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Maternal mortality in Basra city during years 2022 and 2023

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Abstract
Background: Maternal mortality, resulting from pregnancy or delivery complications, profoundly impacts families, with 830 women dying daily from preventable causes, mostly in poorer countries.
Aims of the study: To estimate the maternal mortality ratio and causes of the maternal mortality for the last 2 years 2022 and 2023 in Basra city.
Subjects and Methods: A retrospective registry-based study was conducted in Basra Maternity Hospitals during 2022 and 2023 reviewed maternal deaths among women aged 15-49, analyzing data on antenatal, intrapartum, and postpartum periods. It differentiated between direct and indirect obstetric deaths, using medical records, death certificates, and forensic reports.
Results: Maternal deaths increased in Basra from 2022 to 2023, with the Maternal Mortality Ratio (MMR) rising from 31.69 to 45.00 per 100,000 live births. The study of 68 maternal deaths revealed that 27.94% were aged 31-35, 66.18% lived in Basra's peripheries, and 92.65% were housewives. Most deaths occurred during puerperium (45.59%) and were primarily due to direct obstetric causes like pulmonary embolism (29.41%) and hemorrhage (23.53%).
Conclusion: Despite global efforts to reduce mortality, maternal deaths in Basra remain high, predominantly affecting women from outlying districts with low education and housewives. The highest mortality was among women aged 30-34 and multigravida. Most deaths occurred during puerperium, with direct obstetric causes like pulmonary embolism and postpartum haemorrhage being significant contributors.

Keywords: Maternal mortality ratio, maternal mortality rate, pregnancy, Basra

Introduction

World health organization (WHO), International Classification of Disease-Tenth revision (ICD-10) define maternal death as (death of a woman while pregnant or within 42 days of termination of pregnancy, irrespective of the duration or the site of pregnancy, from any cause related or aggravated by the pregnancy or its management but not from accidental or incidental causes) [1].
The world wide rate of maternal mortality exhibits significant variation among countries, with higher rates seen mostly in developing nations. The regions of Sub-Saharan Africa and South Asia together account for 86% of global maternal mortality rates [2].
The maternal mortality ratio (MMR) is an essential measurement in the field of public health, serving as an important indication of the quality of healthcare services and the social status of women [3]. It refers to the number of maternal fatalities resulting from the process of reproduction among women aged 15-49 years, during a particular time frame, per 100,000 live births occurring during the same period. This ratio serves as a marker for the risk of death per live birth. It may be seen logical to assess maternal mortality among risky people, namely pregnant women or females of reproductive age [3].
The statistical data that is currently available is underestimating the true numbers of fatalities due to the presence of underreporting and misclassification [4]. In 2017, a global estimate of around 810 women per day died from mortality associated with pregnancy and delivery, with a significant proportion of these fatalities being preventable [5].
According to estimates from United Nation (UN) inter-agency sources, there was a notable decrease in the world wide MMR, with a decrease from 342 to 211 deaths per 100,000 live births, during the period from 2007 to 2017. Nevertheless, it is worth noting that a significant majority (94%) of maternal mortality cases have been reported in countries classified as poor and lower middle income.

In 2017, the MMR was found to be 462 per 100,000 live births in developing countries, in contrast to a much lower rate of 11 per 100,000 live births noticed in well developed countries [6].
Based on the annual statistics data released by the Ministry of Health in Iraq, it is evident that Basra exhibited an elevated maternal mortality rate in the year 2016 (55 deaths per 100,000 live births), which exceeded the corresponding national rate of 40 deaths per 100,000 live births. Subsequently, the rate had a significant decrease in 2017 (28 deaths per 100,000 live births), and this decline was seen to be lower than the national rate [7].
According to statistical data from the Ministry of Health of Iraq for Basra city for the year 2017, the primary factors contributing to direct maternal death were: Haemorrhage with a prevalence equal to 32.4%, followed by pre- eclampsia/eclampsia and thromboembolism (14.5%, 14.4%, respectively), and the lowest frequencies were rupture of the uterus (4.7%) followed by sepsis (4.4%) [8].
The influence of the COVID-19 pandemic on maternal mortality is notably significant in the context of pregnancy. Pregnant individuals encounter distinct difficulties as a result of the physiological changes that happen throughout the period of gestation, as well as the potential effects of the virus on the well-being and health of both the mother and the developing fetus [5].
Therefore, the aim of the study is to estimate the MMR and causes of maternal mortality for the last 2 years 2022 and 2023 in Basra city.

