

# Preventable maternal mortality in Morocco: the role of hospitals

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## Abstract

**OBJECTIVE** In 2009, the Ministry of Health of Morocco launched a national confidential enquiry around maternal deaths based on the newly implemented routine maternal death surveillance system (MDSS). The objective of this paper is to show the importance of substandard care among the factors associated with maternal deaths.

**METHODS** The Moroccan National Expert Committee (NEC) organised an audit of maternal deaths identified by the MDSS to determine the medical cause, the preventability of the deaths and the type of substandard care involved.

**RESULTS** Three hundred and three cases of maternal deaths were analysed for the year 2009. Direct causes accounted for 80.8%. 75.9% were considered avoidable by the NEC. The three main factors were insufficient follow-up of care in 45.6% of cases, inadequate treatment in 43.9% and delay in seeking care in 41.3%. The auditors found that 54.3% of all maternal deaths could have been avoided if appropriate action had been taken at the health facilities.

**CONCLUSION** The audit of maternal deaths in Morocco enabled a better understanding of the circumstances contributing to maternal deaths and pinpointed that more than half of maternal deaths were associated with substandard care in hospitals.

**keywords** confidential enquiry, maternal deaths, avoidable factors, audit, substandard care

## Introduction

Emergency obstetric care (EmOC) is seen as a priority strategy for reducing maternal mortality (Campbell & Graham 2006). This strategy includes skilled attendance at delivery both at the primary level of the health system (basic emergency obstetric care in local maternities) and at the secondary level (comprehensive emergency obstetric care) (WHO, UNFPA, UNICEF, & AMDD 2009). Morocco opted for the EmOC strategy in 1995 and created new schools of midwifery to produce the required numbers of skilled attendants for the primary level. More recently in 2008, the Ministry of Health (MOH) developed a global strategy for reducing maternal mortality. It was based on three main axes: i) reducing barriers to access to neonatal and obstetric care, including improving the availability of qualified personnel in public health facilities and fee exemption for delivery and caesarean section, ii) improving the quality of antenatal and delivery care and iii) improving the governance of the safe motherhood programme with the implementation of a

maternal death surveillance system and the stimulation of social mobilisation, partnership and advocacy (Ministère de la Santé du Royaume du Maroc 2008). Partly thanks to this strategy of supplying free antenatal care, skilled attendance at birth and EmOC, and the overall development of Morocco, by 2011 there was a progressive increase in the coverage of antenatal care (77%), skilled attendant deliveries (74%) and caesarean section (16%) (Ministère de la Santé du Royaume du Maroc 2012a). Since 1990, maternal mortality ratios decreased at an annual rate of 5.1% to reach 100 maternal deaths per 100 000 live births (uncertainty interval 62–170) in 2010. This puts Morocco among the 50 countries which are 'making progress' towards achieving Millennium Development Goal 5 by 2015 (WHO, UNICEF, UNFPA, & The World Bank 2012).

This achievement was disappointing with regard to the huge effort invested in 2009 and 2010 but may be partly explained by the delayed positive effect of the policy and by the more immediate negative consequences of the success. The huge number of women delivering in hospitals

may have contributed to a drop in the quality of care, and a number of the maternal deaths occurring in hospitals may be due to substandard care as a consequence. Indeed, simply reaching the hospital may not be sufficient to manage obstetric complications and save mothers' lives. We explored this hypothesis by reviewing the maternal deaths identified by the national maternal death surveillance system (MDSS).

## Methods

Data on maternal deaths were collected through the national MDSS that was implemented in 2009. This system, described elsewhere (Abouchadi *et al.* 2013), provides a complete documentation of the causes and circumstances of any suspected pregnancy-related death.

Pregnancy-related death records were reviewed at central level by a National Expert Committee (NEC) consisting of experts in obstetrics and gynaecology, anaesthesiology, public health and one midwife. For each case, they had to first clarify the cause of death and to decide whether it was due to direct or indirect obstetric causes, incidental causes or a late death. They retained for review 303 maternal deaths that occurred during pregnancy or within 42 days of termination but not from incidental causes. Secondly, the experts had to decide whether the death could have been avoided or not, which factors contributed to the adverse outcome and what action should be taken in future to prevent further similar maternal deaths.

