

# Maternal mortality in Benghazi: a clinicoepidemiological study

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## وفيات الأمهات في بنغازي: دراسة وبائية سريرية

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**خلاصة:** أجرينا دراسة وبائية سريرية على 14 وفاة حدثت بين الأمهات من بين 79 981 ولادة لأطفال أحياء بمستشفى الجماهيرية في بنغازي بين سنة 1993 وسنة 1997. فكان معدل وفات الأمهات لكل مئة ألف ولادة حية هو 17.5. وكان المتوسط الإنجابي للمتوفيات على النحو التالي: وسطي العمر  $31.5 \pm 6.9$  سنوات، ووسطي الإنجابية 4.5، ووسطي الفترة بين الولادات  $14.6 \pm 7.0$  شهرا. وكان وسطي مدة الحمل  $27.7 \pm 14.6$  أسبوعا، وكان وسطي تركيز الهيموغلوبين  $9.3 \pm 2.1$  غرام/ديسيلتر. ولم تسع أي امرأة منهن إلى اتخاذ ترتيبات مسبقة للولادة، كما أن نصفهن كانت بهن قبل الحمل عوامل خطر طبية أو توليدية. وكانت 70% منهن مصابات بفقر الدم، وحُجزن كلهن تقريبا في المستشفى بحالات طمعة وخيمة. كما أن أكثر من نصفهن احتجن إلى تدخل جراحي. وكانت أهم الأسباب الطبية المؤدية إلى وفاتهن هي ارتفاع ضغط الدم الحملي (28.6%) والنزف (14.3%) والانصمام الرئوي (14.3%) وورم بالمخ (14.3%).

**ABSTRACT** We conducted a clinicoepidemiological study of 14 maternal deaths out of 79 981 live births at Al-Jamahiriya Hospital, Benghazi between 1993 and 1997. The maternal mortality rate per 100 000 live births was 17.5. The reproductive profile of these women was: mean age  $31.5 \pm 6.9$  years, mean parity 4.5, mean birth interval  $14.6 \pm 7.0$  months, mean gestation  $27.7 \pm 14.6$  weeks and mean haemoglobin  $9.3 \pm 2.1$  g/dL. None of the women had prebooked their delivery, 50% had preconceptional medical or obstetric risk factors, around 70% were anaemic, almost all were admitted with serious medical conditions and > 50% required surgical intervention. The main underlying medical causes of death were: hypertensive disease of pregnancy (28.6%), haemorrhage (14.3%), pulmonary embolism (14.3%) and brain tumour (14.3%).

### La mortalité maternelle à Benghazi: étude clinico-épidémiologique

**RESUME** Nous avons réalisé une étude clinico-épidémiologique des décès maternels survenus à l'hôpital Al-Jamahiriya de Benghazi entre 1993 et 1997. Il y a eu 14 décès maternels pour 79 981 naissances vivantes. Le taux de mortalité maternelle pour 100 000 naissances vivantes était de 17,5. Le profil génésique de ces femmes se présentait comme suit: âge moyen  $31,5 \pm 6,9$  ans, parité moyenne 4,5, intervalle moyen entre les naissances  $14,6 \pm 7,0$  mois, période moyenne de gestation  $27,7 \pm 14,6$  semaines et hémoglobine moyenne  $9,3 \pm 2,1$ g/dl. Aucune de ces femmes n'avait réservé à l'avance pour leur accouchement, 50% présentaient des facteurs de risque obstétricaux ou médicaux avant la conception, environ 70% étaient anémiques, la quasi-totalité de ces femmes avaient été admises dans un état grave et plus de 50% des cas avaient nécessité une intervention chirurgicale. Les principales causes cliniques de décès étaient: l'hypertension artérielle gravidique (28,6%), l'hémorragie (14,3%), l'embolie pulmonaire (14,3%), les tumeurs cérébrales (14,3%). Il devrait être possible d'abaisser encore davantage la mortalité maternelle grâce à la surveillance prénatale, la planification familiale et l'orientation rapide vers les maternités.