Patients and Methods

A retrospective, registry-based study which was conducted in Basra maternity hospitals during 2022-2023, to study all deaths of reproductive-aged (15–49 years) women in Basra governorate during the years 2022 and 2023 were reviewed based on the definitions of WHO International Classification of Disease (ICD-10). Maternal death causes can be [4]:

1. **Direct obstetric causes of deaths:** Maternal deaths that happened due to obstetric complications of the pregnancy, including the pregnancy, labor, or puerperium, these complications caused by pregnancy interventions, omissions, or improper treatment.
2. **Indirect obstetric causes of deaths:** Maternal deaths existing from previously existing disease or disease that developed during pregnancy [4].

Sociodemographic characteristics of dead mothers, obstetrical features of the pregnant women and the time and place of death were obtained from Basra Health Directorate / Iraq Ministry of Health to review hospitals' medical records, death certificates and maternal deaths related statistics., statistics unit, forensic medicine reports and hospitals medical reports. Information was collected by using a researcher's questionnaire forms. Questionnaire was about: age, education, residence, occupation, gravidity, antenatal care, past medical and surgical history, state and mode of delivery, cause of death, time and place of death.
Frequencies and percentages were calculated by SPSS-23 (statistical package for social science – version 23). In addition, MMR was calculated manually.

Results

The total number of maternal mortality death during 2022 and 2023 was 68 cases, with higher number of maternal deaths was in 2023. During 2022, the number of live births was 91508 and the number of maternal deaths was 29 women, and the MMR was 31.69 per 100000 live births.
During 2023, there were 86665 live births, and 39 women died so the MMR was 45 per 100000 live births (Table 1).

Table 1: The Maternal mortality ratio during 2 years 2022 and 2023 in Basra city

Year	Number of live births	Number of maternal deaths	MM ratio per 100000 live births
2022	91508	29	31.69
2023	86665	39	45.00

Table (2) shows the Sociodemographic characteristics of mothers who died in the last 2 years 2022 and 2023 in Basra city. The total number of deaths was 68 women, and around 27% of them were between 31-35 years old. Only 4.41% of them were below 18 years and 20.59% were above 35 years.
Regarding their residence, 66.18% were from the peripheries of Basra city and 2.94% were from other governorates. 33.82% of those women were just read and write and regarding their occupation, 92.65% were housewives.

Table 2: Sociodemographic characteristics of mothers who died in the last 2 years 2022 and 2023 in Basra city

Sociodemographic features		No. (N=68)	≈100%
Age in years	< 18	3	4.41
	18-25	16	23.53
	26-30	16	23.53
	31-35	19	27.94
	>35	14	20.59
Residence	Basra city center	21	30.88
	Peripheries	45	66.18
	Another governorate (Thi Qar/Jabaish)	2	2.94
Level of education	Illiterate	19	27.94
	Just read and write	23	33.82
	Primary education	16	23.53
	Intermediate education	2	2.94
	Secondary education	4	5.88
	University and higher	4	5.88
Occupation	Housewives	63	92.65
	Employees	4	5.88
	Students	1	1.47

The Pregnancy-related features of dead mothers for the last 2 years 2022 and 2023, are shown in Table (3). The mother's parity was more than five among 47.06% of women and only 19.12% of them were primigravida.
The ANC visits were recorded, 33.82% of women had a pure antenatal care (ANC) while 63.24% hadn't. 33.82% were delivered by cesarean section (CS). 32.53% of women were delivered at Basra city center hospital and only 3 women were delivered at home.

Table 3: Pregnancy-related features of dead mothers for the last two years, 2022 – 2023 in Basra city

Features related to pregnancy		No. (N=68)	≈100%
Parity	Primigravida	13	19.12
	1 -4	23	33.82
	≥ 5	32	47.06
ANC	More than 2 visit	23	33.82
	One visit	2	2.94
	No ANC	43	63.24
Mode and state of delivery	Vaginal delivery	18	26.47
	Caesarean section	23	33.82
	Not delivered	27	39.71
Place of delivery	Basra city center hospitals	22	32.35
	Peripheral hospitals of Basra city	16	23.53
	Delivered at home	3	4.41
	Not delivered	27	39.71

Table (4) shows the distribution of maternal deaths according to time and place of death in Basra city for the last 2 years (2022 and 2023). The antepartum death was among 39.71% of women while 14.71% of them died during delivery and 45.59% during puerperium. Regarding the place of death, most of the women (92.6%) died in the hospital.

Table 4: Distribution of maternal deaths according to time and place of death in Basra city for the last 2 years (2022 and 2023)

Time and place of death		No. (N=68)	≈100%
Time of death in relation to pregnancy	During pregnancy (before delivery)	27	39.71
	First trimester (12 weeks)	4	5.88
	Second trimester (13-28week)	12	17.65
	Third trimester(29-40week)	11	16.18
	During delivery	10	14.71
	Puerperium	31	45.59
Place of death	At hospital	63	92.65
	Basra city center hospitals	47	69.12
	Peripheries hospitals	16	23.53
	At home	2	2.94
	On the road,	3	4.41

The causes of maternal deaths were presented in Table (5). Fifty-five women had died due to direct obstetric death, 29.41% of them died due to pulmonary embolism, 23.53% due to hemorrhages, and 10.29% due to hypertensive pregnancy disorders.

