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### Abstract:

Maternal mortality is described as the death of a woman during pregnancy or within six weeks of delivery. The Maternal Mortality Ratio is an important health marker that reflects the strength of health care system. Maternal mortality caused by a variety of causes. COVID19 pandemic affect the Maternal Mortality Ratio. **Patients and method:** The study conducted in Iraq, the data were collect from health directorate's reports that were send periodically to the Ministry of health for the year of 2021. **Results:** Maternal mortality ratio in the country was (46.1), and COVID19 is the main causative agent for maternal mortality (40%). Most of the dead women were housewives, live in urban places, at bearing age 20-39 years, not complete the primary schools and the place for their delivery was at governmental hospitals. **Discussion:** The maternal mortality ratio is higher than the previous year and this may be due to COVID pandemics.

**Keywords:** COVID19, maternal mortality, live birth.

### وفيات الأمهات وعوامل التحليل الإحصائي المرتبطة بها في العراق

#### الخلاصة

مقدمة: توصف وفيات الأمهات بأنها وفاة المرأة أثناء الحمل أو خلال ستة أسابيع من الولادة. نسبة وفيات الامهات هي عدد الامهات المتوفيات لكل 100000 ولادة طفل حي. تعد نسبة وفيات الأمهات علامة صحية مهمة تعكس قوة نظام الرعاية الصحية. وفيات الأمهات ناجمة عن مجموعة متنوعة من الأسباب. تؤثر جائحة كوفيد 19 على نسبة وفيات الأمهات. المرضى وطريقة العلاج: الدراسة الوصفية التي أجريت في العراق لايجاد نسبة وفيات الامهات والعوامل المرتبطة بها، تم جمع البيانات من تقارير مديريات الصحة التي ترسل بشكل دوري إلى وزارة الصحة لعام 2021. النتائج: عدد الولادات الحية 1059781 , عدد الامهات المتوفيات 489 بلغت نسبة وفيات الأمهات في الدولة (46.1) وكانت اعلى نسبة في محافظة ذي قار و اقل نسبة في صلاح الدين و الانبار، ويعتبر فيروس كورونا المسبب الرئيسي لوفيات الأمهات (40%). معظم الوفيات هن ربات البيوت، يعيشن في المناطق الحضرية، في سن الإنجاب 20-39 سنة، لم يكملن الدراسة الابتدائية ومكان ولادتهن كان في المستشفيات الحكومية. المناقشة: نسبة وفيات الأمهات أعلى من العام السابق وقد يكون ذلك بسبب جائحة فيروس كورونا.

**الكلمات المفتاحية:** كوفيد19، وفيات الأمهات، المواليد الأحياء.

**Introduction:**

Maternal mortality is described as the death of a woman during pregnancy or within six weeks of delivery, whatever the gestational age was. <sup>(1)</sup> The Maternal Mortality Ratio (MMR) is defined as the number of maternal deaths per 100,000 live births, MMR is an important health marker that reflects the strength of health care system. <sup>(2-5)</sup> Maternal mortality has a big burden on the community and families specially the infants. <sup>(6,7)</sup> The World Health Organization records a worldwide ratio of 400 maternal deaths per 100 000 live births. <sup>(8)</sup> Globally more than half million woman die each year due to complications of pregnancy or labor; half of them from Sub-Saharan Africa. <sup>(9)</sup> Maternal mortality caused by a variety of direct and indirect causes, the main direct causes in undeveloped countries are hemorrhage (34%), infection (10%) and hypertension (9%), while in developed countries the major cause of death is hypertension followed by hemorrhage. <sup>(10)</sup> Indirect causes form 20% of total causes; they are already present before pregnancy but exaggerated during it. <sup>(10)</sup> Many of the causes of maternal mortality is preventable as treatment is known, <sup>(11-15)</sup> the millennium declaration of the United Nations was consent in 2000: MMR reduction by three quarters between 1990 and 2015. <sup>(16,17)</sup> MMR globally show a reduction of about one third from 2007 to 2017, by the UN inter-agency estimates, most of the deaths where in the undeveloped countries. <sup>(18)</sup> Despite all efforts to improve the maternal care in United States( U.S. ), the MMR had been doubled in the last twenty years. <sup>(19-21)</sup> Meanwhile, most of the other developed countries show decrease in MMR. <sup>(22)</sup> This increase of MMR in U.S. may be due to the use of death certificate coding in last two decades, <sup>(21)</sup> sociodemographic factors also play role in this increase of MMR in US like advanced maternal age, rural residence and illiteracy. <sup>(23,24)</sup> MMR remained elevated in many undeveloped countries. <sup>(17)</sup> COVID19 pandemic affect the MMR assessment. <sup>(25,26)</sup> As the pandemic of COVID19 begin in 2019, many strategies were adopted by the health organizations like tele-consultation to protect the pregnant ladies. <sup>(27, 28)</sup> The compromise of immune and respiratory systems make them more risky to have complication when get infected with COVID19, <sup>(29)</sup> also they are more at risk of getting the infection because they have to go to health centers for their antenatal care visits despite that many of them suffer from severe infection with the virus. <sup>(30)</sup>