The preventable aspect was broken down into 'avoidable, inevitable or not established'. An assessment of the preventability was based on good practice guidelines, literature data and the expertise of the NEC members. By consensus, death was considered preventable each time an action currently feasible in the Moroccan healthcare system or in the community could have prevented it. For example, these included an action that would have corrected inadequate treatment, inappropriate or inadequate care provision, late diagnosis or therapeutic intervention, negligence on the part of the patient, refusal of care, a professional error, no diagnosis made, distance, etc. If there was no evident healthcare system dysfunction or delay in uptake of care by patients, the death was considered unavoidable. Unavoidable deaths included, for example, death from anaesthetic accident (anaphylactic shock), collapse of an organ due to a pre-existing illness (such as cancer, kidney failure) or an acute complication, untreatable with the resources of the current Moroccan health system (liver necrosis, refractory disseminated intravascular coagulation). Finally, causes of death were coded as 'not established' if there were doubts about the

health of the woman before her pregnancy (e.g. heart failure, hormone-dependent cancer) or if the information on the records was incomplete, thus preventing a clear decision.

The completeness and consistency of the data were first checked before data entry and again during data entry. These checks resulted in identification of 147 cases requiring re-audit. A smaller expert committee then reviewed these records. Once consensus was obtained on the cause and circumstances of deaths, and the data were entered by one clerk and systematically checked by the second data entry clerk. Each case of maternal death was classified according to the main cause of death.

## Results

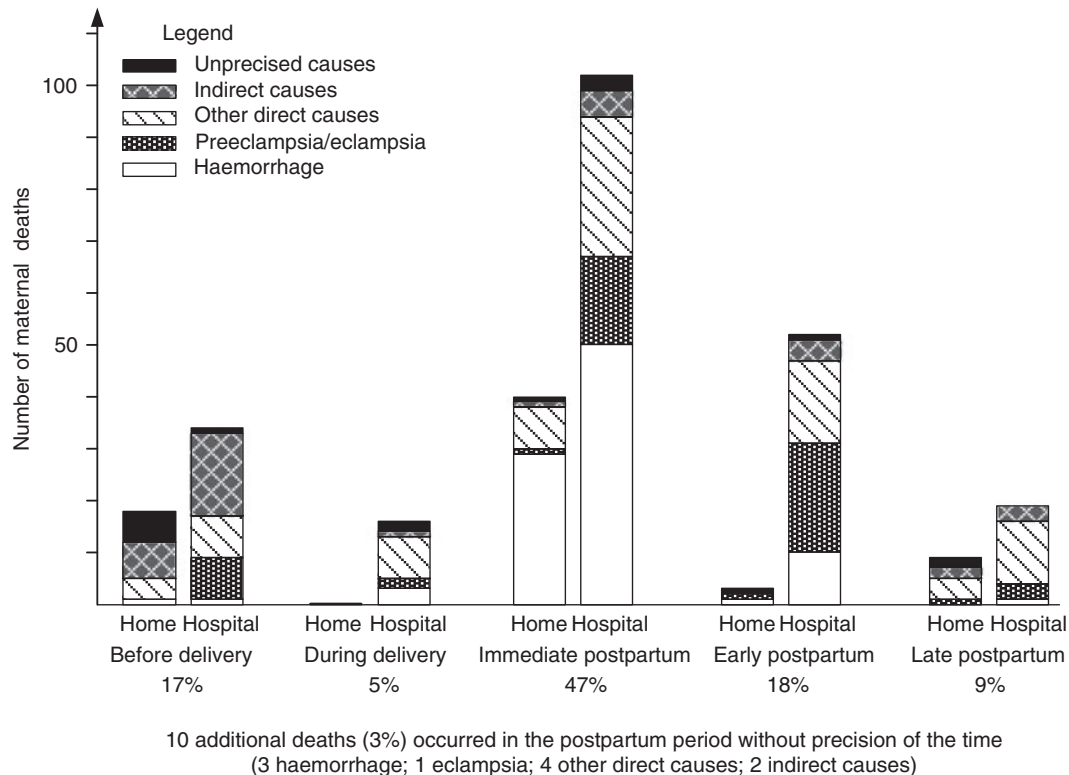
### Cause of death

A total of 303 cases of maternal deaths during pregnancy or within 42 days of termination were analysed for the year 2009. Of the 303 maternal deaths from obstetric causes, direct causes were largely dominant with 245 deaths (80.8%), irrespective of the location of death. Forty-one deaths (13.5%) were associated with an indirect cause, and in 5.6% of cases, the cause of death could not be specified beyond the fact that it was obstetrical. This lack of precision was less common in health facilities (3%) than at home (13%) or on the way to a health facility (17%).

