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Maternal mortality in Southern Iraq Marshes

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Abstract

Background: Maternal mortality is suffering a longstanding ignorance in most of the developing countries including Iraq which lies with countries that have poor registration systems. In addition, maternal mortality is especially important since the WHO have put the reduction of MMR as one of the six health related MDGs adopted by United Nations and declared in 2000.

Methods: The principal method was the sisterhood method which is especially recommended for the situation of Iraq. It involved household visits and made successful interviews with 3683 females in the reproductive age. The questionnaire used was a bit modified from the original survey questions invented for this approach.

Results: The estimated maternal mortality ratio of 92/100 000 live births which looks reasonable if compared to the national estimates made by the Iraqi Ministry of Health, Ministry of Planning and other organizations in the relevant time period.

Conclusion: The current estimate of maternal mortality in marshes of 92 per 100000 live births is reasonable within national context. The present study revealed a tendency for maternal mortality to have declined over years. Most of the causes of female mortality and maternal mortality are preventable.

1- Introduction

Reproductive health (RH) is defined by the WHO as: A state of complete physical, mental and social wellbeing and not merely the absence of disease or infirmity; in all matters related to the reproductive system and to its functions and processes. Maternal health is a term that refers to the health of women during

pregnancy, childbirth and the postpartum period (WHO 2006), while motherhood is often a positive and fulfilling functional experience, but for too many women it is, however, associated with suffering, ill-health and even death (WHO 2006).

In many developing countries, maternal health is described as being of poor quality, or even deficient seriously. In addition, maternal health related problems comprise around 18% of all burden of disease of women in the developing countries **(**WHO 1992, Lule *et al* 2005)

Maternal mortality ratio (MMR) is used to measure the maternal health services and to assess the condition of maternal health. According to the WHO every minute of every day somewhere in the world, a woman dies as a result of complications arising during pregnancy and childbirth. The majority of these deaths are avoidable (UN 2007).

A maternal death is the death of a woman while pregnant or within 42 days of termination of pregnancy, regardless of the site or duration of pregnancy, from any cause related to or aggravated by the pregnancy or its management but not from accidental or incidental causes (WHO 1996, WHO 2006, Hoyert 2007**)**.

The 10th revision of the International Classification of Diseases (ICD10) makes provision for including late maternal deaths occurring between six weeks and one year after childbirth (WHO 2006). Maternal deaths are subdivided into direct and indirect obstetric deaths. Direct obstetric deaths result from obstetric complications of pregnancy, labour, or the postpartum period and account for 80% of all maternal deaths. They are usually due to one of five major causes; hemorrhage (accounts for a quarter of all maternal deaths), sepsis, eclampsia, obstructed labour, and complications of unsafe abortion as well as interventions omissions, incorrect treatment or events resulting from any of these (WHO 1996).

Indirect obstetric deaths result from previously existing diseases or from diseases arising during pregnancy, which are aggravated by the physiological effects of pregnancy; examples of such diseases include malaria, anaemia, HIV/AIDS, and cardiovascular disease (WHO 1996).

In practice, it is often impossible to determine the exact cause of death of a pregnant or recently pregnant woman particularly when deaths occur outside health facilities. For this reason, WHO and others working in this field often use a broader definition, namely pregnancy-related death. This is consistent with the need to determine cause of death and classifies as pregnancy-related all deaths of women of reproductive age in which the woman was pregnant at the time of death or had recently been so. For all practical purposes, the difference between the

two measures is minimal because only a very small proportion of deaths of pregnant or recently pregnant women are unrelated in some way to the pregnancy itself (Hoyert 2007). In other words, the proportion of all deaths among these women that are incidental is very small in almost all settings (WHO 1996).

