

Original Research Article

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Maternal Mortality in cities of Iraq for Three Years

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ABSTRACT

To Study the maternal mortality ratio in Thi-Qar, describe clinical characteristics and circumstances associated with maternal deaths, identification of the main cause of maternal death, study the risk factors leading to maternal death in Thi-Qar, & to assess the burden of complications related to pregnancy the coverage of key maternal health interventions. This was a cross sectional analytical study of the maternal death in Thi-Qar city, extended from 1st January 2010 to the 31th of December 2012. The sample included the 59 women, aged 15 – 49 years, who were classified as maternal deaths. Standard definitions of maternal mortality and direct cause of death and indirect causes were used. Non pregnancy related deaths were not included. The study was carried out in 2 central hospitals and 4 peripheral health centers. certain risk factors were studied by comparing maternal death among different categories (age, parity, place of delivery, type of delivery and residency, gestational age, maternal complications on admission, pregnancy stage, stage of labour, birth attendant at delivery, patient who referred from lower level clinical facilities or self referred from home or by a traditional birth attendant). The intention was to examine the certificates and compile two sets of data one for direct causes of death (e.g., infection, eclampsia, ruptured uterus) and another for indirect causes (e.g., Medical disorders). Where multiple causes of death were recorded, the primary cause was identified using available documentation and postmortem reports. For 2010, 2011, 2012 the maternal mortality ratios were 29, 36, 25 per 100 000 live births respectively. The present study showed that the majority of the deaths were among women of the age group between 30 – 34 years in 2010, 2011 (31.6%, 37.5%) respectively and in 2012, the majority of deaths were among women of the age group between 35 – 39 years (31.3 %), the majority of the deaths were among multigravida 42.1%, 54.8%, 43.8% respectively, the majority of maternal deaths were in rural area 38 (46.4%), the majority of the deaths were at postpartum stage 54.2%, direct deaths accounted for the majority of deaths & the leading cause of direct death was postpartum haemorrhage, which account about 40.54% from the total % of direct death followed by antepartum haemorrhage and eclampsia 21.63, 21.63 respectively & showed the cardiac cause is the leading cause of indirect deaths was account 68.17% of the total indirect deaths. This study provides important information about a range of socio-demographic, clinical & health system factors, which are identified as possible contributors to Thi- Qar, poor progress towards reducing maternal mortality. We conclude that vital managerial change is required; including formulation of therapeutic protocols for primary obstetric health care services. Without these, our efforts will be useless, with little impact on saving women's lives.

Keywords

Maternal Mortality, different categories, risk factors

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Introduction

The aim in any obstetric unit, should be to reduce the mortality from obstetric causes to nil, as there should be no wastage of maternal lives in a physiological process of reproduction. No health problem can be of greater consequence to a nation than maternal and infant welfare. The maternal mortality rate is an important indicator of the quality of obstetric care in a community directly reflecting the utilization of health care services available⁽¹⁾. It differs from place to place, country to country and institute to institute reflecting the type of care provided and health status of the region. Maternal mortality has been higher in developing countries than in developed countries. Pregnancy related deaths and disabilities result not only in human suffering but also in losses to social and economic development. Pregnancy is not a disease.

These deaths and disabilities are preventable through primary health care, and with attainable simple and cost effective intervention of the more than 500,000 woman who die each year as a result of complications arising during pregnancy⁽²⁾⁽³⁾.

In 2005, the global estimate for MMR was 402 maternal deaths per 100,000 live births, with 99% of the burden borne by developing nations.⁽³⁾⁽⁴⁾

Maternal Deaths

WHO defines a maternal death as "the death of a woman while pregnant or within 42 days of termination of pregnancy, irrespective of the duration and the site of the pregnancy, from any cause related to or aggravated by the pregnancy or its management, but not from accidental or incidental causes⁽⁵⁾. We express maternal

deaths as the ratio of deaths to 100,000 live births, rather than as a rate per 100,000 pregnancies. The latter might seem more logical since many maternal deaths occur in the absence of alive birth, but is not possible because pregnancies are not registered⁽⁵⁾. By contrast, the maternal mortality rate (MM Rate) is defined as the number of maternal death in a population divided by the number of women of reproductive age, reflecting not only the risk of maternal death per pregnancy or per birth (live birth or stillbirth), but also the level of fertility in the population⁽⁶⁾. In addition to the MMR and the MM Rate, it is possible to calculate the adult lifetime risk of maternal mortality in the population the probability of dying from a maternal cause during a woman's reproductive periods⁽⁶⁾.