While the other 13 women died due to indirect obstetric causes. 5.88% of them were due to CNS disorders, 4.41% of them due to CVD and 4.41% due to hematological causes.

Table 5: Detailed causes of maternal deaths in Basra for the last two years (2022-2023)

Causes of maternal deaths		No. (N=68)	≈100%
Direct obstetric death No=55	Obstetric Hemorrhage	16	23.53
	Postpartum hemorrhage	10	
	Antepartum hemorrhage	3	
	Rupture uterus	3	
	Pulmonary embolism	20	29.41
	Hypertensive disorder of pregnancy	7	10.29
	Early pregnancy death	2	2.94
	Abortion	1	
	Rupture ectopic	1	
	Sepsis	3	4.41
	Amniotic fluid embolism	4	5.88
	Hyperemesis gravidarum	3	4.41
Indirect obstetric death No=13	Central nervous system disorder	4	5.88
	Stroke	3	
	Epilepsy	1	
	Cardiovascular disease	3	4.41
	Heart failure	1	
	Mitral stenosis	1	
	Aortic dilatation	1	
	Hematological disease	3	4.41
	Sickle cell anemia	1	
	Thrombotic thrombocytopenic purpura	2	
	Pancreatitis	1	1.47
	Hemorrhage fever	1	1.47
	COVID -19	1	1.47

Throughout Comparison between Basra and other governorates, the maternal mortality ratio during two years 2022-2023 shown in Table (6). Fluctuating MMR was noticed in Basra. In 2022 MMR in Basra (31.69 /100000 live births) was asymptotic to Baghdad (31.8/100000 live births) where higher than that in Erbil (9.7/100000 live births), whereas in 2023 MMR in Basra (45 /100000 live births) was higher than that of Baghdad (29.1/100000 live births) and higher than that of Erbil (8.4/100000 live births).

Table 6: Comparison of maternal mortality ratio in Basra city and other governorates

Governorate	Year	MMR per 100000 live births
Basra	2016	54.9
	2017	30.9
	2022	31.69
	2023	45.0
Baghdad	2016	66.7
	2017	37.0
	2022	31.8
	2023	29.1
Erbil	2017	8.7
	2022	9.7
	2023	8.4

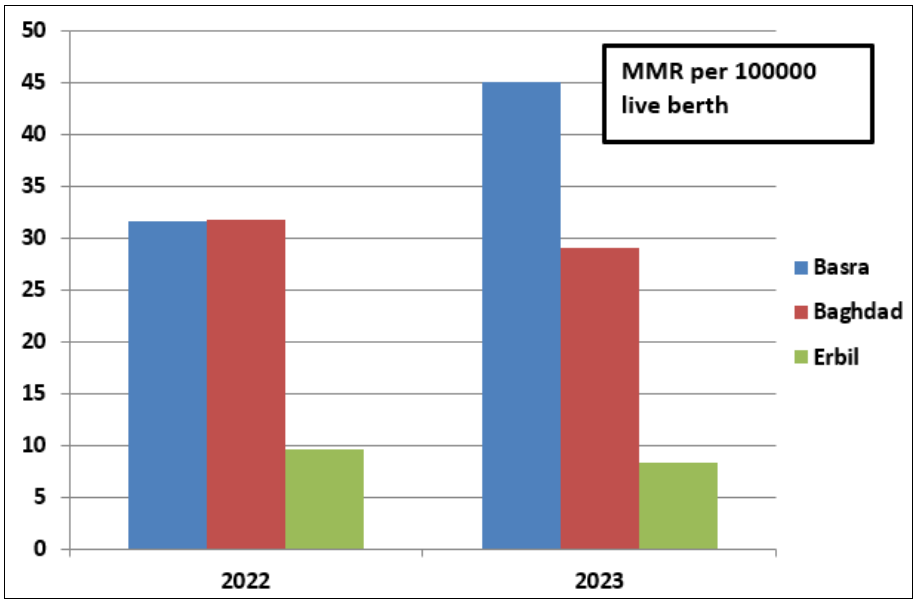

Fig 1: A Bar graph showing the level of variation in the MMR in Basra, Baghdad and Erbil during 2 years 2022 and 2023

Discussion

The WHO set the goal for 2030 to reduce the global MMR to 70 per 100,000 live births [9]. Reducing maternal mortality remains one of the most pressing global health challenges Iraq's maternal mortality ratios has significantly dropped from 127 deaths per 100,000 live births in 2005 to 79 deaths per 100,000 in 2017, but it is still higher than the MMR in other nations in the region. For example, Kuwait has an MMR of 12 per 100,000 live births, Saudi Arabia has 17, Turkey has 17, Bahrain has 14, and Iran has 16 [9].

