care as a result of improvements in transport infrastructure and/or changes in attitudes towards seeking medical care. In the studies from the 1980s, only 21% (5 of 24) of women died in hospital or a health centre, compared with 61% (11/18) in the 1993–98 survey. Standard obstetric referral care was mentioned by all three reviewers far more often than the other factors in the assessment of contributing factors (Table 6).

There is a clear need for improved blood transfusion services in the Farafenni area for cases of severe blood loss and/or severe anaemia. A total of 5 of the 18 maternal deaths reported here involved women who died while awaiting blood transfusion in an obstetric referral care health facility. There is often

Table 6. Frequency of contributing factors, as indicated by three reviewers

Contributing factors	A	B	C
Substandard obstetric referral care	10	11	10
Not recognizing the severity of the problem	5	6	2
Delay in starting decision-making	4	5	2
Substandard primary care	3	3	4
Lack of transport	2	3	1
Other perception of disease	2	1	0
No clear contributing factors	4	0	5

a shortage of blood for transfusion, partly because of a lack of donors among the study population. A vigorous campaign to stimulate blood donor recruitment contributed to an impressive reduction in maternal mortality in Kigoma Hospital in the United Republic of Tanzania (20).

Conclusions

Maternal mortality appears to have fallen considerably in the Farafenni area of the Gambia over the last 15–20 years. The levels involved, however, are still 50 times greater than those in Western and Northern Europe or North America. To produce a further reduction in maternal mortality levels, more high-quality essential obstetric services should be made available and accessible (21). Our results also highlight the need to improve the quality of primary health care and for community-based education directed at increasing recognition of the severity of the problems and the need to take prompt action.

Health care related to pregnancy, childbirth and the often neglected postpartum period involves different levels of care, all of which need to be included in interventions to further reduce mortality. Community services and referral-level services and the link between them need increased support and

attention. In addition, community perspectives of motherhood, which are embedded in local customs and specific behavioural norms, need to be taken into account when strengthening safe motherhood programmes. Improving the community management of complications and emergencies (understanding the severity of problems, preparedness, arrangements for referral) will have to go hand in hand with improvements in the quality of health services to make referrals meaningful and to further reduce maternal mortality in poor rural areas such as Farafenni. ■

Acknowledgements

We thank Louie Lopy and Sheikh Mafugi Dibba for their assistance in the field during the interviews, Dr Marianne van der Sande and Dr Caroline Scherf for reviewing the questionnaires, and Dr Rosalind Coleman who was involved in the situation analysis and gave valuable comments on an earlier draft of this paper. This study is part of a multi-site study involving seven demographic surveillance sites in three West African countries (Gambia, Senegal, and Guinea-Bissau), which are being coordinated by Dr Jean-François Etard (IRD, Senegal). The project was funded by the European Commission / Fourth Framework Programme for RTD/INCO-DC (contract number: ERBIC18CT970248).

Résumé

Gambie : mortalité maternelle en milieu rural (importance, causes et facteurs associés)

Les taux de mortalité maternelle sont un indicateur important de retard tant à l'intérieur d'un pays qu'entre pays en développement et pays développés. Plus de 99 % des 585 000 décès maternels (estimation annuelle mondiale) se produisent dans les pays en développement; on rapporte qu'en Afrique subsaharienne une femme enceinte a 75 fois plus de chances de mourir par suite de sa grossesse qu'une européenne (exception faite de l'Europe de l'Est) ou qu'une américaine. Réduire la mortalité maternelle est par conséquent un objectif hautement prioritaire du programme d'action sanitaire international. Cependant, parce que la mesure de la mortalité maternelle est une opération complexe, on ne dispose pas en général d'estimations fiables concernant l'ampleur de ce problème, et les progrès sont difficiles à évaluer. L'enquête sur la mortalité des femmes en âge de procréer, qui recense et étudie les causes de tous les décès de femmes en âge de procréer, constitue, en l'absence de registres d'état civil, la meilleure solution de remplacement.