### Patients and method:

The study conducted in Iraq, the data were collected from health directorate's reports that were sent periodically to the Ministry of health. Descriptive study was done to set the MMR and the causes behind it together with the associated factors in 2021 were COVID 19 still in pandemic. Lenovo computer did data collection and Minitab system (19th edition) were used to find out the statistical relations.

### Results:

I. Maternal mortality ratio: Results shows that number of live birth was (1059781) ,the number of dead women was ( 489) and the average MMR in the country was (46.1), with highest rate seen in Thi-Qar governorate (75.8) ,and the lowest in both Al-Anbar and Salah Al- Deen governorates (0.0) as shown in table -1-.

Table -1- Maternal mortality rate in Iraqi governorates

Governorate	Number of live births	Number of maternal mortality	MMR
Baghdad	203810	138	67.7
Basrah	91568	44	48.1
Nineveh	90167	34	37.7
Maysan	35295	25	70.8
Al- Dewaniya	33340	12	36.0
Diala	45690	19	41.6
Al-Anbar	48345	0	0.0
Babylon	61932	21	33.9
Kerbela	42476	28	65.9
Kirkuk	39911	14	35.1
Wasit	40250	17	42.2
Thi-Qar	56749	43	75.8
Al-Muthanna	27333	18	65.9
Salah Al- Deen	41281	0	0.0
Al-Najaf	46426	33	71.1
Erbil	63446	15	23.6
Duhouk	43360	8	18.5
Al- Sulaimani	48402	20	41.3
Total	1059781	489	46.1

II. Causes of maternal mortality: Results shows that indirect causes for maternal death form the highest group (54%) and COVID19 is the main causative agent for maternal mortality (40%) in this group of causes, on the other hand ; Postpartum hemorrhage is the main direct cause for maternal mortality (8.9%) as shown in table -2- .

Table – 2- Causes of maternal mortality

	Causes	Percentage %
Direct causes	Postpartum hemorrhage	8.9
	Gestational hypertension	8.7
	Obstetric thromboembolism	6.2
	Antepartum hemorrhage	2.7
	Complications of anesthesia during labor and delivery	2.0
	Infection	1.8
	Uterine rupture during childbirth	0.7
	Amniotic fluid embolism	0.7
	Ectopic pregnancy	0.7
	Abortion	0.5
	Total	32.9
Indirect causes	Covid-19	40.0
	Suspect corona	5.3
	Cancers	2.3
	Preexisting hypertension disorder superimposed proteinuria	1.8
	Heart diseases	1.6
	DM	0.9
	Renal failure	0.9
	Liver diseases	0.4
	Lung infections	0.4
	Nervous system complications	0.4
	Total	54.0
Other causes	Like car accident ,trauma ... etc.	13.1
	Total	100.0

### III. Factors associated with maternal mortality:

#### 1. Residence :

Study results illustrate that (68.7%) dead mothers were live in urban places, figure -1-.

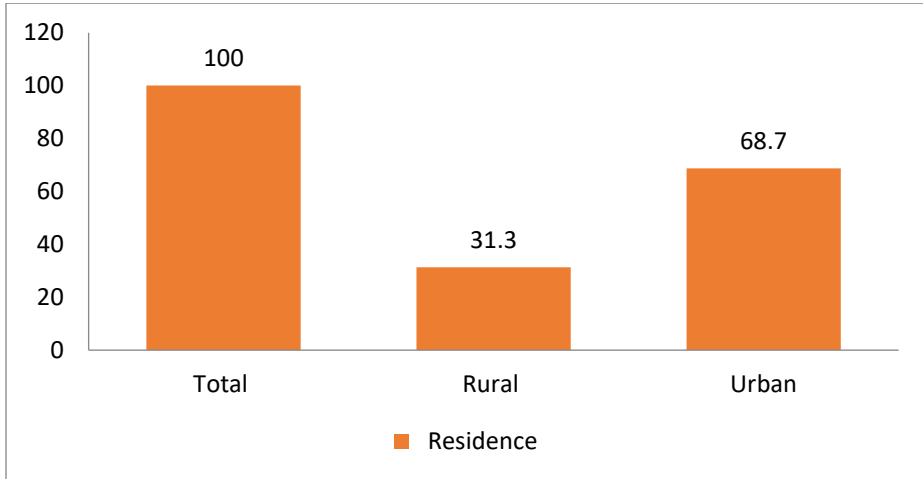


Figure -1- Residence

2. Level of education:

Results shows that (65.2%) of the dead mothers not complete, the primary schools figure -2-.

