

MATERNAL MORTALITY IN NINEVEH GOVERNORATE 2018-2020

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ABSTRACT

Background: Maternal deaths reflects the low health status, which can be prevented by setting up strategies in cooperation with different sectors in community. **Aim:** To describe women death in Nineveh governorate 2018-2020. **Methods:** A Biometry study used to review a record of 81 deceased mothers during 2018-2020 from 1st Jan- July 2021, using standardized maternal mortality inquiry forms adopted by Ministry of Health. **Result:** deceased mothers was 43 (53.1%) in age 20-34 year and one fifth were illiterate. Utilization of antenatal care was 4 (18%), 16 (49%) and 15 (57.7%) during 2018-2020 respectively and 14 (42%) of deceased women who had moderate risk factors during 2019. Midwife intervention commonly seen during 2020, it was 7 (26.9%). Grand total of delivery and death occur in health institution 58(71.6%) and 61 (75.3%). Three fifth of death occur in purprium and 44 (73.3%) of them in 1st 24 hours. Hemorrhage, hypertensive disorder and embolism were the most common cause of direct cause of death and can be prevented in 17(77%), 31 (94%) and 18 (69.2%) during 2018-2020 respectively. Delay at D1D3 during 2018, 2020 it was 7(32%) and 5(19.2%) respectively. Net maternal mortality ratio and rate per 100000 live births were 31.81 and 2.9 respectively in Nineveh governorate. **Conclusion:** Although there was increase awareness of deceased women to seek medical advice during pregnancy but the quality of health care services provided to them were unacceptable.

KEYWORD: Mother death, deceased women, maternal mortality rate.

INTRODUCTION

Maternal death is defined as the death of a woman while pregnant or within 42 days of termination of pregnancy from any cause related to or aggravated by the pregnancy or its management but not from accidental or incidental causes.^[1] Women death due to pregnancy, labor complications and during puerperium is a tragic end because it can be overcome them.^[2] The most common indices used to measure mother death, maternal mortality ratio (MMRatio) is divide the number of maternal deaths in a given year by live births in that year per 100,000, while maternal mortality rate (MMRate) divide the number of maternal deaths by the number of women of childbearing age in the population per 100,000,^[3] to estimate levels of maternal mortality we can use census, surveys or models and other methods such as reproductive-age mortality studies coupled with record review and/or verbal autopsy, population-based household surveys using the sisterhood method is very specific but difficult and required time, money and equipment.^[4] The causes of women deaths are

preventable such as: (hemorrhage, infections, high blood pressure specially during pregnancy, complications from delivery, and unsafe abortion).^[5] The commonest barrier prevent women from seeking medical care: illiteracy, poverty, distance to facilities, lack of information, inadequate quality services, socio-cultural factors and war with political instability.^[6] the context of primary health care center to provide safe motherhood, sexual and reproductive health for their attendance.^[7] WHO 2019, reported that worldwide daily mothers death during 2017 approximately 810 from preventable causes, MMRatio in developing counties was higher than developed countries, it was 462 and 11 per 100,000 live births respectively.^[4]

Skilled care before, during, and after childbirth can save women's' life.^[8] In Iraq, maternal mortality surveillance has been lacking a systematic approach, to bridge this gap, the Ministry of Health (MoH) took the initiative to form a Technical Committee on Maternal Mortality tasked with creating a national-level system to provide a systematic monitoring with reliable data necessary for

the measurement of this essential indicator.^[9]

The aim of present study to highlighted on the common factors on women death in childbearing age in Nineveh governorate 2018-2020.

