Research Article

Etiologic assessment of maternal mortality in west Azerbaijan, Iran: a retrospective descriptive study

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ABSTRACT

Background: The occurrence of maternal death threatens the family foundation and children's health. Determining factors affecting maternal mortality can help us adopt more effective strategies to prevent similar events. This study aimed to determine the factors involved in maternal deaths in West Azerbaijan between years 2007 and 2012.
Methods: A descriptive retrospective study was performed. Data were collected from health vice chancellor of West Azerbaijan database.
Results: According to the results of this research the average Maternal Mortality Rate (MMR) was 22.38 per 100000 live births which constituted change 4.45% of overall maternal mortality in Iran. Hemorrhage was the most prevalent cause of maternal death (26.82%) followed by eclampsia, preeclampsia and pulmonary embolism, respectively. MMR was higher in 18-35 age group, unintended pregnancies and women with low socioeconomic status. Assessment of the impact of any delay in three stages (family, referral and treatment) indicated that incidence of delay in treatment stage was more prevalent than two others.
Conclusions: Maternal mortality is still considerably high in West Azerbaijan. Increasing the coverage and the quality of prenatal and postpartum care, family planning counseling, and improving the skills and knowledge of the medical and midwifery staff would be effective in reducing maternal mortality rates.

Keywords: Maternal death, Mortality Related to Pregnancy, Pregnancy, Mortality

INTRODUCTION

One mother is dying every minute and 1600 mothers die daily due to pregnancy or delivery complications.[1] According to World Health Organization (WHO) International Classification of Diseases 10th edition (ICD 10) maternal mortality is defined as the death of a woman while pregnant or within 42 days postpartum, irrespective of the duration and site of the pregnancy, from any cause related to or aggravated by the pregnancy or its management but not from accidental or incidental causes.[2]

Maternal mortality rate (MMR) shows the number of maternal deaths for every 100,000 live births resulting from complications of pregnancy and delivery and it is one of the most important indicators of a country's socio-economical development.[2,3] This ratio is influenced by women's level of education, availability of midwifery and gynaecological services, health costs, social status of the family and transportation and communication facilities in rural areas. WHO's statistic data estimate that 88–98% of all maternal deaths are preventable if maternal health services are available for all pregnant women.[4]

The mean MMR ratio in developing countries is estimated to be 200 deaths per 100000 live births while

this figure is only 20 in developed countries.[5] Haemorrhagic events, hypertension, infection, diabetes, malaria, AIDS, obesity and thromboembolism has been introduced as the major causes of maternal deaths by WHO.[6] Although the worldwide maternal mortality rate has dropped by over 30% between years 1990 and 2008, the figure is still far from the optimum goal.[7] According to the Millennium Development Goals, maternal mortality ratio should be reduced by 75% from 1990 to 2015.[8]

Due to the importance of data on maternal deaths, Iran has adopted a new policy towards the reduction of maternal deaths. In just over three decades, Iran has encountered demographic changes especially a significant reduction in conception rates and population growth. Parallel to this transition, Iran has experienced a significant decrease in the maternal mortality ratio comparable with developed counties.[9] A previous study in a less developed province in Iran showed that bleeding was the major cause of maternal death. The MMR ratio was found to be 57 in this region. In this study, deaths were associated with illiteracy of mothers, pregnancy history of four times or more; residency in rural areas and failing to access midwifery care.[10] Another study in east Azerbaijan province also indicated a maternal death rate of 42.4 deaths per 100000 live births.[11]

While Improvements in life standards in recent decades and developments in healthcare facilities play a positive role in this regard, social and cultural traditions, early marriage, higher rate of fertility as well as lower educational level in women in West Azerbaijan region causes a controversy to achieve an optimum outcome.[11]

We aimed to evaluate MMR in West Azerbaijan province during a six-year period. We also determined the main reasons of maternal death in this province as well as its correlation with demographic data, social and economical factors. Consequently, the obtained data would enable us to find potential preventive solutions by presenting these data to the healthcare officials.