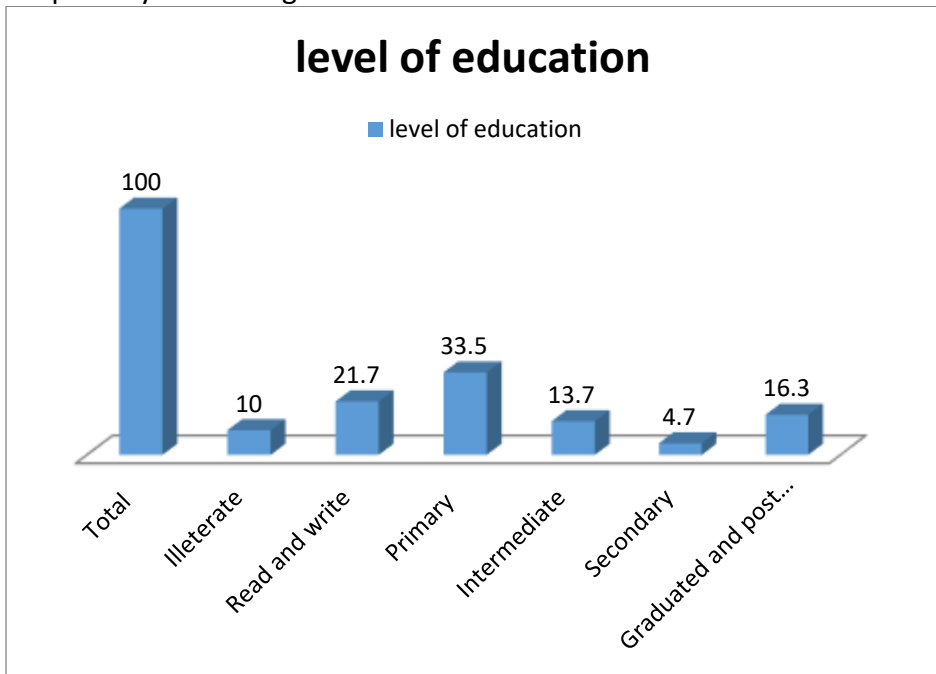


Figure -2- Educational level.

3. Mothers age:

Results shows that (78.1%) of the dead mothers were aged 20-39 years old figure -3-.

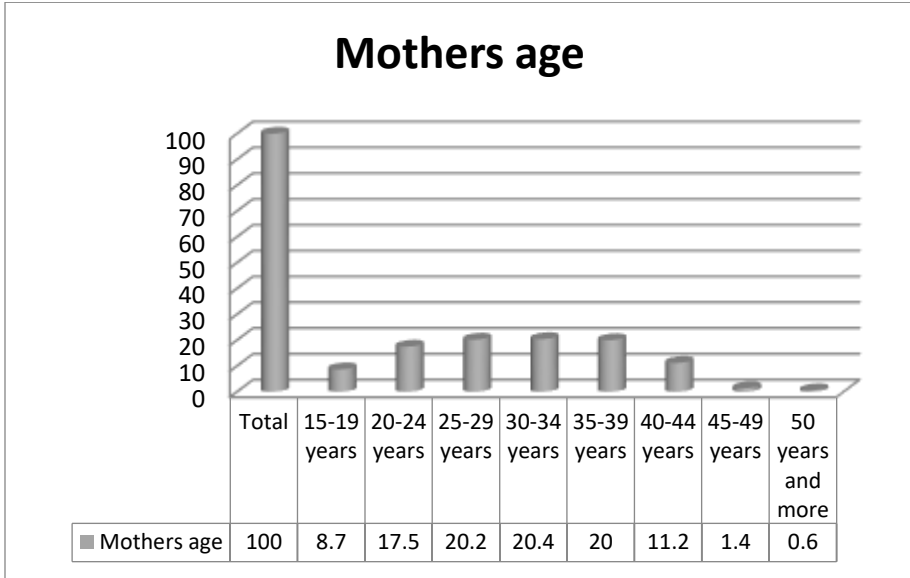


Figure -3- Mothers age

4. Occupation:

Results shows that (87.7%) of the dead mothers were housewife, and only (9.2%) were employee, figure -4-.