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## Introduction

Throughout the world it is estimated that 585 000 women die each year from causes related to pregnancy and childbirth [1]. After Asia, Africa has the second highest maternal mortality rate (MMR) with around 150 000 maternal deaths each year. For the period 1980–1985 the maternal mortality rate per 100 000 live births was estimated at 30 in industrialized countries, 450 in developing countries and 390 for the world as a whole [1]. The highest estimated MMRs in Asia were 1100 per 100 000 live births for the Republic of Yemen and 1710 per 100 000 live births for Afghanistan [2]. In Asia and Africa, maternal deaths account for between 21% and 40% of all deaths in women of reproductive age (15–49 years) compared with less than 1% in the United States [3]. However, the last three decades have seen a significant decline in MMR in almost all industrialized and some developing countries, coinciding with the development of obstetric techniques and improvements in the general health status of women [3].

Overall, women in Africa have the highest lifetime risk of maternal death because the high maternal mortality rate is compounded by high fertility. For North Africa, the estimated MMR of 550 per 100 000 live births in conjunction with an average of six births per woman creates an estimated lifetime risk of 1 in 30; in contrast, the average risk in the industrialized countries varies between 1 in 1750 and 1 in 10 000 [1,3]. Various studies, both from industrialized and developing countries, have shown that less than half of all maternal deaths are actually reported [4], and 99% of these deaths occur in developing countries, which account for 80% of world births [1].

The average MMR per 100 000 live births has been estimated at 340 in western

Asia and 700 in North Africa [3]. For the Libyan Arab Jamahiriya, the estimated MMR per 100 000 live births was 80 in 1973, 61 in 1987 and 40 in 1990 [5,6]. The earliest recorded MMR for Benghazi was for the period 1981–1984 and was 21.2 per 100 000 live births [7]. Since there have been no subsequent studies, we considered it essential to review the situation and to assess and give consideration to preventive and therapeutic measures for the reduction of maternal mortality and promotion of safe motherhood. The objectives of the study were to analyse maternal deaths by their medical characteristics and to identify risk factors amenable to interventions, which may further reduce maternal mortality.

## Definitions

- Maternal mortality: the death of a woman while pregnant or within 42 days of termination of pregnancy (irrespective of the duration and site of pregnancy) from any cause related to or aggravated by the pregnancy or its management but not from accidental or incidental causes [8].
- Direct obstetric deaths: those deaths resulting from diseases or complications which occur only during pregnancy, delivery and the postpartum period related with pregnancy or its management.
- Indirect obstetric deaths: those deaths resulting from previous existing disease or disease that developed during pregnancy and which was not due to direct obstetric causes but which was aggravated by the physiological effects of pregnancy.

## Subjects and methods

The study was carried out at Al-Jamahiriya Hospital, Benghazi, which is the only ma-

ternity hospital for the Benghazi Municipality and is the referral hospital for eastern Libya (covering nearly one-third of the Libyan population). More than 95% of deliveries, both normal births and births with complications, take place at the hospital. The hospital is equipped with modern obstetric and gynaecological services, and ultrasound scanning, blood transfusion, anaesthesia and other facilities are available. Deliveries are routinely conducted by trained midwives, difficult ones by senior house surgeons and the most complicated ones by consultant obstetricians. Obstetric operative procedures are carried out under consultant supervision and a senior teaching obstetrician is on call 24 hours a day. The hospital also serves as a teaching institution for undergraduate medical student internees and postgraduates in obstetrics and gynaecology.

Maternal deaths are discussed by all staff at clinical meetings to determine both causative and preventative factors. Most diagnoses are based on clinical, laboratory and organ imaging diagnostic facilities. The prevailing laws and customs prohibit postpartum examination and therefore such evidence is not available.

The study design was of a retrospective cohort study using medical records and death certificates. It included all the 14 maternal deaths that occurred at the hospital over the 5-year period 1993–1997. The number of live births over the period was 79 981. The records for all obstetric deaths, irrespective of the duration of the pregnancy, were reviewed and death certificates were examined to assign an accurate medical cause of death according to the ICD-10 classification [8]. The variables included were maternal age, parity, obstetric history and gestation period; plus medical condition and diagnosis on admission and causes

of death. The results were compared with those of a previous study conducted at the hospital covering the period 1981–1984 and other available studies from the Eastern Mediterranean Region, Arab countries and other parts of the world. The diagnoses were based on organ imaging, biochemical, microbiological and histopathological findings, in addition to clinical evaluation (except in three cases where the diagnoses were based on clinical evaluation only).

