

# Maternal mortality surveillance and maternal death reviews in countries of the Eastern Mediterranean Region

L.O. Chichakli,<sup>1</sup> H.K. Atrash,<sup>1</sup> A.S. Musani,<sup>2</sup> R. Mahain<sup>2</sup> and S. Arnaoute<sup>2</sup>

ترصد وفيات الأمومة ومراجعة بيانات تلك الوفيات في بلدان إقليم شرق المتوسط  
لينة الشيشكلي وهاني الأطرش وألطف موساني ورامز مهاني وسعيد أرناؤوط

خلاصة: تعرض هذه المقالة نتائج استقصاء أجري سنة 1999 في تسعة عشر بلداً من بلدان إقليم شرق المتوسط لمنظمة الصحة العالمية حول نظم ترصد وفيات الأمومة، وأعمال مراجعة بيانات تلك الوفيات في الإقليم. لقد تم جمع البيانات عن طريق استبيان استوفاه موظفو وزارات الصحة. وأظهرت النتائج أن ثلاثة عشر بلداً تتطلب تقارير رسمية عن وفيات النساء اللاتي في سن الإنجاب. كما أن معظم البلدان تُجري مراجعات لبيانات وفيات الأمومة، ولو أن ثمانية بلدان فقط لديها أنظمة للترصد. وثمة مجالات أخرى تم استقصاؤها، هي مصادر المعلومات الخاصة بوفيات الأمومة، وأنواع البيانات التي يتم جمعها، وكيفية تحليل البيانات والاستفادة منها. إن هناك حاجة لتعزيز نُظم المعلومات الخاصة بوفيات الأمومة في الإقليم، من أجل إرشاد متخذي القرارات في تخطيط برامج صحة الأمومة وفي تقييمها.

**ABSTRACT** This paper presents the findings of a 1999 survey of 19 countries of the World Health Organization Eastern Mediterranean Region on maternal mortality surveillance systems and death review activities in the Region. Data were collected by questionnaire completed by ministry of health personnel. The findings show that 13 countries require official reporting of deaths of women of reproductive age. Most of the countries conduct maternal death reviews although only 8 have surveillance systems. Other areas investigated were the sources of information on maternal deaths, types of data collected, how the data are analysed and how such data are used. There is a need to strengthen information systems on maternal mortality in the Region in order to guide decision-makers in the planning and evaluation of maternal health programmes.

**La surveillance de la mortalité maternelle et les examens des décès maternels dans les pays de la Région de la Méditerranée orientale**

**RESUME** Cet article présente les résultats d'une enquête réalisée en 1999 dans 19 pays de la Région de la Méditerranée orientale de l'Organisation mondiale de la Santé concernant les systèmes de surveillance de la mortalité maternelle et les activités d'examen des décès dans la Région. Des données ont été recueillies à l'aide d'un questionnaire rempli par le personnel du ministère de la santé. Les résultats montrent que 13 pays exigent la notification officielle des décès des femmes en âge de procréer. La plupart des pays réalisent des examens des décès maternels bien que 8 pays seulement aient des systèmes de surveillance. Parmi les autres domaines étudiés, on trouvait les sources d'information sur les décès maternels, les types de données recueillies, la manière dont ces données sont analysées et utilisées. Il est nécessaire de renforcer les systèmes d'information sur la mortalité maternelle dans la Région afin de guider les responsables de la prise de décision dans la planification et l'évaluation des programmes de santé maternelle.

<sup>1</sup>Division of Reproductive Health, National Center for Chronic Disease Prevention and Health Promotion, Centers for Disease Control and Prevention, Atlanta, Georgia, United States of America.

<sup>2</sup>World Health Organization Regional Office for the Eastern Mediterranean, Cairo, Egypt.

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## Introduction

Maternal mortality is a global public health concern and reducing maternal death is a priority on the health and political agenda of every nation. The Safe Motherhood Initiative, launched in 1987, works to reduce maternal morbidity and mortality, and it specifically aimed to cut maternal mortality by half by the year 2000 [1]. Maternal mortality is "the tip of the iceberg" [2]. While over half a million women are estimated to die annually during pregnancy, delivery and the postpartum period, the World Health Organization (WHO) estimates over 25 million cases of maternal morbidity occur every year worldwide [3]. Furthermore, it is estimated that over 99% of maternal deaths occur in developing countries.