Measuring maternal mortality accurately is difficult. In most of the developing countries where maternal mortality is high, vital statistics which are crucial data sources do not exist. Worldwide, maternal mortality is generally underestimated because of misclassification or underreporting of maternal deaths or both **(**Anonymous 1997, WHO 2004, WHO 2007, WHO 2008)

According to the United Nations Children's Fund (UNICEF) 1996 reports; nearly 585,000 women die annually from complications arising from pregnancy and childbirth (UN 2007). Ninety-nine percent of them occur in developing countries, most of them are preventable. Iraq lies within the upper margin of the group of countries with MMR of 50-299 per 100000 live births. According to previous studies (Iraq 2008), maternal mortality ratio ranges between 117 per 100000 live births in 1989 to 300 per 100000 live births in 2005. The most recent and probably the most accurate estimates for MMR is 84 per 100000 live births (MOH 1999, Anonymous 2008)

The Marshlands of southern Iraq suffered long from an exceptional situation of Iraq over the last few decades. The living conditions may be even worse in that the infrastructures are in no way better than any other land of the country. Electricity, safe water, suitable housing and paved roads are main sites of deficiency. Poverty, ill health and low literacy level comprise the triad of the rural and marshlands misery. All possible determinants of maternal mortality may be operating in the marshes.

The present study attempts to measure adult female mortality with some emphasis on maternal mortality ratio in Southern Iraq Marshes.

2- Methods and subjects

At least five approaches to estimate maternal mortality can be identified from the revised literature: Vital registration (WHO 2007), direct household survey Sisterhood methods, Reproductive age mortality study, verbal autopsy and census **(**WHO 2004, WHO 2007**)**.

The sisterhood method was adopted in this study. The sisterhood method was originally developed during the late 1980s **(**WHO 2004**)**. The approach was designed to overcome the problem of large sample sizes and thus reduce costs. It is an indirect measurement technique. The method reduces sample size requirements because it obtains information by interviewing respondents about the survival of all their adult sisters. Consequently, it reduces the over all cost of

studies (Dyson 2006, Maternal mortality update 2004). In settings with high levels of maternal mortality (over 500 maternal deaths per 100,000 live births), sample sizes needed can be of the order of 4,000 households or less. Because such reports cover deaths occurring over a large interval time, the results generate an overall estimate of maternal mortality for a point centered around 10-12 years before the survey. However this period can be shortened by the limitation of the respondent age to younger groups e.g. below 30 years (WHO 2004).

The study was conducted on the population of Missan governorate including all population of eastern and central marshes. Excluded were the populations of western marshes for logistics reasons. The study area consists of a number of urban centres surrounded by vast area of rural populations. A good part of the rural population is living within or very close to the marshes. The study aimed at estimation of female mortality with specific attempt to calculate maternal mortality ratio.

The WHO recommendations for using direct versus indirect sisterhood method were revised, and the conditions of the area under study fulfilled the justifications of indirect (original) sisterhood method usage (WHO 2004). These criteria include:

- No reliable estimates of the MM and an approximate level of the MM level is needed to draw attention to the problem.
- Resources do not permit immediate term approach for MM measuring.
- Starting point is needed for more detailed follow up.
- Resources are only available for smaller sample size.
- The method can give an estimate of MM in reasonably beneficial for the purpose of the study. The time period of the MM estimate is ranging from 4-11 years prior to the survey application (WHO 2004).

The original **indirect sisterhood method**, which is adopted in this study, asks respondents four simple and basic questions:

1. How many sisters (born to the same mother) have you ever had who were ever-married (including those who are now dead)?
2. How many of these ever-married sisters are alive now?
3. How many of these ever-married sisters are dead?
4. How many of these dead sisters died while they were pregnant, or during childbirth, or during the six weeks after the end of pregnancy?

The sample size needed to perform the survey is correspondent to the expected maternal mortality ratio in the area of study. Reviewing the literature, it was possible to identify a maternal mortality ratio of 300/100000 live births in Iraq. Therefore the required sample size was estimated to be around 4000 respondent.

Voluntary health workers (VHWs) for the AMAR international charitable foundation were employed for the gathering of data after full training on the study subject and on filling of the specific questionnaire form of the study.

One percent of the interviews were repeated by the author for the purpose of confirming the true application of the questionnaire. Consistency and reliability were high enough to trust the work of VHWs.