SUBJECTS AND METHODS

Ethical and scientific approval was received from Nineveh Health Directory/ MoH/ Iraq licenses' Number session 210 held on the date 10 Jan 2020 of the numbered research project 21/17. A Biometry study design was used to review 81 records of deceased mothers 2018-2020. The study extended for sex month duration from 1st Jan-July 2021. All maternal mortality information taken from standardized inquiry forms that adapted by Ministry of Health since 2000, contain the following items: Demographic and personal data (age, residence, occupation, education), obstetric and reproductive history (duration of present pregnancy, no. of children, no. of abortion, previous (obstetric, medical, surgical, drug, family) history, antenatal care, date of

(admission, delivery and death), place of (delivery and death), complications that occurred during (pregnancy, delivery, and puerprum), referral and transportation problem, pregnancy out-come, sex of baby, cause of death according to medical record and predisposing factors, sending of deceased mothers and results of post-mortem examination and prevention level (Delay one (D1) in seeking medical care due to factors related to mothers, her family and community, delay two (D2) in transportation and road problem, delay three (D3) provision of health care services in health institution). The maternal death committee take part of the information from the death certificate, hospital and medical record, and interview with (parents, relatives, husband, friends, and providers of care during delivery and the postpartum period). Data were tabulated, categorized, and analyzed using SPSS (version 23) software program. Simple percentage were used and put in suitable tables and figures. Using X^2 to study the association between two variables with p- value equal or less than (0.05).

The maternal mortality ratio is calculated as.

$$\frac{\text{All maternal deaths occurring within a reference period (usually 1 year)} \times 100000}{\text{Total number of live births occurring within the reference period}}$$

The maternal mortality rate is calculated as

$$\frac{\text{All maternal deaths occurring within a reference period (usually 1 year)} \times 100000}{\text{Total number of women in child bearing age within the reference period}}$$

RESULT

Table 1: Deceased mothers by their characteristics.

Category	2018 Total No. (22)		2019 Total No. (33)		2020 Total No. (26)		Grand Total	
	NO.	%	No.	%	No.	%	No.	%
Age groups in years								
< 20	2	9.0	4	12.0	5.0	19.0	11	13.5
20-34	14	55.0	16	49.0	13.0	50.0	43	53.1
≥ 35	6	36.0	13	39.0	8.0	31.0	27	33.4
Residence								
Rural	11	41	17	52	10	38.5	38	46.9
Urban	9	50	15	45	14	53.8	38	46.9
Unknown	2	9	1	3	2	7.7	5	6.2
Education								
Illiterate	1	5.0	6	18.0	9	34.6	16	19.7
Primary	1	5.0	7	21.0	3	11.5	11	13.6
Secondary	1	5.0	2	6.0	4	15.4	7	8.6
University and Higher education	0	0.0	1	3.0	0	0.0	1	1.2
Unknown	19	85.0	17	52.0	10	38.5	46	56.8
Occupation								
Employed	0	0.0	1	3	1	3.8	2	2.5
Unemployed	0	0.0	17	52	16	61.5	33	40.7
Unknown	22	100	15	45	9	34.6	46	56.8

Deceased mothers by their characteristics seen in (Table 1) more than half 43 (53.1%) of deceased mothers in age between 20-34 and no differences regarding residence. One fifth of dead mother were illiterate and commonly

seen during 2020 as 9 (34.6%). Unemployment state were 16 (61.5) and 17 (52%) in 2020 and 2019 respectively.

Table (2): Percentage distribution of deceased mothers by presence on antenatal care, risk factors and midwife intervention.

Category	2018 Total No. (22)		2019 Total No. (33)		2020 Total No. (26)		Grand Total	
	NO.	%	No.	%	No.	%	No.	%
Presence of antenatal care								
Yes	4	18	16	49	15	57.7	35	43.2
No	2	9	4	12	3	11.5	9	11.1
Unknown	16	73	13	39	8	30.8	37	45.7
Scoring risk factors								
No risk factors	0	0	1	3	2	7.7	3	3.7
Low (0-2)	9	41	18	55	18	69.2	45	55.6
Moderate (3-6)	9	41	14	42	4	15.4	27	33.3
Unknown	4	18	0	0	2	7.7	6	7.4
Midwife intervention								
Yes	3	14	5	15	7	26.9	15	18.6
No	16	73	28	85	18	69.2	62	76.5
Unknown	3	13	0	0	1	3.8	4	4.9

(Table 2) showed that presence of antenatal care was 4 (18%), 16 (49%) and 15 (57.7%) during 2018, 2019 and 2020 respectively, 14 (42%) of deceased women who

had moderate risk factors during 2019 to a lesser extend during 2020 it was 4 (15.4%). Midwife intervention commonly seen during 2020, it was 7 (26.9%).