Direct death: Death resulting from obstetric complications of the pregnant state (pregnancy, labor and puerperium), from interventions, omissions, incorrect treatment or from a chain of events resulting from any of the above.⁽⁷⁾

Indirect: death resulting from previous existing disease or disease that developed during pregnancy and was not to direct obstetric causes, but was aggravated by the physiological effects of pregnancy.⁽⁷⁾

Late death: death occurring between 42 days and 1 year after abortion or delivery, due to direct or indirect maternal causes.⁽⁷⁾

Coincidental death: death from an unrelated cause which happens to occur in pregnancy or the puerperium. The word "Coincidental" has replaced the term "Fortuitous".⁽⁷⁾

Aetiology

The cause of maternal mortality are similar

all over the world, although overall and the relative contribution of each cause vary from country to country⁽⁷⁾.

Worldwide

The WHO has published the underlying causes in many developing countries include lack of access to contraception, unsafe abortion, lack of primary care or transport facilities. only 55% of deliveries within the developing world are attended by a trained attendant and only 37% of deliveries occur within health facilities.⁽⁷⁾

There is general agreement to classify maternal death as :

Direct Deaths

It include the following causes :

Hypertensive Diseases of Pregnancy :

They represent a major cause of death in low income countries⁽⁸⁾.

The 98% fall in hypertensive disease of pregnancy (HDP) related mortality in the UK and Sweden over fifty years.⁽⁸⁾

Suggests that HDP – related deaths are highly avoidable.

The fall in mortality from HDP has been largely attributed to a reduction in the number of cases of eclampsia, while the incidence of pre-eclampsia has been more resistant to change⁽⁹⁾⁽¹⁰⁾.

The package of interventions that has caused this drop is not known with certainty, but antenatal screening for high blood pressure and proteinuria in the second half of pregnancy, with early delivery through induction of labour or caesarean delivery in women diagnosed with pre-eclampsia is

thought to be the main reason⁽⁸⁾⁽¹¹⁾.

The routine introduction of MgSo₄ for the treatment of pre-eclampsia and eclampsia in more recent years is likely to have further reduced mortality in high income countries today⁽¹²⁾.

Amniotic Fluid Embolism (AFE)

Amniotic fluid embolism is rare, with an incidence of 1 in 80 000 pregnancies.⁽¹³⁾⁽¹⁴⁾ However, due to its high mortality rate of 80%,⁽¹³⁾⁽¹⁴⁾ it is a restively common cause of maternal mortality,with eight women dying from this condition in the last maternal mortality report.⁽¹⁵⁾

Early Pregnancy Deaths

Deaths before 24 week's gestation now full in this category (formerly the upper limit was 20 weeks)⁽⁷⁾.

The commonest early pregnancy complication of spontaneous miscarriage occurs in approximately 15 – 20 % of all pregnancies, as recorded by hospital episode statistics. The actual figure, from community based assessment, may be up to 30%, as may cases remain unreported to hospital^{(7),(16)}.

Abortion was until recent years, one of the most important causes of maternal mortality. Many of deaths were associated will illegal abortion.

The causes of death in abortion were sepsis, hemorrhage and complication of the interference (e.g over vigorous dilatation, perforation)⁽⁷⁾.

Since 1967 abortion act, there was an acceleration in the decline in maternal deaths despite an increased number of death following legal abortion⁽⁷⁾.