Countries of the WHO Eastern Mediterranean Region adopted the Safe Motherhood Initiative in 1988 at the Thirty-fifth Session of the Regional Committee for the Eastern Mediterranean. In April 1998, an intercountry workshop on achievements of the Safe Motherhood Initiative in countries of the Region was held in Sana'a, Republic of Yemen [4]. During the workshop, several Member States expressed their concerns about the persistence of high maternal death rates in the Region. Some countries of the Region have some of the highest reported rates of maternal mortality in the world. Recent data from the WHO Regional Office for the Eastern Mediterranean show that in 1996 Afghanistan reported 1700 maternal deaths per 100 000 live births, and in 1990 Somalia reported 1100 maternal deaths per 100 000 live births (Table 1) [5]. The workshop identified the apparent lack of accurate data on the magnitude and causes of maternal morbidity and mortality. Participants also recognized that they lacked the skills and resources to define the problem in the Re-

**Table 1 Maternal mortality ratios (maternal deaths per 100 000 live births) for countries of the World Health Organization Eastern Mediterranean Region**

Country	Maternal mortality ratio	Year
Afghanistan	1700	1996
Bahrain	46	1995
Cyprus	0	1995
Djibouti	Not available	-
Egypt	48	1992
Islamic Republic of Iran	40	1996
Iraq	130	1994
Jordan	50	1995
Kuwait	7	1995
Lebanon	104	1996
Libyan Arab Jamahiriya	40	1995
Morocco	322	1992
Oman	21	1996
Pakistan	300	1994
Palestine	26	1996
Qatar	0	1995
Saudi Arabia	18	1993
Somalia	1100	1990
Sudan	365	1993
Syrian Arab Republic	97	1995
Tunisia	69	1994
United Arab Emirates	3	1996
Republic of Yemen	1000	1991

Source: [5]

gion and to monitor the impact and progress of maternal health programmes in achieving the goals set by the Safe Motherhood Initiative.

In January 1999, the WHO Regional Office for the Eastern Mediterranean, in collaboration with the Centers for Disease Control and Prevention, Atlanta, conducted a survey of countries of the Eastern Medi-

terranean on various aspects of maternal and reproductive health in order to gain a better understanding of the current situation in the Region. This paper presents the findings on maternal mortality surveillance systems and maternal death review activities in the Region.

## Methods

Data were collected through questionnaires completed by maternal health and family planning experts in the ministries of health in the 19 countries surveyed. The survey enquired about policies, systems and established programmes in countries of the Region that focus on identifying and investigating maternal deaths and providing family planning services, including birth spacing.

After pilot testing in the Syrian Arab Republic and Egypt, the questionnaire was revised and then distributed to 19 countries in the Region. The data from the completed questionnaires were analysed with *Epi-Info* 6.0. Data from questionable answers or answers that did not follow the specified directions were not included in the analysis.

## Results

All 19 countries included in the survey completed and returned the questionnaire (Table 2). Most of the 19 countries surveyed reported that they conducted maternal death reviews and had official legislation that makes the death of a woman of reproductive age a reportable event. Only 8 countries reported having a surveillance system for ascertaining maternal deaths (Table 2).

Of the 13 countries that officially require the reporting of deaths of women of reproductive age, 9 reported using multiple

sources for identifying maternal deaths; 10 countries reported vital records as a source for identifying maternal deaths and 9 reported that they used other sources, such as surveys and studies. Mandatory notification was stated as a source for identifying maternal deaths by 8 countries. Finally, 6 countries reported that they had maternal death review processes (Table 3).

Of the 8 countries that reported they had surveillance systems, 6 indicated that surveillance was at the national level and 2 reported that they had systems that ascertained deaths only in certain regions of the country. In 7 countries, the maternal mortality surveillance system covers both urban and rural areas, while in 1 country it covers only rural areas. In 4 of the 8 countries with surveillance systems, only hospital deaths are investigated, while in 3 countries, all deaths are investigated; data were missing from 1 country. The ministry of health is responsible for the surveillance system in 7 countries; 1 country reported that the ministry of health and the ministry of interior were jointly responsible for the surveillance system.

The types of data collected by the maternal mortality surveillance systems varied slightly. Of the 8 countries with surveillance systems, 3 reported that they collected clinical data on the causes leading to maternal death and the underlying conditions of death. The remaining 5 countries reported that, in addition to clinical data, they also collected data on the demographic and the socioeconomic status of maternal death cases.