Table (3): Deceased mothers by parity, place, and type of delivery.

Category	2018 Total No. (22)		2019 Total No. (33)		2020 Total No. (26)		Grand Total	
	No.	%	No.	No.	No.	%	No.	%
Parity								
No child	6	27	10	30	7	26.9	23	28.4
< 4	7	32	8	25	6	23.1	21	25.9
≥ 4	9	41	13	39	13	50.0	35	43.2
Unknown	0	0.0	2	6	0	0.0	2	2.5
Place of delivery								
Health institution	16	73	26	79	16	61.5	58	71.6
House	4	18	2	6	5	19.2	11	13.6
Road	0	0	1	3	0	0.0	1	1.2
No labor	1	5	3	9	5	19.2	9	11.1
Unknown	1	5	1	3	0	0.0	2	2.5
Type of delivery								
Normal vaginal delivery	12	54	16	49	11	42.3	39	48.1
Cesarean section	8	36	13	39	9	34.6	30	37.1
Abortion	0	0.0	0	0.0	2	7.7	2	2.5
No labor	1	5	3	9	4	15.4	8	9.9
Unknown	1	5	1	3	0	0.0	2	2.5

Deceased mothers who had four and more child 9 (41%), 13 (39%) and 13 (50%) delivery took place in health institution seen in 16 (73%), 26 (79%), 16 (61.5%) from 2018 to 2020 respectively and 30 (37.1%) of them delivered by cesarean section. This is seen in Table 3.

Table (4): Deceased mothers by pregnancy outcome and sex of baby.

Category	2018 Total No. (22)		2019 Total No. (33)		2020 Total No. (26)	
	No.	%	No.	%	No.	%
Pregnancy outcome						
A life	17	78	22	67	15	57.7
Dead	3	13	9	27	6	23.1
Abortion	0	0.0	0	0.0	5	19.2
Unknown	2	9	2	6	0	0.0
Sex of baby						
Male	11	50	23	70	13	50.0
Female	5	23	7	21	2	7.7
Unknown	6	27	3	9	11	42.3

Table 4 depict that pregnancy outcome with a life baby were 17 (78%), 22 (67%) and 15 (57.7%) respectively 2018-2020. Half of them were male baby during 2018

and 2020 and nearly three fourth of pregnancy outcome were male during 2019.

Table (5:a): Distribution of deceased mothers by place of death.

Place of death	2018		2019		2020		Grand Total	
	No.	%	No.	%	No.	%	No.	%
Health institution	16	73	27	82	18	69.2	61	75.3
Home	4	18	4	12	5	19.2	13	16.1
Road	2	9	2	6	2	7.7	6	7.4
Unknown	0	0.0	0	0.0	1	3.8	1	1.2
Total	22	100.0	33	100.0	26	100.0	81	100.0

Most common place of death was health institution as 61 (75.3%), to lesser extend in road it forms 6 (7.4%) these

finding reported in Table 5: a.

Table (5:b): Time of death in relation to delivery.

*Death in relation to delivery	2018		2019		2020		Total	
	No.	%	No.	%	No.	%	No.	%
During pregnancy	1	5	3	9	5	19.2	9	11.1
During labor	1	5	3	9	8	30.8	12	14.8
During puerprum	20	90	27	82	13	50.0	60	74.1
Total	22	100.0	33	100.0	26	100.0	81	100

*Using χ^2 (P- value = 0.014)

Time of maternal death in relation to delivery was seen in (Table 5:b). Death of mother during pregnancy and labor in 2020 were 5 (19.5%) and 8 (30.8%)

respectively, at same time death during puerprum was seen in 2018 , it was 20 (90%). P- value = 0.014.