With in vitro fertilization (IVF) and other assisted reproductive technologies (ART), the risk of ectopic pregnancy increases substantially, and the location of those ectopic implantations changes.⁽¹⁷⁾ The most recent confidential Enquiry into maternal deaths conclusively demonstrates that mortality from ectopic pregnancy has not declined and is still on the increase compared to rates described 10 years ago⁽¹⁸⁾.

A substantial reduction in maternal deaths can be achieved if complications due to abortion are prevented or recognized early and treated appropriately^{(7),(18)}.

Haemorrhage

It is still one of the leading causes of maternal mortality, with postpartum haemorrhage playing a significant role in the deaths⁽¹⁴⁾.

Postpartum haemorrhage is still a cause of maternal mortality and active management of the third stage of labour decreases the risks of postpartum haemorrhage with accurate estimation of blood loss is essential, acute management requires a multidisciplinary approach with the involvement of senior clinicians, It's important to monitor central venous pressure in severe cases and early transfusion and correction of coagulopathies are fundamental^{(14),(18)}.

Antepartum haemorrhage is one of the commonest reasons for admission in pregnancy. It affects approximately 4% of all pregnancies and is associated with increased rate of fetal and maternal morbidity and mortality⁽¹⁹⁾.

Placenta praevia and abruption together account for 50% of bleeding and represent the greatest threat to the fetus and mother^{(7),(19)}.

Thus all APH must be taken seriously^{(18),(19)}.

Maternal Sepsis

Is a general term which has been used to include various obstetric and genitor-urinary tract infections introduced into the mother⁽²⁰⁾.

The World Health Organization ranks maternal sepsis as the sixth leading cause of disease burden for women aged 15 – 44 years, after depression, HIV / AIDs, tuberculosis, abortion and schizophrenia.

As many as 5.2 million new cases of maternal sepsis are thought to occur annually and an estimated 62,000 maternal deaths will result from the condition⁽²⁰⁾⁽²¹⁾.

A specific form of maternal sepsis is known as puerperal sepsis, an infection which is introduced during childbirth, but manifests in the postpartum period within first 42 day after delivery. It is special importance because it is a serious, life threatening disease of the mother with infection of the womb and abdominal cavity, bloodstream infection, fever and pain^{(20),(22)}. In industrialized countries, puerperal sepsis is rare, causing 2.1% of maternal deaths. In developing countries, It is the second commonest cause of maternal mortality after haemorrhage, causing 9.7% and 11.6% of deaths respectively⁽²⁰⁾.

Uterine Rupture

Uterine rupture, or a tear in the uterus, usually happens due to a previous uterine injury^{(23),(24)}. It is rare, occurring with an incidence of 0.03 – 0.3 %⁽²³⁾.

Uterine rupture may be spontaneous, traumatic, or associated with a prior uterine scar, and it may occur during or before

labour as at the time of delivery. A prior uterine scar is associated with 40% of cases⁽²⁴⁾. With a prior lower-segment transverse incision, the risk for rupture is <1%, where as the risk with a vertical scar is 4-7%⁽²⁴⁾. The signs and symptoms of uterine rupture are highly variable. Classically, rupture is characterized by sudden onset of intense abdominal pain and some vaginal bleeding⁽²⁴⁾.

Impending rupture may be heralded by hyperventilation, restlessness, agitation, and tachycardia. A high index of suspicion is required. Immediate laprotomy is essential^{(24),(25)}.

Delay in management places both mother and child at significant risk⁽²³⁾⁽²⁴⁾⁽²⁵⁾. Although the associated maternal mortality rate is now <1%, if the mother is left untreated she will almost certainly die⁽²⁴⁾⁽²⁵⁾.

Anaesthesia

Anaesthesia requirements are different for vaginal and caesarean section delivery in regard to type, depth or level and duration.

General anaesthesia is preferable for emergencies unless a regional block has already been started and function⁽²⁶⁾.

The problems with anaesthesia were failed intubation and pulmonary aspiration of gastric contents, misplaced endotracheal intubation, local anesthetic toxicity and high spinal or epidural block^{(26),(27)}.