Surveillance data are analysed at the national level in all 8 countries. However, several countries reported that analysis was also conducted at the regional, district and local levels (Table 4). Of the 8 countries with surveillance systems, 6 reported that they analysed the data annually, 1 country

**Table 2 Legislation on reporting maternal deaths, maternal mortality surveillance and maternal death review activities in countries of the World Health Organization Eastern Mediterranean Region**

Country	Has legislation that requires reporting the death of a woman of reproductive age	Has a surveillance system for ascertaining maternal deaths	Conducts maternal death review activities
Bahrain	Yes	Yes	Yes
Egypt	Yes	Yes	Yes
Kuwait	Yes	Yes	Yes
Morocco	Yes	Yes	Yes
Oman	Yes	Yes	Yes
Saudi Arabia	Yes	Yes	Yes
Iraq	Yes	No	Yes
Palestine	Yes	No	Yes
Sudan	Yes	No	Yes
United Arab Emirates	Yes	No	Yes
Cyprus	Yes	No	No
Jordan	Yes	No	No
Syrian Arab Republic	Yes	No	No
Islamic Republic of Iran	No	Yes	No
Pakistan	No	Yes	Not sure
Djibouti	No	No	No
Lebanon	No	No	No
Qatar	No	No	No
Republic of Yemen	No	No	No

reported that it conducted monthly data analysis and another reported that it performed data analysis once every 5 years.

Of the 8 countries, 5 reported that they had more than one professional responsible for data analysis. In Oman and Pakistan they have only one person in charge of data analysis, whereas in Bahrain maternal mortality review committees are responsible of analysing surveillance data (Table 5).

Most countries reported that they use surveillance data to monitor the incidence

and trends of maternal mortality, and to determine the leading causes of maternal death, the underlying conditions and the preventability of maternal death (Table 6). In all the countries with surveillance systems, the ministry of health receives the results of the data analysis. However, the information is shared with maternal death review committees in 5 countries; information is shared with health centres in only 2 countries and is shared with the media in only 1 country. Of the 8 countries with sur-

**Table 3 Sources for identifying maternal deaths in countries of the World Health Organization Eastern Mediterranean Region**

Country	Vital registration	Mandatory notification	Maternal death reviews	Not sure	Other
Bahrain			X		
Cyprus	X	X			X
Djibouti	X				
Egypt	X	X			
Islamic Republic of Iran			X		
Iraq	X		X		X
Jordan	X				X
Kuwait	X	X	X		
Lebanon	X				X
Morocco					X
Oman		X			
Pakistan					X
Palestine		X			
Qatar				X	
Saudi Arabia	X	X	X		X
Sudan	X	X	X		
Syrian Arab Republic					X
United Arab Emirates	X	X			
Republic of Yemen					X

**Table 4 Level at which surveillance data are analysed in countries of the World Health Organization Eastern Mediterranean Region**

Country*	National	Regional	District	Local
Bahrain	X			X
Egypt	X	X	X	X
Islamic Republic of Iran	X	X	X	X
Kuwait	X			X
Morocco	X	X	X	X
Oman	X			
Pakistan	X	X		
Saudi Arabia	X	X		

\*Only countries with surveillance systems are included

Table 5 Person in charge of data analysis of the mortality surveillance system

Country <sup>a</sup>	Health officer	Statistician	Epidemiologist	Health information system analyst	Other
Bahrain					X
Egypt	X		X	X	
Islamic Republic of Iran	X	X	X		
Kuwait	X	X	X		
Morocco	X	X	X	X	
Oman	X				
Pakistan		X			
Saudi Arabia		X		X	

<sup>a</sup>Only countries with surveillance systems are included

Table 6 Major items of analyses of surveillance data

Country <sup>a</sup>	Incidence, prevalence and trends	Leading causes of maternal death	Underlying conditions of maternal death	Preventability of maternal death	Preventable factors
Bahrain	X	X	X	X	X
Egypt	X	X	X	X	
Islamic Republic of Iran	X	X			
Kuwait		X	X	X	X
Morocco	X	X	X	X	X
Oman	X	X	X	X	
Pakistan					
Saudi Arabia	X	X	X	X	X

<sup>a</sup>Only countries with surveillance systems are included

veillance systems, 7 reported that the information produced by the maternal mortality surveillance system was used in the management and evaluation of both the system itself and the maternal health care programme; 5 countries reported that they also used the information in determining the allocation of resources.

Of the 10 countries that reported having maternal death review activities, 9 also re-

ported that the review activities were established because of official requirements or legislation. All 10 countries reported that these activities were established at the national level. Of the 10 countries, 6 reported that maternal death reviews were conducted annually and 2 countries reported that their maternal death review activities were performed quarterly.