Tabulation and calculations

The results were tabulated according to each of the reported variables and an estimation of the total fertility rate (TFR). Since there is no reliable estimate about the fertility in the area of study and since there is only modest reduction in the fertility in general population in Iraq (Health globalis 2008, WHO 2008**)** ; the TFR of the respondents has been used as an approximate to the TFR of the deceased sisters. The used formulas of calculation are as follows:

Age specific fertility rate (ASFR)

$$= \frac{\textbf{Births in year to women aged X}}{\textbf{No. of women aged X at mid-year}}$$

$$\text{TFR (per woman)} = \frac{\textbf{ASFRs x 5}}{\textbf{1000}}$$

Sister unit = Reported number of sisters × K where K is an adjustment factor based on age distribution pattern for developing countries[18] which are listed below:

Age group	**Period of age group**	Adjustment factor
A	**15-19 years**	0.107
B	20-24	0.206
C	25-29	0.343
D	30-34	0.503
E	35-39	0.664
F	40-44	0.802
G	45-49	0.900

Life time risk

$$= \frac{\textbf{Total number of maternal deaths}}{\textbf{Total sister units of risk exposure}}$$

MMR= $\mathbf{1-[\ 1-(LTR \times 1/TFR]} \times \mathbf{100000}$

All compiled data were fed on computer programme using the Statistical Package for Social Science (SPSS-Version-11). Data were presented in tables and appropriate statistical tests (if needed) were used accordingly.

3- Results

A total of 3683 respondents were interviewed of whom 440 were interviewed in health facilities, the rest (3243) were interviewed through household visits. No more than one respondent per household visit was interviewed. The respondents are exclusively adult females in the age groups of 15-49 years.

Characteristics of respondents

Marital status and age of respondents: Most of the respondents were married (87%). Single, divorced and widows were also interviewed in smaller proportions; 10.7 %, 0.9% and 1.4 % in that order. Regarding their age (Table 1), nearly three quarters (73.2%) aged 34 years or less. Women aged 35 years and over accounted for 26.8% 0nly.

Table 1: Age and marital status of respondents.

Age group	Period (years)	Single	Ever married)	Divorced	Widow	Total	Cumulative percent
A	**15-19**	**214**	**240 (240)**	**0**	**0**	**454**	**12.3**
B	**20-24**	**72**	**579 (590)**	**7**	**4**	**662**	**30.3**
C	**25-29**	**57**	**929 (951)**	**12**	**10**	**1008**	**57.7**
D	**30-34**	**27**	**525 (545)**	**7**	**13**	**572**	**73.2**
E	**35-39**	**18**	**547 (557)**	**3**	**7**	**575**	**88.8**
F	**40-44**	**9**	**262 (280)**	**3**	**15**	**289**	**96.66**
G	**45-49**	**0**	**120 (123)**	**0**	**3**	**123**	**100**
Total	**15-49**	**397**	**3202 (3286)**	**32**	**52**	**3683**	

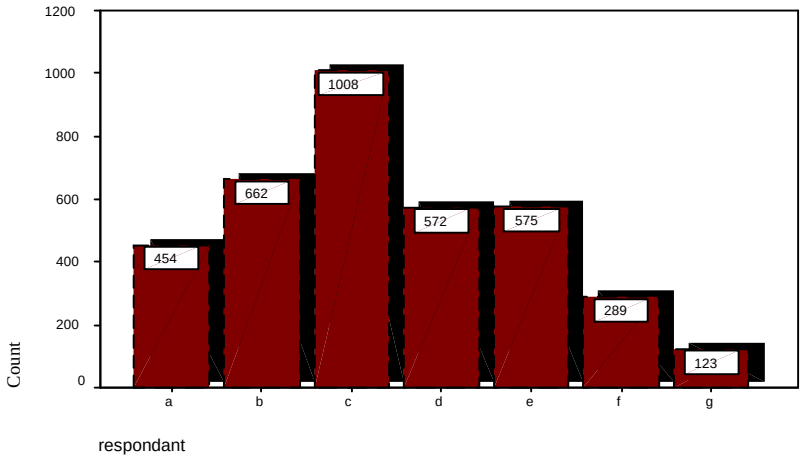

Fig.1: Age distribution of respondents

Occupation: Most of the respondents were housewives (92.3%). Governmental employees are mostly teachers; nurses and few (7.7%) are employed as workers in the local schools and primary health care centres

Education: Illiteracy is very prevailing among the respondent women in the reproductive age who were interviewed 33.5%). Those who are having Diploma are mostly nurses and primary school teachers in the sampled areas. The respondents having a Bachelor are mostly teachers in the secondary schools.

Table 2: Respondent's education levels

Level	Number	Percent
Illiterate	**1232**	**33.5**
Primary school	**1383**	**37.6**
Intermediate	**598**	**16.2**
Secondary	**212**	**5.8**
Diploma	**205**	**5.6**
Bachelor	**53**	**1.4**
Total	**3683**	**100**

Number of dead sisters: Table 3 gives details on the number of sisters, ever married sisters and dead sisters according to age groups. The total reported number of dead sisters was 128.