Venous Thromboembolism

Venous thromboembolic disease (VTE) is the most common cause of direct maternal death in the UK.^(18,28,29,30) The most recent reports from the USA show that thrombotic embolism is the third cause of maternal

mortality after haemorrhage and hypertensive disorders.⁽³¹⁾⁽³²⁾ Pregnancy is a hypercoagulable state because of an alteration in the thrombotic and fibrinolytic systems. Pregnancy is associated with a 6 – 10 fold increase in the risk of venous thromboembolic disease compared to the non-pregnant situation^{(28),(30)(33)}.

Without thrombo prophylaxis, the incidence of non-fatal pulmonary embolism (PE) and deep vein thrombosis (DVT) in pregnancy is about 0.1% in developed countries, this increases following delivery to around 1-2% and is further increased following emergency caesarean section.⁽²⁸⁾⁽³³⁾

The risk of PE is higher in women aged > 35 years with history of thrombophilia, obese (> 80Kg) Previous thromboembolism, severe varicose veins, smoker, malignancy and those with multiple gestation, pre-eclampsia, grand multiparity, sepsis and with prolonged bed rest⁽²⁸⁾.

It is crucial to recognize PE, as missing the diagnosis could have fatal implications. The most common presentation is of mild breathlessness, or inspiration chest pain, in a woman who is not cyanosed but may be slightly tachycardia (> 90 bpm) with a mild pyrexia (37.5 C). Rarely massive PE may present with sudden cardiorespiratory collapse^{(28),(30)}.

So rapid treatment of suspected VTE in pregnancy should be commenced while waiting diagnosis^{(28),(30)}.

Other Direct Causes

Hydatidiform mole, Hyperemesis gravidarum, vaginal wall haematoma, acute fatty liver of pregnancy and obstructed labour.⁽³⁰⁾

Indirect Causes

Cardiac Diseases

Pregnant women who have heart disease have a 100 fold higher mortality than the normal pregnant population, according to new data from the first ever formal registry on pregnancy and heart disease⁽³⁴⁾⁽³⁵⁾.

The authors note that overall, about 0.9% of pregnant women have some form of heart disease⁽³⁵⁾.

There is clear differences were found in countries with respect to the underlying cardiac diagnosis, with cardiomyopathy associated with the worst prognosis, and these women also had higher rate of heart failure and reticular arrhythmias postpartum hemorrhage occurred more often in patient with valvular heart disease, probably related to their high use of oral anticoagulants.

As may be expected, there was also a large difference between mortality rate in developing 3.9% and developed (0.6%) countries⁽³⁴⁾⁽³⁵⁾.

Neurological Conditions

Serious manifestations of neurological disease are fortunately rare in pregnancy, though cerebral hemorrhage remains a significant cause of maternal death⁽³⁶⁾⁽³⁷⁾⁽³⁸⁾. It can occur as a result of uncontrolled hypertension or due to vascular malformations.

Ischemic strokes arise in pregnancy, but it is controversial as to whether this is associated with an increased incidence reflecting the coagulation changes of pregnancy⁽³⁶⁾. In the maternal mortality report published in 2004⁽³⁷⁾ 17 out of 21 cases of intracranial hemorrhage were due to subarachnoid hemorrhage, but non of the cases occurred

during labour. In 7 of the 17 cases, an aneurysm was identified.

Death in a convulsion or due to accident related to seizures⁽³⁸⁾⁽³⁹⁾. So it is important that control of seizures is achieved to minimize maternal morbidity (fits can be fatal)⁽³⁶⁾⁽³⁹⁾.

Respiratory Disorders

Asthma is the most common respiratory disorder affecting 3% of women of childbearing age⁽³⁶⁾. The most common reason that their asthma symptoms deteriorate is patients reducing their treatment because of a belief that the medication may be harmful. Acute asthma is still a cause of maternal death and as such must be taken extremely seriously⁽³⁶⁾⁽⁴⁰⁾.