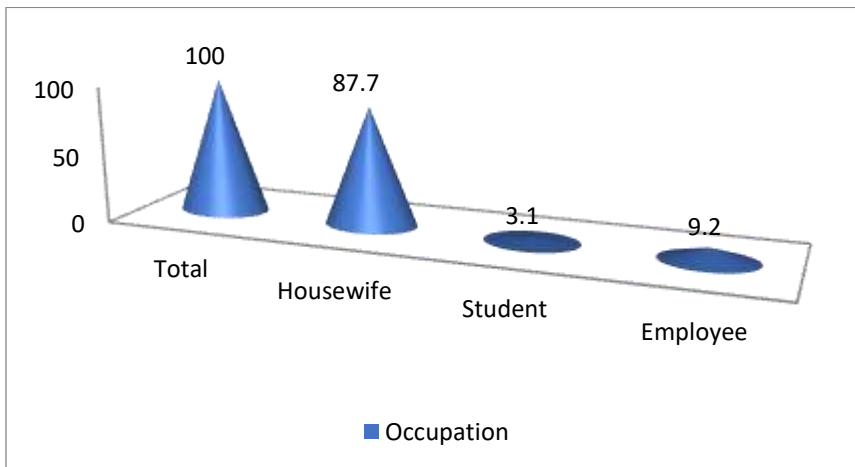


Figure -4- occupation.

### 5. Site of birth:

Results shows that most of the dead mothers were delivered at governmental hospitals (65.8 %), figure -5-.

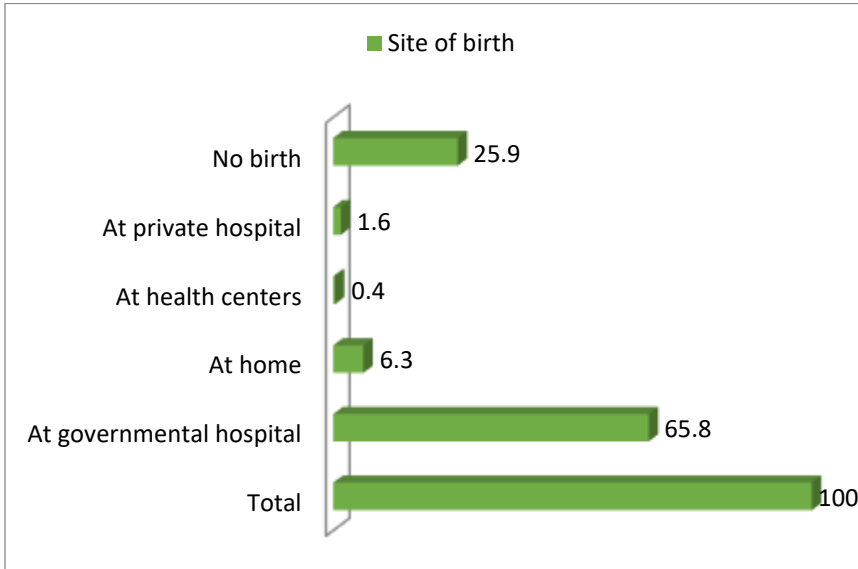


Figure -5- Site of birth.

### Discussion:

The average MMR in this study was (46.1) for the year 2021 , while in 2020 was (34.2), this may be due to COVID pandemics, in Mexico MMR was 46.6 in 2020, as shown in Mendez-Dominguez et al study<sup>(31)</sup> (which is highest ratio in last 10 year in that country). The MMR was less in northern governorates; this may be related to geographic factors or the level of health services. Results shows that COVID19 is the main causative agent for maternal mortality, like results of Mendez-Dominguez et al <sup>(31)</sup>. More than two –third of the dead mothers were lived in urban areas, the same results of Shahidi et al study <sup>(32)</sup>, and opposite to results of both Karimzaei et al and Tirkesh et al studies <sup>(33,34)</sup>, the authors suggests the cause may be due the fact that number of urban population is more and the recording programs more accurate there. Again, about two third of dead mothers not complete the primary schools, near results of both Karimzaei et al and Jamshidi et al studies <sup>(33,35)</sup>, and opposite to Farzianpour et al results <sup>(36)</sup>, this may be due to more early marriage in low educated females which associated with high mortality, and of course the educated females have more health care informations than



the others. Results shows that most of the dead mothers were aged between 20 and 39 years (78.1%), exactly the same percentage in Mendez-Dominguez et al study<sup>(31)</sup>, this may be due to the fact that this is the bearing age in women. Results shows that only (9.2%) of dead mothers were employee, same results of Vahiddastjerdy M et al study<sup>(37)</sup> in which (9.0%) were employee, opposite to Farzianpour et al results<sup>(36)</sup>, in which 71% of dead mothers were employee, this may be due to that house wife prefer more home delivery and have less antenatal care visits. Results shows that most of the dead mothers were delivered at governmental hospitals, this may be due to many reasons, first the number of hospital deliveries is more, second the recording system is better in hospital than other delivery places, the results is same like in Nepal in which death in hospital was 59.6% as shown in Sitaula, S. et al study<sup>(38)</sup>.

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