Haemorrhage was the leading direct obstetric cause of death (33% of all deaths). Seven of 12 deaths that occurred during a transfer between health facilities were the result of a haemorrhage. The second most common cause was pre-eclampsia/eclampsia (18%) followed by infections (8%), and ruptured uterus (7%). Cardiac disease was the most frequent indirect cause of maternal death with 16/41 cases (39%).

*Time and location of death.* The majority of deaths (79%) occurred during or after delivery and half of the deaths took place during the immediate postpartum period (less than 24 h after delivery). Haemorrhage was the leading cause both at home and in hospital. Indirect causes of death showed a different pattern; half of them occurred before delivery (Figure 1).

Among the 230 hospital maternal deaths, it was possible to measure the delay between arrival and death in 185 cases (80%). About two-thirds of the deaths (66.4%) were within 24 h of arrival at a facility. This varied according to the type of complication. The highest proportion of direct obstetric death within 24 h was due

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**Figure 1** Causes of maternal deaths according to time and location of death, Morocco, 2009.

**Table 1** Delay between arrival at a facility and death according to the cause of death

Cause of death	≤ 24 h (%)	>24 h	Total
Haemorrhage	50 (87.7)	7	57
Pre-eclampsia/Eclampsia	20 (45.5)	24	44
Infection	2 (18.2)	7	9
Rupture of uterus	14 (66.7)	7	21
Other direct causes	18 (72)	7	25
Indirect cause	13 (56.5)	10	23
Other causes	6 (100)	0	6
Total	123	62	185

to haemorrhage (87.7%); pre-eclampsia accounted for less than 50% and infection for 18.2% (Table 1).

**Avoidability of death.** The proportion of deaths that were judged avoidable among the cases reviewed was 75.9%, whereas 1.3% were considered unavoidable. The proportion of those whose preventability could not be established was 22.8%. The proportion of preventable deaths varied according to the direct or indirect

cause of death. Indeed, most preventable deaths were related to one of four major direct causes (haemorrhage, ruptured uterus, pre-eclampsia, infection) with 90.5% of causes avoidable (85.7% for all direct causes), while only 46.3% of the deaths due to indirect causes (Table 2) could possibly have been avoided. The three main identified factors in 230 maternal deaths were insufficient follow-up of care in 45.6% of cases, inadequate treatment in 43.9%, and family's delay in seeking care in 41.3%.

Avoidable factors differ according to the location of the woman's death. For women who died in health facilities or during their transfer between structures, inadequate follow-up of care (22.0%) and inappropriate treatment (21.7%) were the two predominant factors. For women who died at home or en route, the family's delay in taking a decision to seek care (28%) and/or the distance to hospital (26.4%) were the main factors associated with death, whether or not there had been contact with a health facility (Table 3).

A combination of at least two factors was found in 76.1% of the 230 preventable cases. The auditors found that 54.3% of all maternal deaths could have been

**Table 2** Preventability according to the cause of death

Cause of death	Preventable		Not preventable		Not established		Total
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	
Haemorrhage	90	90,9	0	0,0	9	9,1	99
Ruptured uterus	22	100,0	0	0,0	0	0,0	22
Pre-eclampsia/Eclampsia	49	89,1	0	0,0	6	10,9	55
Infection	19	82,6	0	0,0	4	17,4	23
Other direct causes	30	65,2	3	6,5	13	28,3	46
Indirect cause	19	46,3	1	2,4	21	51,2	41
Non classified obstetric cause	1	5,9	0	0,0	16	94,1	17
Total	230	75,9	4	1,3	69	22,8	303

**Table 3** Factors contributing to death by location

Factor related to	Avoidable	Location of death				Total
		Health facility/ Transfer(%)		Home/to health facility(%)		
Health facility	Treatment	100	(21,7)	13	(10,4)	113
	Insufficient technical infrastructure	48	(10,4)	1	(0,8)	49
	Insufficient care follow-up	101	(22,0)	15	(12,0)	116
	Delay in managing patients	49	(10,7)	2	(1,6)	51
	Subtotal	298	(64,8)	31	(24,8)	329
The community	Delay in finding transport (to reach the health structure)	24	(5,2)	19	(15,2)	43
	Distance	25	(5,4)	33	(26,4)	58
	Delay by the family in seeking care	74	(16,1)	35	(28,0)	109
	Subtotal	123	(26,7)	87	(69,6)	210
Other factors	–	39	(8,5)	7	(5,6)	46
Total	–	460	(100,0)	125	(100,0)	585

avoided if action had been taken at the health facilities. All deaths that occurred during the transfer between health facilities (12) were considered preventable.