## Results

Over the 5 year period (1993–1997), there were 79 981 live births and 14 maternal deaths (Table 1). The maternal mortality rate per 100 000 live births was 17.5, ranging from 6.8 in 1993 to 40.1 in 1995. By nationality, 9 (64.3%) were Libyan, 3 (21.4%) were Egyptians married to Libyans and 2 (14.3%) had no nationality recorded. The recorded residence for 10 (71.4%) women was Benghazi, 1 (7.1%) came from Beida (200 km east of Benghazi) and residence was not noted for the remaining 14.3%. Their educational

**Table 1 Maternal mortality at Al-Jamahiriya Hospital, Benghazi, 1993–1997**

Year	Live births	Maternal deaths	MMR per 100 000 live births
1993	14 614	1	6.84
1994	21 162	3	14.17
1995	14 913	6	40.13
1996	14 860	3	20.18
1997	14 432	1	6.92
1993–1997	79 981	14	17.50

MMR = maternal mortality rate

**Table 2 Characteristics of women who died as a result of pregnancy at Al-Jamahiriya Hospital, 1993-1997**

Case no.	Age (years)	Parity	Interval since last delivery (months)	Pre-existing medical risk	Antenatal care
1	27	1	12	-	Unbooked
2	30	2	18	3 caesarean sections	Unbooked
3	42	9	24	Hypertension	Unbooked
4	28	9	12	Chronic anaemia	Unbooked
5	35	10	14	-	Unbooked
6	27	1	15	-	Unbooked
7	29	0	NA	-	Unbooked
8	36	7	12	-	Unbooked
9	23	1	13	-	Unbooked
10	26	0	NA	-	Unbooked
11	27	0	NA	Diabetes mellitus	Unbooked
12	36	6	14	Diabetes mellitus	Unbooked
13	35	13	12	2 caesarean sections	Unbooked
14	40	4	15	-	Unbooked

Age: mean  $\pm$  standard deviation (s) = 31.5  $\pm$  6.9 years

Parity: mean  $\pm$  s = 4.5  $\pm$  4.2 years

Interval: mean  $\pm$  s = 14.6  $\pm$  7.0 years

status was not recorded for any of the women.

Age varied between 23 years and 42 years (mean 31.5 years, SD 6.9 years). There were seven (50.0%) women between 20 years and 29 years of age, five (35.7%) between 30 years and 39 years of age and two (14.3%) women between 40 years and 44 years of age (Table 2). There were six (42.9%) women with parity of either 1 or 0 and two (14.3%) with parity of 10 or more (Table 2). Parity ranged from 0 to 13 (mean 4.5, SD 4.2). The birth interval ranged from 12 months to 24 months (mean 14.6 months, SD 7.0 months). Among all parous women, the birth interval since last delivery or termination was 12 months for four (28.6%) and within 24

months for the remainder. The gestation period at the time of death ranged from 8 weeks to 38 weeks (mean 27.7 weeks, SD 10.9 weeks). There were five (35.7%) women between 8 weeks and 21 weeks of gestation, five between 22 weeks and 36 weeks and four (28.6%) were 37 weeks pregnant or more (Table 3).

Age was a reproductive risk (i.e. being 35 years old or more) for seven (50.0%) women and parity a risk (parity of 0-1 or 10 and over) for eight (57.1%). Medical or obstetric conditions (chronic medical disorders or a bad obstetric history) were a risk for six (42.9%). As regards preconception, six (40.2%) had some risk factors, such as two or three previous caesarean section deliveries, chronic anaemia, hypertension and dia-

**Table 3 Duration of gestation, type of delivery or termination and health status of women on admission to hospital**

Case no.	Gestation (weeks)	Urine analysis	Haemoglobin (g/dL)	Type of delivery or termination	Medical diagnosis on admission
1	12	Albumin (3+)	8.0	D & C	Choriocarcinoma
2	27	-	5.0	CS and hysterectomy	Placenta praevia and history of 2 CS
3	37	Albumin (3+)	7.0	Vaginal	Eclampsia
4	33	-	2.9	Vaginal	Severe anaemia
5	36	Albumin (3+)	10.0	CS	Eclampsia
6	38	Albumin (3+)	9.9	CS	Eclampsia
7	35	Albumin (3+)	10.0	CS	Eclampsia
8	32	-	8.0	Vaginal	Anaemia
9	16	Acetone (4+)	14.0	Vaginal	Hyperemesis gravidarum
10	18	Acetone (3+)	13.1	Vaginal	Hyperemesis gravidarum
11	19	Sugar (2+)	6.2	Instrumental vaginal	DM and pneumonia
12	39	Sugar (1+)	12.6	CS	DM
13	38	-	14.0	CS	History of 2 CS
14	8	-	10.0	D & C	Septic abortion