Pneumonia : can be a life-threatening illness in a woman of childbearing age⁽³⁶⁾.

Respiratory failure post-partum can a rise for the first time in the post-partum period. The differential diagnosis includes adult respiratory distress syndrome, pulmonary oedema secondary to pre-eclampsia or nephrotic syndrome, amniotic fluid embolism, pulmonary embolism, infection and collapse and side effects of tocolysis⁽³⁶⁾.

The main aim of this study includes, Study the MMR in Thi-Qar city. Describe clinical characteristics and circumstances associated with maternal deaths. Identification of the main cause of maternal death. Study the risk factors leading to maternal death in Thi-Qar city. And also to assess the burden of complications related to pregnancy the coverage of key maternal health interventions.

Methodology

This was a cross sectional analytical study of the maternal death in Thi-Qar city,

extended from 1st January 2010 to the 31th of December 2012.

Ethical approval for this study was granted by the university of Thi-Qar. Ethical approval was also sought and granted by the Thi-Qar state ministry of health.

Data Collection

A pilot study was conducted for 2 weeks during January 2010.

Six hospitals in Thi-Qar were visited. The experience (Time, cost, feasibility of the study) and results of pilot study have been published.

The sample included the 59 women, aged 15 – 49 years, who were classified as maternal deaths Standard definitions of maternal mortality and direct cause of death and indirect causes were used.

Non pregnancy related deaths were not included.

The study was carried out in 2 central hospitals and 4 peripheral health centers :

The central Hospital are,

1. Bent Al-Huda maternity teaching hospital (BAHH) : Is the main obstetrical referral center in Iraq. The patients at BAHH are referred either from other hospitals or from the community, usually following evidence of complications. Deliveries at BAHH women are delivered in maternity couches and mostly attended by midwives, but in cases of complications, attended by doctors.

2. Al-Hussein general teaching hospital

The peripheral hospitals are :

1) Al-Shatra hospital.

- 2) Al-Refaie hospital.
- 3) Al-Gepaesh hospital.
- 4) Souq Al-Sheukh hospital.

Information extracted from mother's hospital records (by using structured questionnaire) included : age, parity, gestational age, maternal complications on admission, pregnancy stage, stage of labour, birth attendant at delivery, patient who referred from lower level clinical facilities or self referred from home or by a traditional birth attendant.

The intention was to examine the certificates and compile two sets of data one for direct causes of death (e.g., infection, eclampsia, ruptured uterus) and another for indirect causes (e.g., Medical disorders).

Where multiple causes of death were recorded, the primary cause was identified using available documentation and postmortem reports.

The annual incidence estimates were augmented by data provided by the records department at the hospitals and health centers, giving total numbers of total births, live birth, and maternal deaths per year, these data were used to calculate the annual maternal mortality ratios. The information taken from Thi-Qar Medical directorate after permission. certain risk factors were studied by comparing maternal death among different categories (age, parity, place of delivery, type of delivery and residency).

All data were coded and double entered into Microsoft Excel 2007 work sheets. Data were then read from Excel into SPSS 14 for the main analysis.

We use SPSS (Statistical Package of Social Sciences) to estimate the incidence of mortality, determinates of mortality and

using percentages, Chi-square test (X²), P value which was significant < 0.05.

Results and Discussion

From the first January 2010 and thirh one December 2012, there were a total of 196, 859 deliveries and 59 maternal mortality deaths. Table (1) and figure (1) show annual changes in MMRs. In 2011, the MMR was the highest 36 / 100,000 live births and MMR in 2012 was the lowest 25/100,000 live births.

Table (2) and figure (2) show the distribution of age according to years of maternal mortality. which shows that the majority of the deaths were among women of the age group between 30 – 34 years in 2010, 2011 (31.6%, 37.5%) respectively and in 2012, the majority of deaths were among women of the age group between 35 – 39 years (31.3 %).