Table (5:c): Time of death in relation to puerprum.

*Death in relation to puerprum	2018		2019		2020		Grand Total	
	No.	%	No.	%	No.	%	No.	%
In the 1 st 24 hrs. of puerprum	16	72	20	61	8	30.8	44	73.3
After 24 hrs. of puerprum	4	18	7	21	5	19.2	16	26.7
**Total	20	90.0	27	82.0	13	50.0	60	100.0

*Using χ^2 (P- value = 0.5) ** deceased mother during pregnancy and labor not included

Time of death in relation to puerprum seen in Table 5:c, as 44 (73.3%) ocuure in 1st 24hrs of purperum and mainly seen in 2018 it was 16 (72%) . Maternal death

after 24 hrs frequently seen in 2019 it was 7 (21.0%). P- value not statistically significant.

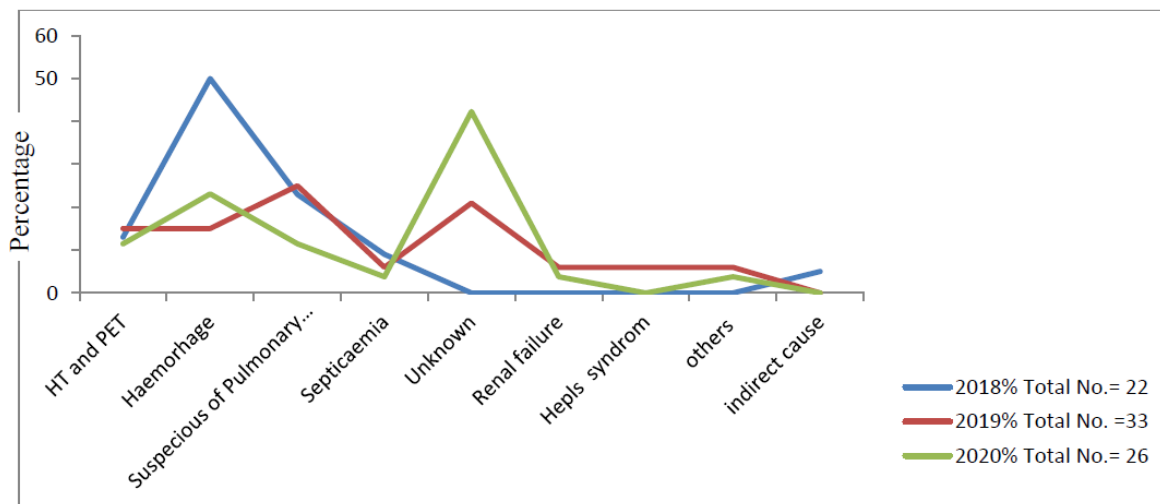


Fig (1): Distribution of deceased mothers by cause of death according to clinical diagnoses.

(Fig1) revealed that commonest cause of death among mothers by clinical diagnoses during 2018 were hemorrhage 11(50%), suspicious of pulmonary embolism 5 (23%), and complication of hypertension and preeclampsia 3 (13%). Meanwhile the comment cause of death during 2019 were suspicious of embolism

8 (25%), unknown cause 7 (21%), and complication of hypertension, preeclampsia, and hemorrhage were 5 (15%). At same time Unknown cause then hemorrhage more frequently seen in 2020 they were 11(42.3%) and 6 (23.1%) respectively. In general, 100% of cause of death was due to direct cause during 2019 and 2020.

Table (6): deceased mothers by referral to postmortem examination.

Referral to post-mortem examination	2018		2019		2020	
	No.	%	No.	%	No.	%
Yes	12	55	18	55	15	57.7
No	6	27	13	39	9	34.6
Refuse	4	18	2	6	1	3.8
Unknown	0	0.0	0	0.0	1	3.8
Total	22	100.0	33	100.0	26	100.0

More than half 15 (57.7%) of deceased women were send to postmortem examination during 2020. No referral was more frequent seen during 2919 as 13 (39%)

while relative refuse referral was more common during 2018 as 4 (18%). This is seen in Table 6.