*D & C = dilatation and curettage CS = caesarean section DM = diabetes mellitus*

*Gestation: mean  $\pm$  standard deviation = 27.7  $\pm$  10.9 weeks*

*Haemoglobin: mean  $\pm$  standard deviation = 9.3  $\pm$  2.1 g/dL*

betes mellitus (Table 2). On admission, four (28.6%) women had eclampsia, two (14.3%) had diabetes mellitus (one with pneumonia), two had anaemia and two hyperemesis gravidarum. There were individual cases of septic abortion, major placenta praevia (with a history of three previous caesarean sections) and choriocarcinoma. Haemoglobin levels on admission ranged from 2.9 g/dL to 14.0 g/dL (mean 9.3 g/dL, SD 2.1 g/dL). It was less than 5 g/dL for one woman, between 5 g/dL and 10 g/dL for nine (64.3%) and between 11 g/dL and 14 g/dL for four (28.6%). Two (14.3%) women were febrile and unconscious at the time of admission.

The type of delivery or termination was emergency caesarean section for six (42.9%) women, normal vertex for five women (35.7%), one assisted vaginal delivery and two women underwent dilatation and curettage (Table 3).

One woman died on the first day, seven (50.0%) women died in the first week, three (21.4%) women died between 8 days and 14 days and three (21.4%) died between 15 days and 21 days of delivery or termination. The average was 8.6 days. There was a direct cause of death for 11 (78.6%) women and an indirect cause for the other three women (Table 4). The most common direct obstetric causes included

**Table 4 Causes of maternal mortality at Al-Jamahiriya Hospital, 1981-1984 and 1993-1997**

Cause of death	Maternal deaths			
	1981-1984*		1993-1997*	
	No.	%	No.	%
<i>Direct cause</i>				
Haemorrhage	8	61.5	2	14.3
Hypertensive disease of pregnancy	3	23.1	4	28.7
Sepsis	1	7.7	1	7.1
Pneumonia	-	-	1	7.1
Pulmonary embolism	-	-	2	14.3
Choriocarcinoma	-	-	1	7.1
<i>Indirect cause</i>				
Anaemia	-	-	1	7.1
Aneurysm of circle of Willis	1	7.7	-	-
Brain tumour	-	-	2	14.3
<i>Total deaths</i>	13	100	14	100
<i>MMR per 100 000 live births</i>		21.25		17.5

\*Total live births = 61161

\*Total live births = 79981

MMR = maternal mortality rate

eclampsia (28.6%), haemorrhage (14.3%), pulmonary embolism (14.3%), septic shock (7.1%), choriocarcinoma (7.1%) and pneumonia. Indirect obstetric deaths were due to brain tumours (14.7%) and anaemia (7.1%).

## Discussion

Measuring the extent and causes of maternal mortality in a given country or community is extremely difficult. Populations are large and household surveys to measure

maternal mortality are very expensive; consequently most official MMRs are underestimates. The MMR in this study refers to hospital deaths before discharge, directly or indirectly connected with pregnancy, labour or postpartum.

For the period 1993-1997, the MMR was 17.5 per 100 000 live births. It fluctuated between 6.8 per 100 000 live births in 1993 and 40.1 per 100 000 live births in 1995 without any obvious trend. This rate was both lower than the rates at Al-Jamahiriya Hospital between 1981-1984 and the national estimate of 40 per 100 000 live births for the year 1995 [2,7]. Among 31 industrialized countries, MMR ranged from 1 per 100 000 live births and 21 per 100 000 live births (except in Romania) and 29 had an MMR below that of our study [3]. Furthermore, in countries of the Eastern Mediterranean Region of the World Health Organization (WHO) MMR ranged from 0 per 100 000 live births for Cyprus to 1100 per 100 000 live births for the Republic of Yemen and 1700 per 100 000 live births for Afghanistan [2]. Therefore, our rate was higher than most industrialized countries and for some developing countries. Also the MMR observed in our study was lower than the rate of 21.2 per 100 000 live births at the same hospital for the period 1981-1984 [7].

The cumulative risk status for all the women who died was high or very high. Although the educational status of these women was not recorded, none of them had made a prior booking for their delivery reflecting negligence and ignorance of the importance and availability of antenatal care. The proportion of women throughout the country who do not use the services of trained personnel during pregnancy has been reported as 33% [2]. The status of women in the community strongly affects maternal mortality and influences the pat-

tern of child rearing. In our study, there were six (42.9%) women with parity of between 6 and 13. A high MMR has been found to be associated with low levels of education, low social status and high parity (all of which, unfortunately, could not be examined in this study).