METHODS

This retrospective descriptive study was conducted during a six-year period from 2007 to 2012 in West Azerbaijan province. Data were recruited from the Urmia University of Medical Sciences, vice chancellor of health database. A checklist prepared by vice chancellor technical committee which included demographic characteristics of mother, educational level, socio-economical status, the interval of pregnancies, cause of death, number of pregnancies, type of delivery and delivery outcome (healthy, unhealthy, dead new-born) was filled for all maternal death files. Additionally, any delay in action contributing to the death by family members, in referral stage or in healthcare setting was recorded.

The study was approved by the ethical committee of the faculty of medicine, Urmia University of Medical Sciences. Descriptive statistical analysis was performed by SPSS (version 20).
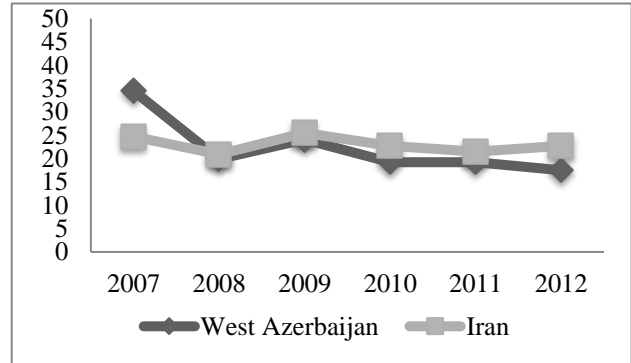
RESULTS

Figure 1: Pattern of MMR change in West Azerbaijan vs. Iran between 2007 and 2012.

The total number of deaths occurred between 2007 and 2012 was 82 cases in this region accounting for 4.45% of the overall deaths during the same period of time in the country. During our study the MMR in West Azerbaijan experienced a downward trend starting from a maximum MMR of 34.5 which eventually reached 17.5 in 2012 (Figure 1).

Table 1: Causes of maternal death in this study.

Cause of Death	Number (%)
Hemorrhage	22(26.83)
Eclampsia	14(17.07)
Thromboembolism	10(12.20)
Cardiovascular Accident	2 (2.44)
Illegal Abortion	1 (1.22)
Anesthesia and surgery complications	3 (3.65)
Unclassified	5 (6.10)
Other Causes	25(30.49)

We investigated the main reasons causing maternal death in this province. Hemorrhage, eclampsia and thromboembolism were the three main causes of death in our study with 26.83%, 17.07% and 12.20% of overall maternal deaths, respectively (Table 1).

Maternal age

There was not a record of death for maternal age of 18 or below. Seventy-five percent of maternal deaths occurred in 18-35 age group while 25 percent of overall deaths occurred in women older than 35 years old.

Lodging status

Regarding the place of residence of the mothers, urban areas had a higher prevalence of maternal death compared to rural areas. Of all maternal deaths 52.43% occurred in women who resided in urban areas while the remaining 47.57% of mothers resided in towns or villages.

Unintended pregnancy

Study results indicated that 13.08% of the pregnancies leading to maternal death during the six-year assessment were unintended.

Time of death

We evaluated the time of death in three categories: 1) during pregnancy 2) during delivery 3) postpartum. Majority of deaths (68.29%) in study period occurred postpartum followed by 24.39% during pregnancy. The lowest figure of death belonged to the time of delivery with 7.31%. In 2007-2011 time interval most of the maternal deaths happened after delivery, however, in 2012 a large percentage of deaths (54.54%) occurred in pregnancy stage (Figure 2).
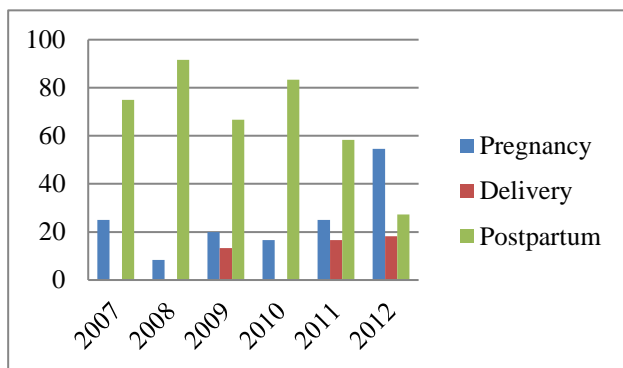

Figure 2: Percentage of maternal deaths in pregnancy, delivery and postpartum stage in six years.