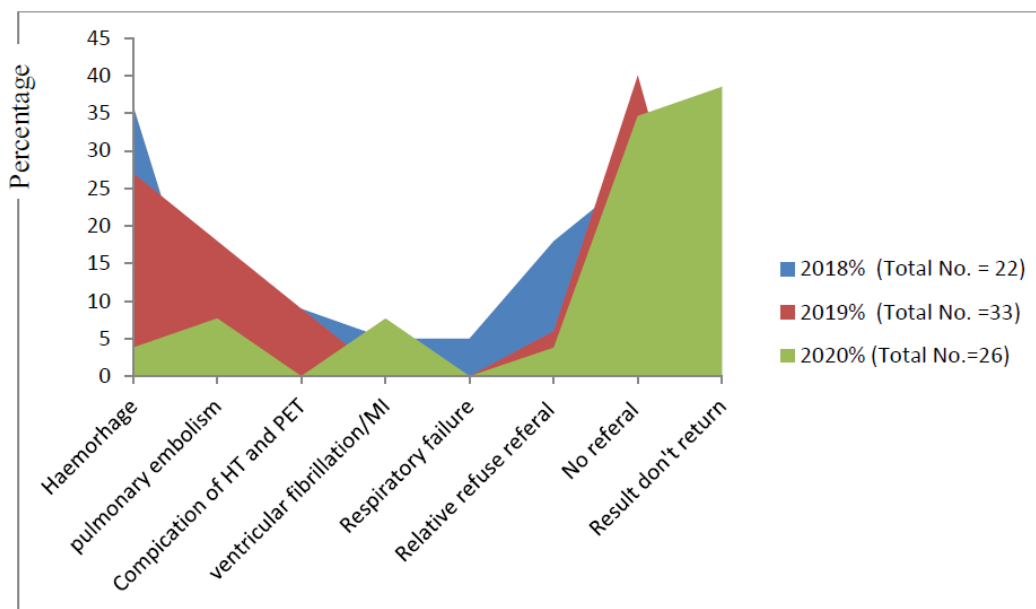


Fig (2): Sending and result of postmortem examination.

Result of post mortem examination was found in Fig 2. The most common cause of death was hemorrhage 8 (36%), 9(27%) and complication of hypertension and preeclampsia 2(9%), 3(9%) respectively during 2018 and

2019. Relative refuse referral more frequent 4(18%) during 2018 mean while No referral more common 13 (40%) during 2019 and result don't retain more common 10 (38.5%) during 2020.