En Gambie, la mortalité maternelle est très importante en milieu rural. Les études effectuées dans la zone de surveillance démographique et sanitaire de Farafenni dans les années 80 ont rapporté des taux de mortalité maternelle supérieurs à 1000 pour 100 000 naissances vivantes. Dans le présent article, les données d'une enquête sur la mortalité des femmes en âge de procréer recensant tous les décès survenus entre janvier 1993 et

décembre 1998, dans la zone de surveillance démographique de Farafenni, sont analysées. Des entretiens de groupe dirigés ont été menés par deux agents de terrain auprès des parents et autres personnes (par ex. accoucheuses traditionnelles) présentes au moment du décès des femmes concernées. Tous les entretiens ont été analysés par deux obstétriciens expérimentés afin d'établir la cause du décès et d'identifier les facteurs ayant pu contribuer à ce dernier. Un autre médecin a examiné tous les cas qu'au moins un des obstétriciens avait rangé dans la catégorie des décès maternels.

Au cours de la période d'étude, 74 décès ont été enregistrés chez des femmes âgées de 15 à 49 ans, dont 18 ont été rangés dans la catégorie des décès maternels (25,7 %). Au cours de la même période il y a eu 4245 naissances vivantes, ce qui correspond à un taux de mortalité maternelle de 424 pour 100 000 naissances vivantes, soit moins de la moitié des taux rapportés dans des études effectuées dans les années 80. Neuf décès ont été rangés dans la catégorie de ceux ayant une cause obstétricale directe, et l'hémorragie a été le principal facteur incriminé dans la mort de 6 patientes (4 au cours du post-partum en raison d'une dystocie/atonie utérine, 1 par suite d'une rétention placentaire et 1 à cause d'un placenta praevia). Les autres décès par causes directes ont eu lieu en début de grossesse (2) et par suite d'une dystocie (1). Les décès par cause obstétricale indirecte ($n = 9$) ont été principalement causés par l'anémie (4),

l'hépatite (1) et des facteurs indéterminés (4). Chacun des obstétriciens a noté à plusieurs reprises que le fait de ne pas avoir apprécié la gravité du problème au niveau communautaire, d'avoir tardé à prendre la décision de rechercher de l'aide et de ne pas avoir bénéficié de soins de santé primaires et de recours de qualité (surtout en ce qui concerne l'absence de services de transfusion sanguine au niveau de recours), étaient des facteurs qui avaient probablement contribué à ces décès maternels.

Les résultats de cette enquête laissent à penser qu'il y a eu une réduction importante de la mortalité maternelle dans les régions rurales de Gambie au cours des 15 à 20 dernières années. Au début des années 80, les installations médicales et les professionnels de la santé étaient peu nombreux dans la région étudiée, et les moyens de transport pour se rendre à la ville de Farafenni étaient limités: bicyclettes, charrettes tirées par des chevaux ou des ânes et quelques taxis-brousse roulant

sur des pistes. En 1983, un nouveau centre de santé a ouvert à Farafenni, et on a pu progressivement disposer des interventions obstétricales permettant de sauver la vie des mères. Au cours de la seconde moitié des années 80, des services de bus réguliers ont été mis en place entre les villages les plus importants et Farafenni, ainsi qu'un service d'ambulances entre les dispensaires, le centre de santé de Farafenni et l'hôpital de recours de Banjul, la capitale. Le téléphone a également été installé dans les plus gros villages au début des années 90. Il est par conséquent fort probable que la mise à disposition de soins obstétricaux essentiels, auxquels les femmes ont eu accès, a joué un rôle important dans cette réduction. Et l'on peut s'attendre à ce que d'autres améliorations des soins obstétricaux de recours et de la prévention/prise en charge de l'anémie et de l'hémorragie du post-partum permettent de réduire encore davantage la mortalité maternelle.