High risk pregnancy

High risk pregnancy was defined as any co-existing disease during pregnancy, history of C-section and multiple pregnancies, first conception, pregnancy in age over 35, placenta previa and placental abruption. High risk pregnancy was observed in 58.53% of all cases. Year 2008 had the highest rate of high risk pregnancies and 2010 had the lowest rate in this regard with 75% and 33.33% respectively.

Type of delivery

After exclusion of twenty deaths occurred during pregnancy, the trends in two main types of delivery (cesarean and natural vaginal delivery) were evaluated.

Natural delivery and cesarean had the same share in overall maternal deaths (50%). However, trends differed significantly in different years. Moreover, 70.96% of the deliveries were performed by a gynaecologist and obstetrician specials, 16.12% were performed by an educated midwife and 12.90% were performed by traditional local midwives (Figure 3).
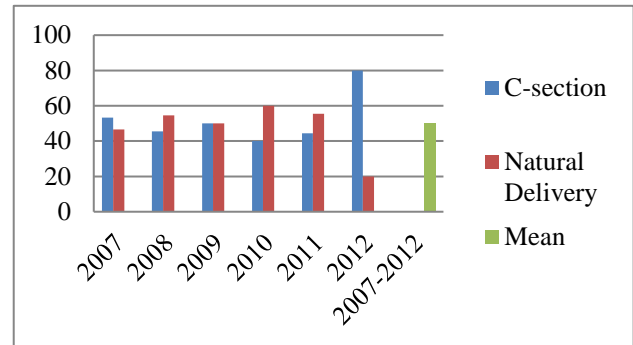

Figure 3: Percentage of cesarean versus natural delivery rates in maternal deaths.

Number of pregnancies and pregnancy interval

The percentage of mothers with previous pregnancies less than five was 82.92. Remaining 17.08% had a pregnancy history of five or more. Regarding pregnancy interval, 59.75% of the pregnancies had a three-year interval or less between their two recent pregnancies.
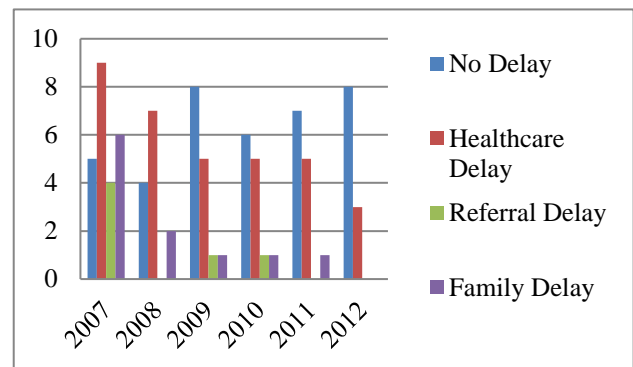

Figure 4: Incidence of delay in maternal care in family, referral or healthcare level.

Birth outcomes

After exclusion of twenty deaths which occurred during pregnancy, the birth outcome was categorized as live birth, birth with defects and stillbirth (dead birth). Of all deliveries, 66.12% resulted in live births while 12.92% of the new-borns had a congenital disorder or other defects. Stillbirth was observed in 20.96% of the cases. No neonatal death was encountered in year 2008. In years 2009 and 2009 no case of neonatal defect or anomaly was observed. The rate of neonatal rate was considerably higher in 2009 with 5 deaths (41.66%).

Prenatal care

Obtained results showed that 85.36% of the mothers had partial or complete access to prenatal care during their pregnancies which included gynaecologist or midwifery visits, sonography during pregnancy and complementary supports. Year 2011 had the best result in this respect which 100% of mothers received prenatal care. The lowest figure, however, belongs to 2012 when only two third of the mothers received professional care during pregnancy.

Maternal literacy

Of all included cases, 41.4% were illiterate, 28.6% had a primary level education, 11.4% had a high school diploma and 18.6% had college or university degree.

Socioeconomic status

After exclusion of 12 cases with missing economical status data, of evaluated 70 cases 42.75% were from a low income family, 50% were from middle class and 7.14% had a high socioeconomic status.