## Discussion

Our results show that almost 80% of the maternal deaths that occurred in Morocco in 2009 were avoidable and that in more than half of the hospital deaths substandard care in hospitals was involved. Such a high proportion of avoidable deaths (80%) was shocking for the NEC members, policymakers and practitioners. This result challenges the effectiveness of the policy implemented since 2009, which aimed at improving access to emergency obstetric care. From a political perspective, it may be difficult to explain why the huge investment in increasing access to public health facilities did not prevent women from dying in hospitals. Moreover, the main factors linked to substandard care in hospitals (inadequate treatment and insufficient follow-up) were due to lack of com-

petence and motivation of health personnel rather than lack of resources.

We assessed that 80% of the 303 audited deaths were avoidable, and among these 230 deaths, 129 could have been avoided provided the care had been good. This seems to be a low proportion (less than a third). However, the perceived quality of care plays a role in making delivering in maternity acceptable for the population, and we cannot thus precisely define the impact of an improvement of maternity care on utilisation. The impact may look low today in terms of numbers of maternal deaths, but it has a high political impact since the government was supposed to guarantee the best quality of care for its population and certainly prevent 'avoidable' deaths due to substandard care.

Without underestimating the importance of these substandard care factors, the definitions of avoidable death and substandard care need to be clarified when comparing these indicators with other countries. Our definition of avoidable factors is not standardised. In accordance

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with the British definition, we classified a preventable factor as ‘some departure from the standard of satisfactory accepted care (norms) by the woman, practitioner or institution/expected at a particular level of care, which may have contributed to the death’ (Walker *et al.* 1986; De Muylder 1990; Fawcus *et al.* 1996; Kildea *et al.* 2008). This definition is heavily dependent on how expert auditors define ‘satisfactory care’ and ‘standard’; furthermore, it is expected that this definition evolves over time and according to resources. Granja *et al.* (2000) in Mozambique explicitly defined avoidable factors as based on the current resources of the country and using this approach only identified 40% of preventable deaths. The definition we used is very broad. For example, a woman who died of eclampsia, who did not receive prenatal care and arrived late at the hospital, was considered to be a preventable death because the current healthcare system, according to good practice guidelines, should have brought this woman to antenatal care, screening for pre-eclampsia, and then have given her a timely referral. Other authors would have classified such a death as unavoidable. Our results demonstrate that suboptimal care is common in Morocco; however, they should not eclipse the many women whose lives has been saved by the high level of care provided in public hospitals. One can also see the glass as half full rather than half empty and say that ‘in the death registers only remain the cases which did not get optimal care’ (Benhamou *et al.* 2009).

According to statistical projections, about 650 maternal deaths were expected in 2010 (uncertainty 403–1105), but only 436 pregnancy-related deaths were identified by the MDSS (article submitted), and 303 maternal deaths reviewed. Does this low proportion of maternal deaths reviewed in relation to expected deaths (47%) allow for an accurate interpretation of the situation? The NEC believes that the maternal mortality surveillance system setup by the Ministry of Health has identified virtually all maternal deaths that occurred in hospitals (Abouchadi *et al.* 2013) and considers that the findings were relevant for action. The missing data pertain mainly to deaths at home. Coverage of deaths at home has been estimated to be about 35% of total deaths. It is likely that the unidentified deaths occurred in communities with poor access, and the appropriate action would be to improve geographical access to care. The home deaths files that were reviewed indeed pinpointed the issue of access to care (69.6% of home deaths, i.e. 81 women if applied to the 116 pregnancy-related reported deaths) and in one-fourth of cases a problem with the health services. If we consider the estimate that 330 additional mothers died at home (i.e. 650 maternal deaths according to the Maternal Mortality Expert Independent Group (WHO, UNICEF,

UNFPA, & The World Bank 2012) minus the 320 pregnancy-related deaths reported in hospitals), this suggests that Morocco still needs to invest in making facilities accessible to every mother.