Resumen

Mortalidad materna en la Gambia rural: niveles, causas y factores contribuyentes

Los niveles de mortalidad materna son un indicador importante de la proporción de personas desfavorecidas tanto dentro de un país como a efectos comparativos entre países en desarrollo y países desarrollados. Más del 99% de las 585 000 defunciones maternas que se calcula que se registran en todo el mundo cada año tienen lugar en los países en desarrollo. Se ha señalado que una mujer del África subsahariana que queda embarazada tiene 75 veces más probabilidades de morir como consecuencia del embarazo que una mujer de similares características en Europa (excluida Europa oriental) o América del Norte. La reducción de la mortalidad materna, así pues, constituye una meta de alta prioridad en el programa de actividades sanitarias internacionales. Sin embargo, debido a la complejidad inherente a las mediciones de la mortalidad materna, pocas veces se dispone de estimaciones fiables de la magnitud del problema, y resulta difícil evaluar los progresos realizados para alcanzar ese objetivo. Se considera que, a falta de datos del registro civil, la mejor alternativa es el estudio de la mortalidad durante la etapa reproductiva, que entraña la identificación e investigación de las causas de todas las defunciones de mujeres en edad reproductiva.

La mortalidad materna es muy alta en las zonas rurales de Gambia. Los datos aportados por estudios realizados en la zona de vigilancia demográfica y sanitaria de Farafenni en los años ochenta pusieron de manifiesto razones de mortalidad materna de más de 1000 por 100 000 nacidos vivos. En este artículo se presentan los datos obtenidos en un estudio realizado entre todas las mujeres fallecidas entre enero de 1993 y diciembre de 1998 en la zona de vigilancia demográfica de Farafenni a fin de determinar la mortalidad durante la etapa reproductiva. Dos trabajadores de campo realizaron entrevistas estructuradas por grupos entre los parientes y demás personas (p. ej., parteras tradicionales) que habían sido testigos de la enfermedad terminal y

la defunción de las mujeres implicadas. Todas las entrevistas fueron revisadas por dos obstetras experimentados que clasificaron la causa de defunción y los factores que podían haber contribuido a la muerte. Otro médico revisó todas las defunciones clasificadas como maternas por al menos uno de los obstetras.

Durante el periodo de estudio se registraron 74 defunciones entre las mujeres de 15 a 49 años, 18 de las cuales se clasificaron como defunciones maternas (25,7%). Durante el mismo periodo se contabilizaron 4245 nacidos vivos, lo que corresponde a una razón de mortalidad materna de 424 por 100 000 nacidos vivos, menos de la mitad de los niveles observados en estudios realizados en los años ochenta. Nueve de las defunciones se clasificaron como debidas a una causa obstétrica directa, siendo el principal factor causal la hemorragia, que contribuyó a 6 de las muertes (4 posparto por parto prolongado o útero atónico, una por retención de la placenta y otra por placenta previa). Otras causas directas fueron el embarazo precoz (2) y el parto obstruido (1). Las defunciones por causas obstétricas indirectas ($n = 9$) tuvieron por origen la anemia (4), la hepatitis (1), y razones no determinadas (4). El no reconocimiento de la gravedad del problema a nivel comunitario, la demora en iniciar el proceso de adopción de decisiones para buscar asistencia y una atención primaria y de derivación inferior a la norma (especialmente la falta de servicios de transfusión sanguínea en el nivel de derivación) fueron identificados en más de una ocasión por cada uno de los revisores como factores que probable o posiblemente contribuyeron a esas defunciones maternas.

Los resultados de este estudio indican que se ha producido una importante reducción de la mortalidad materna en las zonas rurales de Gambia durante los últimos 15 a 20 años. A principios de los ochenta había un número limitado de servicios médicos y de profesionales sanitarios en la zona estudiada, y sólo se

podía llegar a la ciudad de Farafenni en bicicleta, en carretas tiradas por caballos o burros o en destartalados taxis a través de carreteras de tierra. En 1983 se abrió un nuevo centro de salud en Farafenni y empezó a aumentar el acceso a intervenciones obstétricas decisivas para salvar la vida de las madres. En la segunda mitad de los años ochenta se abrieron líneas regulares de autobús entre las aldeas más grandes y Farafenni, y aparecieron los primeros servicios de ambulancia entre los dispensarios, el centro de salud de Farafenni y el hospital de derivación de la capital, Banjul. A ello se añadieron, a

principios de los noventa, líneas telefónicas de enlace con las aldeas más importantes. Así pues, muy probablemente la ampliación de los servicios de atención obstétrica básica y del acceso a los mismos ha contribuido de forma sustancial a esa reducción. Cabe prever que lo que más permitirá seguir reduciendo la mortalidad materna en el futuro serán las mejoras que se introduzcan en la atención obstétrica de derivación y en la prevención y el manejo de la anemia y la hemorragia posparto.