Delay in maternal care

Any delay in family action, referral level or delay in healthcare level was evaluated. Delay in healthcare setting was responsible for the majority of delays in maternal care (Figure 4).

DISCUSSION

Results of this study showed an average MMR of 22.38 in 100000 live births per year during the six-year period in West Azerbaijan province. This rate is comparable with national statistics of MMR in recent six years which is 22.99 per 100000 live births. Compared to a similar study conducted in 2005 in West Azerbaijan MMR has had a significant decrease by 42.4%, however, this figure is still considerably higher than the WHO goal of 3.3 deaths in 100000 live births.[11]

The most common causes of death in this evaluation in descending order of prevalence were haemorrhagic events followed by eclampsia and preeclampsia, pulmonary embolism, unidentified causes, anesthesia and surgery complications and cardiovascular events. Although, most of these events leading to maternal death experienced a decrease compared to the study results inby Eslamloo F et al, haemorrhagic events during or after delivery still remains as the main cause of maternal death which requires a specific attention by healthcare officials.[5,11] An investigation conducted among 1.5 million deliveries in the United States concluded that by optimizing maternal care, all deaths resulting from hemorrhage are potentially preventable.[12] There was a decline in maternal deaths related to cardiovascular disease, infection and abortion in our study while a growth in pulmonary embolism cases was observed. Increased rate of c-section births and a growing tendency towards it by women may be an influential factor which makes pulmonary embolism the third cause of maternal death. The use of pneumatic compression devices (PCDs) have been suggested by different studies to improve the outcomes and reduce the deaths from pulmonary embolism.[13,14]

Studies in other regions of Iran have also shown that hemorrhage is the main reason for maternal death.[15]

Similar to the study by Eslamloo et al the majority of maternal deaths occurred in 18-35 age group which has a higher incidence of pregnancy and childbirth.[11]

Nevertheless, contrary to the mentioned study, maternal deaths mainly occurred in urban areas in our study. Population shift from rural to urban areas especially in recent years may have contributed to this inequality.[11]

The rate of unintended pregnancies which is experiencing a downward trend in recent years due to improvements in birth control and family planning services in our country was 17% in this research. Family planning strategies seem to have an effect on decreased number of women with pregnancy experience of more than five times as well. According to our findings, 58.5% of pregnancies were categorized in high risk group which necessitates appropriate prenatal care and early diagnosis and treatment of diseases in this group.

Moreover, our statistics show that in last six years maternal deaths mostly occurred in hospital setting while there was a decline in maternal deaths in home or in transferring stage which may be due to better practice in peripheral health facilities and setting limitations for traditional midwifery in rural areas. Natural delivery and C-section were equally observed in this study which indicated a considerable growth in the rate of C-section compared to previous studies in this region. Increased number of referrals to specialist physicians especially in high risk patients on one hand, and decreased number of midwifery visits may have influenced this ratio. However, this high rate of C-section procedures in our study requires more scrutinizing. For a long time, it has been recognized that the risk of death for women who undergo caesarean delivery is ten times or more compared to women with vaginal delivery.[12] Nevertheless, a recent study suggested that most of the maternal deaths due to cesarean delivery do not stem from the procedure itself, but an underlying cause leading to cesarean is the main cause of death.[16]

About fifteen percent of maternal deaths in our investigation occurred in individuals who did not receive any kind of prenatal care during their pregnancy while some may have been preventable if women had proper access to healthcare facilities. Making strategies to make

maternal care available for every pregnant woman should become a priority of healthcare policies.

Moreover, study findings showed that MMR was considerably higher among women with low educational and socioeconomic level. Lower tendency among educated women for multiple pregnancies as well as their higher awareness of health issues contributed to a lower percentage of deaths.

Evaluation of delay in family action, referral level or delay in healthcare level indicated that delay in treatment level was involved in majority of deaths which requires prompt corrective actions towards improvements in diagnostic and therapeutic services, enriching blood banks and financial support in rural health centers. Educational interventions in healthcare system as well as raising public awareness about prenatal and postpartum care may help to reduce life-threatening errors. Providing mothers with necessary and understandable information is crucial.

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