Direct obstetric deaths accounted for 78.6% of deaths and 21.4% were due to indirect causes. Similarly, during the earlier period of 1981–1984 most deaths (92.9%) at Al-Jamahiriya Hospital were due to direct causes [7]. The proportion of directly caused deaths has been shown to vary between 83% and 89% in the Syrian Arab Republic, Morocco and Tunisia [3]. Direct causes, together with anaemia, are responsible for more than 80% of all maternal deaths reported from developing countries [3]. Among the direct causes, we found eclampsia (the sequela of hypertensive disorder of pregnancy) was the most common medical cause of maternal death, followed by haemorrhage, pulmonary embolism, sepsis, pneumonia and choriocarcinoma. At present, the three leading causes of maternal death in the United States of America are pregnancy-induced hypertension, haemorrhage and pulmonary embolism; similar to the causes found in Benghazi [9]. Of the three indirectly caused deaths, two died from brain tumours and one of severe anaemia. However, no autopsies were performed to confirm the brain tumour diagnoses.

In the earlier Benghazi study, most deaths were due to haemorrhage (61.5%) or hypertensive disorder of pregnancy (23.1%) and ruptured aneurysm. In fact, hypertensive disorder of pregnancy accounted for 11.4% of all maternal diseases treated at the hospital among all women admitted for delivery between 1991 and 1992 [10].

Hypertensive disorder of pregnancy has been reported to be the primary cause of maternal mortality in Qatar, second most common cause in Bahrain and Sudan and third most common in Algeria, the Islamic Republic of Iran and Tunisia [1]. Unfortunately, as a cause of death, it declines more slowly than overall maternal mortality because it depends on the use and availability of high quality professional health care. All the women in our study with hypertensive disorder of pregnancy had already developed eclampsia before admission. In tropical Africa, the disease tends to progress rapidly and is fatal (if untreated) within 24 to 48 hours [3].

We found postpartum haemorrhage to be the cause of two deaths. In the earlier Benghazi study, the majority of maternal deaths were due to haemorrhage, indicating that as a cause of death it has declined rapidly. Haemorrhage was also the second most common maternal disorder among all women admitted to the hospital between 1991 and 1992 and caused 16.2% of maternal morbidity. Obstetric haemorrhage is the leading cause of maternal death in the developing world and frequent precursors of postpartum haemorrhage are retention of the placenta and failure of the uterus to contract and close down the blood vessels after delivery [4]. In this study, one of the women with postpartum haemorrhage was severely anaemic (Hb of 5 g/dL) and the other was grand multiparous. The former had an emergency caesarean section and the latter an instrumental delivery. Because haemorrhage is difficult to predict and is swift to kill, rates for this cause of death are slow to decline even when the overall rate of maternal mortality is low. Therefore, it is highly commendable that haemorrhage as a cause of death declined from 61.5% in

1981–1984 to 14.2% in 1993–1997, even though most women in the later period had anaemia along with serious medical disorders. A similar steep decline in maternal deaths from haemorrhage was seen in Cuba between 1962 and 1988 [3].

A further two deaths were caused by pulmonary embolism. The two women (35 years old and over) were grand multipara of six or more. One of them had anaemia (Hb of 8 g/dL) and the other had an emergency caesarean section (with a history of two earlier caesarean sections). Embolism was reported as the second most common cause of maternal death in the Islamic Republic of Iran and Qatar and the third in Bahrain [3]. Diabetes mellitus was found in two (14.3%) of the maternal deaths, one of whom died of pulmonary embolism and the other of haemorrhage after an assisted vaginal delivery. Diabetes mellitus accounted for 12.3% of maternal diseases among women admitted to the hospital between 1991 and 1992 [9].

Of the remaining fatalities, one woman died of pneumonia and another of septic shock. Both women had had abortions, one of them was admitted with a diagnosis of septic abortion and the other with diabetes mellitus. The woman with septic abortion was para four and 40 years old; both the women were anaemic. Sepsis is generally the first cause of death to decline as the overall MMR falls [1,2]. Reductions in deaths from infection or sepsis often reflect both improvements in the hygiene standards of delivery care and the wider use of antibiotics.

Lastly, one woman died of choriocarcinoma. She was 27 years old, anaemic (Hb 8.0 g/dL) and of gravida three and para one.