Have these audits taught something to the members of the NEC and the practitioners? Prior to the audit, the consensus among the medical staff of maternity hospitals was that these deaths were largely due to the family’s delay in seeking care. The maternal death review showed that distance and the delay by families in seeking care were the problem in 28.5% of avoidable factors. However, the majority of the avoidable factors (63.6%) were due to problems with the healthcare system (substandard care or difficulty in finding an ambulance). Continuity of care issues or inadequate treatment and delay in starting treatment are factors that predominate in low and middle income countries [Zimbabwe (De Muylder 1990; Fawcus *et al.* 1996), Malawi (Kongnyuy *et al.* 2009), Nigeria (Ozumba & Nwogu-Ikojo 2008), South Africa (Chopra *et al.* 2009), Jamaica (Walker *et al.* 1990), Egypt (Abdel-Hady *et al.* 2007)] compared to rich countries [France (Bouvier-Colle *et al.* 1995), United Kingdom (Centre for Maternal and Child Enquiries (CMACE) (2011), Australia (Kildea *et al.* 2008)]. In Morocco, two types of factors (insufficient follow-up and delay in management) were related to a lack of continuity of care in the hospital and included all members of the care team; they contributed to 51% of facility-related factors. The second most important factor was inappropriate treatment (34.3% of facility-related factors), a decision which is mainly the responsibility of the physician. NEC members were surprised by the finding that reaching a hospital in the event of a complication was not sufficient to survive because of the substandard care. This message is understood and has been disseminated to all the practitioners.

Does the NEC report contribute to the improvement of the management of care for mothers and their newborns in Morocco? We believe so. In Western countries, even in the absence of proof, audits get credited with having influenced care thanks to a better understanding of the associated factors. One example cited is the study of Benbow and Maresh (1998), which concluded that the introduction of confidential audits in the UK has reduced maternal risk between 1993 and 1996 due to improvements in the processes of care (e.g. more blood banks, available protocols). However, it is impossible to prove that it was the audits that led to these changes ‘the belief that it improves clinical performance remains an article of faith rather than an established fact’ (Reynell 1986). Without evidence that maternal death reviews play a major role in reducing maternal mortality, it is still reasonable to consider that knowledge of the causes and

circumstances of death enables the relevant actors to define specific solutions and so contributes to reducing mortality. The quality of care axis of the 2008–12 Moroccan maternal mortality reduction strategy comprised three interventions: audit of maternity health facilities; organisation of the provision of neonatal care at regional level; setting up a specific ‘quality contest’ for maternities. Following the results of the first national maternal death review, the MOH included in its 2012–16 maternal mortality reduction strategic plan very specific indicators such as availability of blood and vital drugs or documented monitoring in postpartum (Ministère de la Santé du Royaume du Maroc 2012b). This shows the reactivity of the MOH to the results of the national maternal death review and gives hope that the periodic monitoring of causes and circumstances of deaths through confidential enquiries would show whether the solutions have successfully been implemented. It is also necessary that the managers of local health systems and practitioners receive the information and the means to implement the recommendations.

### Conclusion

In Morocco, the introduction of maternal death reviews was first implemented as a national strategy in 2009, along with the establishment of a maternal death surveillance system. They enabled a better understanding of the circumstances contributing to maternal deaths and pinpointed the avoidable factors. The main avoidable factors are in order of importance: 1 – insufficient follow-up of care, 2 – inadequate treatment and 3 – the delay by the families in seeking care. In this study, the likelihood of under-reporting of home deaths contributed to putting the lack of access to health services ranking third. The Ministry of Health should however keep in mind that the most important causal factor related to maternal death remains poor access to care in Morocco. Nevertheless, the observed level of sub-optimal care in hospitals is alarming. The commitment of practitioners is essential to improving quality of care. This is clearly the main challenge facing the Moroccan Ministry of Health in the coming years if the government wants the results of national maternal death reviews to make an effective contribution to accelerating the reduction of maternal mortality.

### Acknowledgements

We thank the regional and provincial managers and the provincial team responsible for the maternal mortality surveillance system for their commitment and their

contribution to the setup of this system. Our thanks for their collaboration also go to the Ministry of the Interior, the members of the NEC, the WHO, the UNPFA and the Fundacio clinic for their support to the NEC. Particular thanks go to Marilys Corbex (Maternal & Reproductive Health Unit, Institute of Tropical Medicine) for her useful comments and to Rachel Hammonds (International Health Policy Unit, Institute of Tropical Medicine) for her careful editing.

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