References

1. **World Health Organization and UNICEF.** *Revised 1990 estimates of maternal mortality.* Geneva, World Health Organization, 1996 (unpublished document WHO/FRH/MSM/96.11).
2. **Walraven GEL et al.** Assessment of maternal mortality in Tanzania. *British Journal of Obstetrics and Gynaecology*, 1994, **101**: 414–417.
3. **Graham W, Brass W, Snow RW.** Estimating maternal mortality: "the sisterhood method". *Studies in Family Planning*, 1989, **20**: 17–25.
4. **Greenwood AM et al.** A prospective study of the outcome of pregnancy in a rural area of the Gambia. *Bulletin of the World Health Organization*, 1987, **65**: 635–643.
5. **Greenwood AM et al.** Evaluation of a primary health care programme in the Gambia. I. The impact of trained traditional birth attendants on the outcome of pregnancy. *Journal of Tropical Medicine and Hygiene*, 1990, **93**: 58–66.
6. **Telfer M, Rowley J, Walraven G.** *Report on the maternal health care survey conducted in the villages of the MRC main study area, North Bank Division, Republic of The Gambia between October 1998 and April 1999* (unpublished document).
7. **Gambia State Department for Health.** *1997 safe motherhood needs assessment* (unpublished document).
8. **Hill AG et al.** *Report on the living standards survey conducted in the villages of the MRC main study area, North Bank Division, Republic of The Gambia in June-July 1996* (unpublished document, MRC the Gambia/Harvard Centre for Population and Development Studies).
9. **Ratcliffe AA, Hill AG, Walraven GEL.** *Two sides to the story. Male and female reproduction in the Gambia.* Boston, MA, Harvard Center for Population and Development Studies, 1999 (Working Paper 99.07).
10. **Campbell O, Ronsmans C.** *Verbal autopsies for maternal deaths.* Geneva, World Health Organization 1995 (unpublished document WHO/FHE/MSM/95.15).
11. **Ronsmans C et al.** A comparison of three verbal autopsy methods to ascertain levels and causes of maternal deaths in Matlab, Bangladesh. *International Journal of Epidemiology*, 1998, **27**: 660–666.
12. **Bledsoe CH et al.** Constructing natural fertility: the use of western contraceptive technologies in rural Gambia. *Population and Development Review*, 1994, **20**: 81–113.
13. **De Brouwere V, Tonglet R, van Lerberghe W.** Strategies for reducing maternal mortality in developing countries: what can we learn from the history of the industrialized West? *Tropical Medicine and International Health*, 1998, **3**: 771–782.
14. **Chandramohan D et al.** The validity of verbal autopsies for assessing the causes of institutional maternal death. *Studies in Family Planning*, 1998, **29**: 414–422.
15. **Maine D.** *Safe motherhood programmes: options and issues.* New York, Center for Population and Family Health, Faculty of Medicine, Columbia University, 1992.
16. **Walraven G, Weeks A.** The role of (traditional) birth attendants with midwifery skills in the reduction of maternal mortality. *Tropical Medicine and International Health*, 1999, **4**: 527–529.
17. **Hofmeyer GJ et al.** A randomised placebo controlled trial of oral misoprostol in the third stage of labour. *British Journal of Obstetrics and Gynaecology*, 1998, **105**: 971–975.
18. **Greenwood BM et al.** The effects of malaria chemoprophylaxis given by traditional birth attendants on the course and outcome of pregnancy. *Transactions of the Royal Society of Tropical Medicine and Hygiene*, 1989, **83**: 598–594.
19. **Shulman CE et al.** Intermittent sulphadoxine-pyrimethamine to prevent severe anaemia secondary to malaria in pregnancy: a randomised placebo-controlled trial. *Lancet*, 1999, **353**: 632–636.
20. **Mbaruku G, Bergström S.** Reducing maternal mortality in Kigoma, Tanzania. *Health Policy and Planning*, 1995, **10**: 71–78.
21. **Weil O, Fernandez H.** Is safe motherhood an orphan initiative? *Lancet*, 1999, **354**: 940–943.