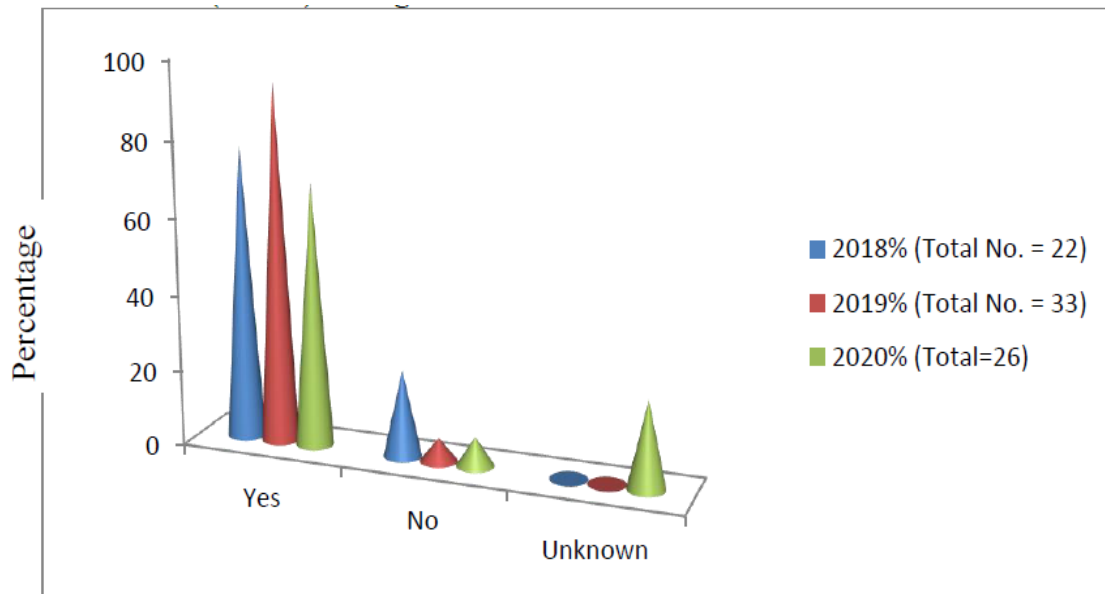
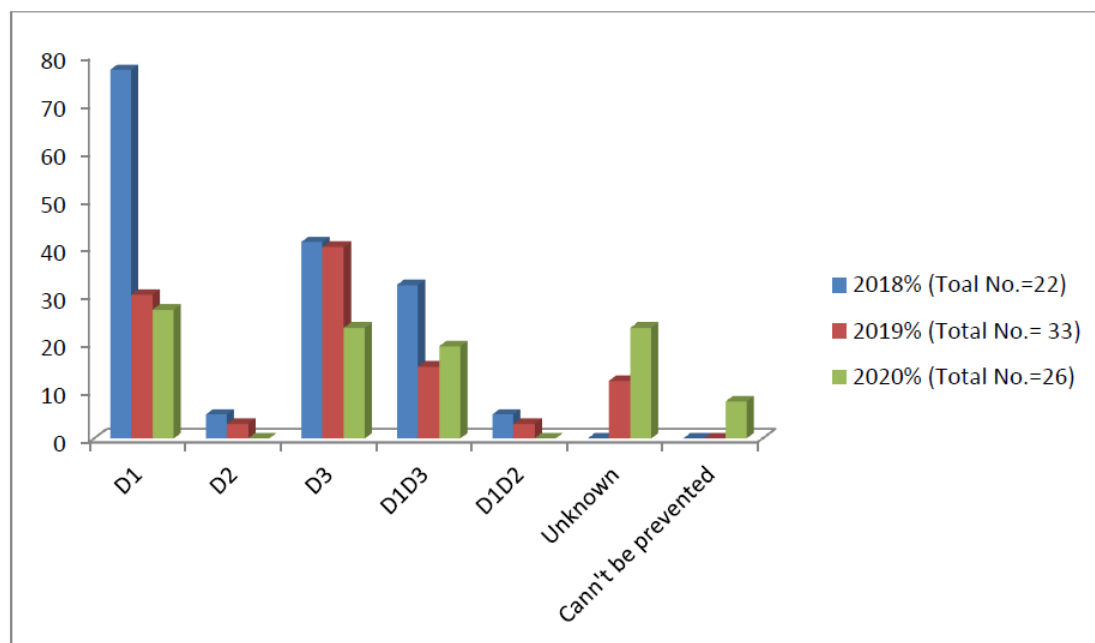


Fig (3): Prevention of death among deceased women.

Death of deceased mothers can be prevented in 17(77%), 31 (94%) and 18 (69.2%) during 2018- 2020

respectively. This is seen in Fig 3.



*Multiple Response

Fig (4): Prevention level.

Delay in seeking medical care due to factors related to mothers, her family and community (D1), more common 17 (77%) during 2018 if compare with year 2019 and 2020 as cause of mothers' death due to delay at D1 level was 10(30%), 7(26.9%) respectively this is clear in Fig 4. No difference was seen in percentage of mothers'

cause of death due to delay in provision of health services in health institution during 2018 and 2019, it was 9(41%) and 13(40%) respectively. Delay at D1D3 more frequently seen during 2018, 2020 it was 7(32%) and 5(19.2%) respectively. Death can't be prevented 2 (7.2%) in 2020.