Age specific fertility rates for the respondents: Age specific fertility rate (ASFR)can be calculated by dividing the number of live births by the number of ever married respondents in each of the age strata as shown in Table 4.

The age specific (and marital specific) fertility rates were used to calculate the TFR as follows:

$$\text{TFR (per woman)} = \frac{\sum \text{ASFRs} \times 5}{1000}$$

$$\text{TFR} = \frac{1366 \times 5}{1000}$$

=6.8 births per women completed reproductive age.

Table 3: Other characteristics of the respondents.

Age group	Number of respondents	Parity*	No of sisters who are ever married	No of dead sisters
A	**454**	**166**	**1051**	**9**
B	**662**	**875**	**1804**	**8**
C	**1008**	**2163**	**2944**	**26**
D	**572**	**1368**	**1620**	**35**
E	**575**	**1735**	**1645**	**34**
F	**289**	**814**	**712**	**10**
G	**123**	**86**	**215**	**7**
Total	**3683**	**7207**	**9991**	**128**

Table 4: Age specific fertility rates of respondents

Age group	Number of women	Number of ever married women	Number of live births	ASFR*
15-19	**454**	**240**	**166**	**69**
20-24	**662**	**590**	**875**	**148**
25-29	**1008**	**951**	**2163**	**227**
30-34	**572**	**545**	**1368**	**251**
35-39	**575**	**557**	**1735**	**311**
40-44	**289**	**280**	**814**	**290**
45-49	**123**	**123**	**86**	**70**
Total	**3683**	**3286**	**7207**	**1366**

Characteristics of the dead women in the reproductive age

Of the 3683 respondent, 3.5 % reported the death of one sister. Thus, it was possible to detect 128 deceased women in the reproductive age. No respondent has reported a death of more than one sister. The characteristics of deceased sisters are summarized as follows:

Age: The majority of deceased women were very young at the time of death. Nearly 60.2% died before the age of 30 years. The mean age of the deceased women was 27.6 years (confidence interval of the mean = 26.7- 28.5) and the median was 25 years. The distribution of deaths per age categories is summarized in Table 5.

Table 5: Deaths by age categories

Age group	Number of deaths	Percent	Cum. Percent
A	**28**	**21.9**	**21.9**
B	**25**	**19.5**	**41.4**
C	**24**	**18.8**	**60.2**
D	**13**	**10.2**	**70.3**
E	**14**	**10.9**	**81.3**
F	**11**	**8.6**	**89.8**
G	**13**	**10.2**	**100**
Total	**128**	**100.0**	

Place of death: Half (50.0%) of the deaths occurred in hospitals, 47.7% occurred at home and 2.3% were reported to have occurred in neither home nor hospital, these were: two in the "river" as drowning and one in the street due to road traffic accident.

Occupation: All of the reported deaths were among housewives.

Marital status: The marital status of the deceased sisters is described in Table 6.

Parity: The range of children ever borne to the deceased sisters was from none to 10 with a mean of 3.2 and an SD of 2.56. The number of children in relation to the age categories of the deceased is listed in Table 7.

Table 6: Marital status of the deceased sisters

Age group	Married	Single	Total
A	**10**	**18**	**28**
B	**11**	**14**	**25**
C	**20**	**4**	**24**
D	**10**	**3**	**13**
E	**12**	**2**	**14**
F	**6**	**5**	**11**
G	**13**	**0**	**13**
Total	**82**	**46**	**128**

Table 7: Parity per age categories of the married dead sisters

Age group	Number of children	Percentage
A	**9**	**10.0**
B	**11**	**13.7**
C	**20**	**24.7**
D	**10**	**12.4**
E	**12**	**14.9**
F	**6**	**7.5**
G	**13**	**16.0**
Total	**81**	**100.0**

Residence of the deceased sisters: Of the 128 deceased sisters, 95 (74.2 %) were from rural areas, 29 (22.7%) were from urban areas and 4 (3.1%) were of unidentified residence.