Maternal mortality has increased in Iraq because of years of political disturbance and challenges, including poor delivery practices, a lack of emergency obstetric care, and a high prevalence of anemia in pregnant women, particularly in rural regions [10].

The maternal mortality ratio per 100,000 live births in Basra grew significantly from 27.9 in 2010 and 25.8 in 2011 to 37.4 in 2018, as per the maternal mortality report that the Iraqi Ministry of Health adopted [11]. This rise can be attributed to improved hospitals' reporting and registration system of maternal deaths in Basra in 2012 [11].

The MMR in Basra fluctuated across the two years that were part of this study. Basra's MMR (31.69 and 45 /100000 live births) in 2022 and 2023 was higher than Baghdad's (31.8 and 29.1/100,000 live births) and Erbil's (9.7 and 8.4/100000 live births) (12,13). In 2016 Basra MMR (54.9/100000 live births) ranked the second following AL-Najaf (MMR 66.7/100000 live births) (14). In 2017 Basra MMR (30.9/100000) dropped to below that of Baghdad (MMR 37/100000 live births) but still higher than that of Erbil (MMR 8.7/100000 live births) [14]. The Basra Health Directorate's strict standards for specialist availability during the night shift and the implementation of a teamwork structure in managing a dangerous pregnancy can be used to explain this notable decline [15]. Basra's MMR improved little to 37.4/100000 live births in 2018.

Regarding sociodemographic features of the dead mothers, from 68 dead mothers, the highest percentage of deaths (27.9%) present in women in the age group 31-35 years old; which was observed in Thi Qar [16].

In this study (61%) of dead women were at low stage of education. Illiteracy remains a major concern in Iraq, according to 2007 survey done by Iraqi Central Organization for Statistics and Information Technology (COSIT) indicate that (18-20%) of the adults are illiterate [17].

Women who receive high education will have a better knowledge about antenatal care and maternity health care that they need to make educated healthcare choices [18].

Housewives in Basra were represented at a rate of 92.6% which is similar to what observed in Iran [19]. This can be explained by poor nutritional status and low health care. This study shows that maternal mortality was higher (66.1%) among women from rural regions of Basra city as well as availability of health care facilities, the presence of specialists, and education status. This work revealed that maternal mortality was higher 47.6% among multigravida > 5. This is in agreement with Maternal Death Surveillance and Response report (MDSR) [11] and Thi Qar province (16). About 33.8% were delivered by caesarean section (CS) and 26.4% were delivered vaginally. This result is in contrast to what was recorded 18 years earlier in Basrah, 2006, where most dead mothers delivered vaginally [20]. When compared to vaginal delivery, CS is associated with several intraoperative and postoperative complications that increase maternal mortality and morbidity.

Regarding antenatal care (ANC), 63.24% not received ANC and 33.8% had ANC despite whether it is adequate or not. A similar finding was reported in UK in 2018 [21]. Regarding the place of delivery, it was noticed that most of the deliveries 55.8% took place in hospitals and only 4.41% of women were delivered at home. This can give an idea that there might be increased maternal awareness about the importance of giving birth in hospitals in the presence of a suitable conditions. The rate of home delivery in Basra is decreased from 12.5% in 2014 to 4.41% in 2022.

Out of 68 women, there was 39.7% of women died before delivery while 14.7% of them died during delivery and 45.5% during puerperium which is in agreement with another authors [22]. The present study revealed that direct obstetric causes for death is pulmonary embolism (29.4%). Pulmonary embolism is one of the 3 main causes of maternal deaths in western countries [10]; The second direct cause was, hemorrhage which end in maternal deaths in 16 (23.53%) women; the majority is due to postpartum haemorrhage. Like what was found 18 years earlier in Basra [20]. Hemorrhage was also the main cause of death in Iraq\ Thi Qar and Iran [20, 23]. Hypertensive disorders of pregnancy were found to be the 3rd cause of maternal deaths (10.2%) which agree with what had been reported by study in Erbil Maternity Teaching Hospital [24]. Indirect obstetric deaths account for 19% of maternal deaths in Basra, including cardiac diseases, central nervous system disorders, COVID infection, hemoglobinopathy and one case was hemorrhagic fever. Nearly half of maternal death in Basra during the study period was during the puerperium period, like the finding obtained in India in 2017 [25].

Conclusion

Despite global efforts to reduce mortality, maternal deaths in Basra remain high, predominantly affecting women from outlying districts with low education and housewives. The highest mortality was among women aged 30-34 and multigravida. Most deaths occurred during puerperium, with direct obstetric causes like pulmonary embolism and postpartum haemorrhage being significant contributors.

Conflict of Interest

Not available.

Financial Support

Not available.

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