Table (7): Maternal mortality ratio and rate in Nineveh governorate.

Years	No. of deceased mothers	No. of women in childbearing age	No. of live birth	Maternal mortality ratio/100000	Maternal mortality rate/100000
2018	22	886533	89274	24.6	2.4
2019	33	886533	84434	39.0	3.7
2020	26	909698	81671	31.83	2.8

Table (7) revealed that maternal mortality ratio per 100000 was 24.6 to 39.0 to 31.81 live birth and maternal mortality rate per 100000 was 2.4 to 3.7 to 2.8 women in childbearing age during 2018-2020 in Nineveh governorate.

DISCUSSION

Mothers are important member in the community so that, caring for her mean healthy society in general.^[10] Maternal deaths in childbearing is age reflects the low health status, which can be prevented by setting up strategies and arrangements in cooperation with various sectors of community.^[11]

as nearly half 43 (53.0%) of deceased mothers in age 20-34 and no differences regarding residence. One fifth of dead mother were illiterate and commonly seen during 2020 as 9 (34.6%). Deceased mothers with antenatal care 35(43.2%) more prevalent during 2020 and 27 (33.3%) had moderate risk factors. Midwife intervention 7 (26.9%) frequently seen during 2020.

Education and employment make women to delay marriage, use contraceptives, reduce fertility, increase women's mobility and enable them to acquire greater capacities and skills, and in particular greater economic independence, which can in turn enable them to have greater access to health care.^[12, 13]

WHO 2018, revealed that age, education, socioeconomic status, parity and others are contributing factors of maternal death, women in child bearing age specially in their twenties tend to have fewer complications during pregnancy than younger or older women in presence of adequate quantity and quality of health services.^[14] In Kurdistan region 2015, the percentage of death among younger females was 11 % for women aged less than 24 year.^[15] In spite of 95% of births occurred by well-trained health personnel.^[16]

Probability of mothers death during pregnancy labor and puerprum increase with increasing scoring risk factors, maternal death surveillance and response Iraq 2013, revealed that women with more than 30 years, multigravida, low educational status, inadequate antenatal care were at risk to die.^[17] A similar finding was seen in a study in south-east Asia and middle Africa

2015,^[18] and a household survey maternal in select districts of Iraq 2018.^[16]

The coverage percentage of 4th antenatal visit in Iraq it was 50% according to MICS4 2011, the required recommended antenatal visit by Ministry of Iraqi Health/ maternal and child health department at least 4 visit during pregnancy, this low coverage rate due to inadequate knowledge regarding importance of antenatal visits and/or lack of confidence in PHC services,^[19] while in Erbil city 2015, prenatal health care was accessible to 100 % of women and 73 % to postnatal care.^[15] The birth assessed by health personnel was 100% in Erbil and it was 85% in Al- Sulaymania.^[16] In Mosul city 2020, the coverage percent of 4th antenatal visit, it was 7% as a result of damaging infrastructure of most health institution during war liberation in addition to emerging new CORONA virus and application of strict social isolation.^[20]

Midwife intervention increase from 3(14%) in 2018 to 7 (26.9%) during 2020 due to utilization of hospital by new emerging COVID-19 make shifting of pregnant mothers to birth attendance. Maternal death surveillance and response Iraq, showed that mean percent of traditional birth attendance(TBA) interference was 25.1% during 2010-2012,^[17] this result was increase to 36% according to annual report of maternal mortality in Iraq 2013-2015 as a result of activation of maternal death surveillance inquiry form to register all maternal death by MoH 1.^[9] Trained TBAs in sub-Sahara Africa 2013, have positive impact on reducing maternal death, because TBAs can help to break socio-cultural barriers on intervention on reproductive health programmes.^[21]

Another study among 78 low-moderate level country 2014, found that midwifery with family planning prevent a total of 83% of all maternal deaths.^[22]

Delivery and death of women took place in health institution were more frequent in 2019 than 2018 and to lesser extent during 2020. Death during puerprum specially in 1st 24 hrs. more common during 2018 and lower during 2020.