**Table 7 Types of data collected in maternal death reviews**

Country*	Clinical	Demographic	Behavioural
Bahrain	X	X	
Egypt	Missing data	Missing data	Missing data
Iraq	X	X	
Kuwait	X	X	
Morocco		X	
Oman	X	X	
Palestine	X		
Saudi Arabia	X	X	X
Sudan	X		
United Arab Emirates	X	X	X

\*Only countries with maternal death review activities are included

A total of 8 countries reported that their maternal death review activities collected clinical data, 7 collected demographic data and only 2 collected behavioural data (Table 7). Most countries (8) reported that a health officer was the person responsible for collecting the maternal death review data.

Most countries stated that they conducted maternal death reviews in order to determine the incidence, prevalence and trends in maternal mortality, understand the leading cause(s) and the underlying condition(s) leading to maternal death, and to determine the preventable factors and the preventability of maternal deaths (Table 8).

## Discussion

Achieving the goals set by the Safe Motherhood Initiative is a priority in the national health programmes of countries of the WHO Eastern Mediterranean Region. Countries of the Region have adopted strategies to reduce by half the number of maternal deaths by the year 2000. Countries reported various means by which they iden-

tify maternal death cases. Of the 19 countries surveyed, 13 reported that their legislative systems required maternal death cases to be officially reported. In addition to mandatory notification, 6 countries have both maternal mortality surveillance systems and maternal death review activities. Previous studies indicate that the number of maternal deaths identified increases with the number of sources used in identifying cases. For instance, a study by Walker et al. illustrates that by using multiple case-finding sources they were able to identify 193 maternal deaths in Jamaica between 1981 and 1983, while vital statistics reported only 56 maternal deaths for the same time interval [6].

Of the 19 countries surveyed, 8 have maternal mortality surveillance systems. For various reasons, maternal deaths are hard to detect and maternal mortality remains underestimated in many industrialized and developing countries [7]. In most countries, the cause of death is not recorded on the death certificate, and in many cases the recorded cause of death may not indicate the death as a maternal death [8,9]. Maternal mortality surveillance increases

Table 8 Major items of analyses of maternal death review data

Country*	Incidence, prevalence and trends	Leading causes of maternal death	Underlying conditions of maternal death	Preventability of death	Preventable factors
Bahrain	X	X	X	X	X
Egypt	Missing data	Missing data	Missing data	Missing data	Missing data
Iraq		X	X		
Kuwait		X	X	X	X
Morocco	X	X	X	X	X
Oman	X	X	X	X	X
Palestine	X	X	X	X	
Saudi Arabia	X	X	X	X	X
Sudan	X	X	X	X	X
United Arab Emirates		X	X		

\*Only countries with maternal death review activities are included

accuracy in measuring maternal mortality and provides useful information on the scope and characteristics of the problem by using multiple sources of information for case identification and investigation. Surveillance is an ongoing, systematic process that also helps in monitoring and evaluating interventions and control/prevention programmes, and in establishing preventive measures [10].

The results of our survey illustrate that currently countries primarily want to determine the leading causes of their maternal deaths, and then the incidence, prevalence and trends of maternal deaths, the underlying conditions leading to death, the preventability of death, and finally the preventable factors of maternal death. However, qualitative and quantitative analyses of data are needed to produce essential information to develop interventions for the prevention of maternal mortality. Data analysts need to establish the medical (or pathophysiological) cause of death, as well

as determine the non-medical factors contributing to death [9]. They need to examine factors related to the woman herself (such as her care-seeking behaviour), to the community (such as traditions and practices) and to the health care system (such as accessibility to care and availability of adequate care) [9].

Our data indicate that all the countries with surveillance systems, except Oman, analyse surveillance data at more than one level (Table 4). When similar data are available, then different geographic areas can be compared. Analysing data by place of residence, place of delivery, district or region helps to identify those at risk of falling through the cracks of the health care delivery system [9].

One of the primary objectives of maternal mortality surveillance is to take action based on the results from the data analyses [9,11]. These results will help define the problem, determine the scope of the problem, identify the medical and non-medical



factors involved that lead to the problem, and determine the actions (interventions) necessary to control the problem and to prevent any future reoccurrence. Thus, it is essential to communicate this information to all the concerned parties (such as decision-makers, health personnel, the community and women of reproductive age) [11]. Comprehension of the information is essential in order to build and influence public policy and for it to be translated into public health practice conducted at all levels, including the health system, the community and the individual.