Cause of death: Despite the intensive interrogative interviews with the sisters it was not possible to have the cause of death of the deceased sisters determined in around 18 % of the cases. The rest which were determined with considerable accuracy according to the interviewed sister's memory in the shortest phrase are listed in Table 8. The proportion of maternal deaths represented 16.4 % of the total reproductive age female mortality and 20.4% of the cases for which causes were determined. It was not possible to determine the cause of death in 25 (19 %) of the reported deaths.

The maternal deaths by age category are represented in Table 9.

Table 8: Reported causes of deaths of deceased sisters

Cause of death		Frequency	Percent
Accident*		**12**	**9.27**
Anemia		**1**	**0.78**
Appendicitis		**1**	**0.78**
Bronchial asthma		**1**	**0.78**
Bullet injury		**4**	**3.12**
Burn		**17**	**13.28**
Cancer		**10**	**7.81**
Cerebral palsy		**2**	**1.56**
CVA		**7**	**5.47**
DM		**1**	**0.78**
Drowning		**3**	**2.34**
Epilepsy		**1**	**0.78**
Heart disease		**2**	**1.56**
Hypertension		**1**	**0.78**
Jaundice		**2**	**1.56**
Kala azar		**1**	**0.78**
Meningitis		**2**	**1.56**
Mental retardation		**1**	**0.78**
Psychosis		**1**	**0.78**
Pregnancy related	**labour**	**17**	**16.4**
	PPH	**2**	
	Jaundice	**1**	
	pregnancy	**1**	
Renal failure		**2**	**1.56**
Sepsis		**1**	**0.78**
SLE		**1**	**0.78**
Sudden death		**5**	**3.90**
TB		**1**	**0.78**
Typhoid		**2**	**1.56**
Undetermined		**25**	**19.35**
Total		**128**	**100**

*** Accident includes fatal war and non-war injuries like RTA, mine injuries and**

shell injuries but not deaths from bullet injuries which are tabulated separately.

Table 9: ma ternal deaths by age categories

Age group	Number of respondents	Adjustment factor (K)	Sister unit of exposure
A	**1051**	**0.107**	**112.5**
B	**1804**	**0.206**	**371.6**
C	**2944**	**0.343**	**1009.8**
D	**1620**	**0.503**	**814.9**
E	**1645**	**0.664**	**1092.3**
F	**712**	**0.802**	**571.0**
G	**215**	**0.900**	**193.5**
Total	**9991**	**3.525**	**4165.6**

Calculation of maternal mortality ratio

From Table 8 the number of maternal deaths is 21. if we assume that among the 25 cases of undermined cause, maternal deaths also represent 16.4% or 5 cases, the total maternal deaths could be 26 cases and the maternal mortality ration is calculated as follows:

$$LTR = \frac{\text{Total number of maternal deaths}}{\text{Total sister units of exposure}}$$

$$LTR = \frac{26}{4165.6} = 0.00624$$

$$MMR = 1-[1-(LTR \times 1/TFR] \times 100\,000$$

$$MMR = 1-[1-(0.00624 \times \frac{1}{6.8})] \times 100\,000 = 92/\ 100\,000\ LB$$

4-Discussion

The Importance of measuring maternal mortality cannot be overlooked especially when MMR is considered as an indicator of reproductive health However, measuring maternal mortality levels is difficult and researchers, including the present study authors, should have to judge carefully about the justification of implementing a research on the subject. Expected difficulties in implementation of data collection as well as in the analysis of the collected data should not prohibit attempting to obtain the most precise information possible.

Registration of vital events, births and deaths, in most of the developing countries are not optimal. They are incomplete, biased, unrepresentative and often out-of-date (Lopez et al 2007). Iraq shares 60 countries in the virtue of having poor registration systems (WHO 1995). This required the use of alternative approach to estimate maternal mortality in southern Iraq marshes. The sisterhood method provided a good alternative. The estimate of maternal mortality ratio obtained in this study (92 per 100000 live births is within the range reported for Iraq for the period 1990-2005, but is slightly higher than the estimates obtained in 2007 at 84 maternal deaths per 100000 live births.

It is not difficult to explain such differential. Marsh population are severely under-served, under developed, unstable and surrounded by very undesirable conditions. Obstetric care is poor and high maternal mortality is no surprise. It is very recommended that development projects including adequate health care services are adopted in southern Iraq marshes. Vital events registration needs reform at governorate level and at each primary health care centre.

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