During 2019 there were improvement of socio-economic condition of people in Mosul city after liberation process

and stabilization of political condition of the city, health authorities with non- Governmental organization start to work tirelessly hard with to restore, rehabilitate and rebuild the health system and infrastructure.^[23] While during 2020 as a result of spread of Corona Virus cause shifting of labor to TBS (home deliver) and decrease admission and consultation to health institution, Delivery by caesarian section was less in 2020 than 2019 and 2018. Due to emerging new CORONA virus cause shifting of pregnant women to home delivery by TBS. The grand total percent of caesarian section during 2018-2020 was 30 (37.1%). Caesarian section is one of method should be done to safe mother and fetus but in life saving condition used to save any one of them,^[24] WHO reported that caesarian section should not exceed 15% of delivery.^[6] The risk of death from caesarian section in developed countries is rare if it compare with undeveloped countries but still higher than vaginal delivery, it is found that maternal mortality is 2.2 per 100,000 for c-sections and 0.2 per 100,000 for vaginal births.^[14] WHO 2009, reported the direct risk of death due to pulmonary embolism usually associated with CS in 1st few hours.^[6] this is also reported by maternal death surveillance and response Iraq 2013,^[17] and a study in low- and middle-income countries 2015.^[18] in Pakistan 2015, the active surveillance system showed that quality of obstetric care is less effective in saving mother's life among those with delay in seeking medical advice due to starting of un reversible pathological changed since pregnancy.^[25] one way to reduce maternal mortality is by improving the availability, accessibility and quality of services for the treatment of complication that arise during pregnancy and child birth.^[6] Such services if provided universally can reduce MM by 90% or even more.^[11] The most common cause of death diagnosed by post mortem examination were hemorrhage during 2018-2019 and pulmonary embolism during 2020. According to annual report in MM in Iraq for a period 2013-2015, 70% of death due to direct cause such as hemorrhage, pulmonary embolism and complication of hypertensive disorder, the mean percent were 20% ,16%, 9% respectively.^[9] WHO 2014, systematic analysis revealed that the hemorrhage, hypertensive disorders, and sepsis were responsible for more than half of maternal deaths worldwide and more than a quarter of deaths were due to indirect causes.^[5] Maternal mortality rate and ratio was a bite lower in 2020 than 2019, but still higher than 2018, this as a result the of increases number of deceased mother to seeking medical advice and had had low risk factors and improvement of services provided to women as a result of activation of all PHCC in Mosul city, while registration and reporting of mothers' death were better as a result of activation of maternal mortality surveillance system and increase quality of postmortem examination during 2019 if it compare with 2018.

CONCLUSION

The study concluded that there was improvement in antenatal care attendance by deceased mothers and more than one fourth of study sample had mid wife

intervention during 2020, half of study sample had normal vaginal delivery and 20 (90%) death was occurred during puerperium specially in 1st 24 hrs in 2018. Death in health institution 27(82%) frequently seen during 2019. It was notice there were decrease in both maternal mortality rate and ratio during 2020, 100% of cause of death was due to direct cause during 2019 -2020 and 31 (94%) can be prevented in 2019. D1D3 more frequently seen during 2018, 2020 it was 7(32%) and 5(19.2%) respectively. Death can't prevented 2 (7.2%) in 2020.

Recommendation

- 1- Formal training for TBS to increase their skill regarding dealing with serious case and how, when and where to refer.
- 2- Provision of health care services to high-risk group and improve availability, accessibility, quality and quantity of services for both central and remote hospitals.

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Conflict of Interest

The authors of this study declare no conflict of interest.

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