Most countries reported establishing maternal death reviews because of official requirements. In essence, maternal death reviews build on the confidential enquiry method, which is known as the gold standard for maternal death research methods [12]. Conducting nationwide enquiry is a demanding task that requires the cooperation of the country's health care system, including the health care providers, facilities and affiliates involved in the provision of health services. For example, a national maternal mortality study conducted in Egypt in 1992-93 required the cooperation of the directors of selected health bureaux, the health care providers (such as physicians and traditional birth attendants), health care facilities (such as maternal and child health units, public hospitals and private clinics), and family and friends of the deceased [13].

In addition to detailed information on the scope and characteristics of the problem of maternal mortality at the national level, maternal death reviews can also provide information about the quality of care provided by the maternal and child health care programme [12]. For example, the maternal death review study conducted in Egypt had four specific objectives: 1) obtaining a national figure of maternal mortal-

ity in Egypt, 2) identifying the main causes of maternal mortality, 3) determining the preventable factors of these maternal deaths, and 4) developing preventive programmes to reduce maternal deaths [13]. Defining objectives helps identify the indicators needed to fulfil them, and the data needed to generate these indicators [14]. The maternal mortality ratio is an example of a health indicator used by the Egyptians in their national maternal mortality study to gain a better understanding of the maternal death rate in Egypt [13].

In order to prevent and control maternal deaths, all deaths of women of reproductive age should be reviewed, and each identified maternal death should be studied to determine the social, economic and health circumstances leading to it. Maternal mortality is acknowledged to be a health and gender problem embedded in social, political, and cultural structures [12]. Unfortunately, only 2 of the 10 countries with review activities reported collecting clinical, demographic and behavioural data on maternal deaths; 4 of the remaining 8 countries collected clinical and demographic data, and the rest of the countries collected only clinical or demographic data. It is essential to collect the data needed for generating the desired information on the topics of interest.

Finally, as in all cases, having a surveillance system or a death review activity is not enough to ensure that programme and policy decisions are based on good information or even that these activities are providing the information needed for action in the war to prevent maternal death. The key is collecting proper and accurate data in a timely manner, analysing the data and producing valid information, and disseminating the information to those who need to know. The information produced is only as good as the data collected. The purpose of our survey was to describe current maternal

mortality surveillance systems and maternal death review activities in countries of the Region. No attempt was made to examine the quality of data collected or the information produced or the use of such information for decision-making or resource allocation.

## Conclusions and recommendations

During the intercountry workshop on developing national capacity in safe motherhood, surveillance, and neonatal health [15], representatives of countries from the WHO Eastern Mediterranean Region convened to review progress in the Region towards achieving the objectives of the Safe Motherhood Initiative. Participants also discussed the results of our survey and presented information on maternal mortality surveillance systems and maternal death review activities in their countries. Participants collectively recognized the need for stronger information systems and death review activities and discussed the need for implementing or strengthening existing maternal mortality surveillance systems. Furthermore, the participants emphasized the need for surveillance to assist and guide decision-makers at various levels to monitor, plan and evaluate existing maternal health programmes and to allocate resources and provide advocacy. Consequently, all the Member States present at the workshop agreed on several recommendations to be carried out by countries of the Region and supported by interested parties and non-governmental organizations.

The first recommendation was for each country to use all available data sources (such as vital statistics, national surveys and hospital surveys) for surveillance purposes. However, to generate accurate and useful

information from available data, countries recommended improving the quality of current data sources by ensuring the accuracy of information on existing records. For instance, all countries of the Region were encouraged to strengthen national vital registration systems used in generating the desired information about maternal health. Participants also recommended identifying and collecting data on indicators relevant to maternal health. According to WHO, care must be taken to ensure that indicators serve to identify possible problem areas and contribute to decision-making, rather than being ends in themselves [14]. Indicators should, as far as possible, be scientifically robust (i.e. valid, specific, sensitive and reliable), useful, representative, understandable, accessible and ethical [13]. In addition, participants of the workshop recommended that information obtained from the surveillance system be disseminated as appropriate to decision-makers, programme managers, health care providers and communities. After all, "good surveillance does not necessarily ensure the making of right decisions, but it reduces the chances of wrong ones" [16].

Finally, it was recommended that the countries enhance their analytical capacity in maternal health surveillance in general and in maternal mortality surveillance in particular. Every maternal death case identified and studied can help to prevent the deaths of other women from similar causes. Maternal mortality surveillance provides information that helps to develop appropriate interventions for preventing maternal mortality and morbidity. Implementing, modifying and enhancing the maternal mortality surveillance systems in countries of the WHO Eastern Mediterranean Region will facilitate and expedite the achievement of the goals set by the Safe Motherhood Initiative sooner rather than later.

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