Anaemia was an underlying or associated cause of death among six out of seven deaths where there was surgical interven-

tion, either consequent to a caesarean section delivery or dilatation and curettage. Anaemia was also associated with all the four women who died of eclampsia and three out of four who died after emergency caesarean section deliveries. Of the two maternal deaths due to postpartum haemorrhage, one had anaemia and the other had diabetes mellitus. Therefore, anaemia was associated with the majority of deaths that followed surgical intervention as well as deaths due to abortions, infections, hypertensive disorder of pregnancy, haemorrhage, pulmonary embolism and choriocarcinoma. Overall, there were 10 (71.4%) women who had anaemia (Hb 2.9–10 g/dL), of whom two were admitted with the diagnosis of anaemia itself, one of whom died directly as a result of anaemia. In the earlier Benghazi study there were no deaths due to anaemia.

The condition of anaemia is widespread in developing countries, affecting an estimated 66% of pregnant women compared with just 14% in industrialized countries [3]. Between 1991 and 1992 up to 18.0% of pregnant women admitted to the hospital were reported to have anaemia [10]. The condition plays an important role in maternal mortality, both directly and indirectly. Death from anaemia is usually the result of heart failure, shock or an infection that often takes advantage of a patient's impaired resistance to disease.

More than one-third of women in our study died after abortions. The medical causes of death included brain tumours (two cases) and choriocarcinoma, pneumonia and septic shock due to septic abortion (one case each). Anaemia was present among more than half of these. Unsafe abortions are widespread and a major cause of maternal death in developing countries [3,4]. Throughout the world, neither lack of



access to safe procedures nor the illegal status of abortion seems to deter women from having abortions. There can be no accurate figures for abortions and many abortion deaths will have the underlying cause of death recorded as sepsis or haemorrhage.

The catchment area for Al-Jamahiriya hospital is fairly well defined and transport and cultural factors facilitate its accessibility to most women seeking admission for delivery, termination or following serious difficulties or complications. It is assumed that almost all maternal deaths occurred at the hospital. There were two deaths where the woman's place of residence was unrecorded and one other who lived outside Benghazi. If these three maternal deaths are assumed to be from outside the Benghazi area and are excluded when calculating the maternal mortality rate, the MMR at Benghazi was 13.7 per 100 000 live births. The hospital recorded MMR of 17.5 might therefore be an overestimate of Benghazi's MMR. Rapidly spreading female education, an equal sex ratio in the population (both in years 15-44 and older), combined with a low incidence of polygamy, indirectly support the likelihood of a low MMR in Benghazi.

It should be noted that the medical causes of maternal death represent only the most visible of female health problems. The event of becoming pregnant (with existing bioreproductive and medical risk fac-

tors), uniform absence of antenatal care, concomitant presence of anaemia among most women and the late attendance at hospital by women with serious complications are some of the many circumstances which may ultimately result in a woman's death. There are usually a number of opportunities during pregnancy to interrupt the chain of events that too often lead to maternal deaths. In the immediate future, however, the implementation of a "risk approach" to maternal and child health care may be a sound solution to alleviate the situation in Benghazi as well as throughout the country.

With declining mortality rates, maternal morbidity, reproductive mortality and pregnancy-related maternal mortality should be more appropriate indicators for evaluating the health risks of reproduction. At Benghazi, we believe the major measures which will further lower maternal mortality will be the raising of educational and social levels for all women, assessment of risks before and during pregnancy, complete antenatal care with high quality services at mother and child health centres, early referral of high-risk pregnancies to the maternity hospital and the efficient management of complicated cases at the hospital. Integration of mother and child health, contraceptive and hospital services, as well as the implementation of the baby-friendly hospital initiative would further reduce maternal mortality and would result in safer motherhood.

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### Promotion of reproductive health and family planning

Safe motherhood activities remained a priority issue in the Region in 1999. Strong emphasis was maintained on activities for the reduction of maternal and perinatal mortality and morbidity. Pursuant to the 1998 Sana'a Declaration, the Regional Office promoted the value of accurate and appropriate data on maternal and neonatal deaths and diseases through surveillance; intercountry and national workshops were held on developing and improving national capacity in maternal and perinatal health surveillance in close collaboration with CDC, Atlanta.

Source: The work of WHO in the Eastern Mediterranean Region. Annual Report of the Regional Director. 1 January–31 December 1999. Page 69.