Table (3) and figure (3) show distribution of recorded gravida according to years of maternal mortality, which show the majority of the deaths were among multigravida 42.1%, 54.8%, 43.8% respectively. Table (4) Show distribution of residence according to years of maternal mortality, shows that the majority of maternal deaths were in rural area 38 (46.4%).

Table (5) Show distribution of pregnancy stage on admission according to years of maternal mortality. It shows the majority of the deaths were at postpartum stage 54.2%. In 2010, 2011, 2012 the percentages of the postpartum stage on admission were 57.9%, 58.3%, 43.8%, respectively. Table (6) Show distribution of deliveries in Thi-Qar according to the place of the delivery to years of maternal mortality. It shows the majority of the deliveries were take place in health institutes. According to years of study 2010, 2011, 2012, the total no. of deliveries

were 65428, 67852, 63579 respectively. And the majority of these deliveries were taken place in health institutes 51.5%, 60.3%, 64.5% respectively.

Figure (4, 5) show the distribution of the percentages and the numbers of the deliveries in health institutes which show there was gradually increasing in the percentage of deliveries were taken place at health institutes from 2005 (39.2%) toward 2012 (64.5%).

Table (7) : Shows the distribution of deliveries according to the mode of delivery. The majority of deliveries in 2010, 2011, 2012 were vaginally 72.1%, 81.9%, 82.5% respectively.

Table (8), figure (6) : Show distribution of mode of delivery according to years of maternal mortality 35.6% were delivered by caesarian section while 32.2% were delivered vaginally and the rest 32.2% not delivered included 3.4% died due to miscarriage. There is no significant statistical association between the time trends of mortality and mode of the delivery of died mothers.

Table (9), figure (7) : Show distribution of place of delivery according to years of maternal mortality. The majority of death were occurred at hospitals 49.2%. There is significant statistical association between the time trends and the place of delivery.

Table (10) &(11) :show the distribution of place of death according to years of maternal mortality. Show majority of deaths occurred at hospitals in all the 3 years of the study 2010, 2011, 2012, 57.9%, 70.8%, 50% respectively & most of death at Bint AL – huda Hospital 32.2%. The deaths percentages that occurred at road according to years of maternal mortality were 21.1%, 16.7 %, 18.8%, respectively.

Table.1 Distribution of the MMR According to the Year of the Maternal Mortality

Year	No.	Maternal death/ 100000 live births
2010	19	29
2011	24	36
2012	16	25

Table.2 Distribution of Age According to Years of Maternal Mortality

	Age by years	Year			Total
		2010	2011	2012	
	15-19	3	2	0	5
		15.8%	8.3%	.0%	8.5%
	20-24	3	4	1	8
		15.8%	16.7%	6.3%	13.6%
	25-29	3	1	4	8
		15.8%	4.2%	25.0%	13.6%
	30-34	6	9	4	19
		31.6%	37.5%	25.0%	32.2%
	35-39	2	3	5	10
		10.5%	12.5%	31.3%	16.9%
	40 and more	2	5	2	9
		10.5%	20.8%	12.5%	15.3%
	Total	19	24	16	59
		100.0%	100.0%	100.0%	100.0%
Fisher's Exact Test	Df	Point Probability			
9.888	10	.012			

Table.3 Distribution of Recoded Gravida According to Years of Maternal Mortality

Gravida		Year			Total
		2010	2011	2012	
Primigra- vida		6 31.6%	6 25.0%	3 18.8%	15 25.4%
Multigra- vida (2-4)		8 42.1%	11 45.8%	7 43.8%	26 44.1%
5 and more		5 26.3%	7 29.2%	6 37.5%	18 30.5%
Total		19 100.0%	24 100.0%	16 100.0%	59 100.0%
Pearson Chi-square	df	Point Probability			
979	4	058			

Table.4 Distribution of Residence According to Years of Maternal Mortality

Residence	Year			Total
	2010	2011	2012	
Urban	5 26.3%	9 37.5%	7 43.8%	21 35.6%
Rural	14 73.7%	15 62.5%	9 56.3%	38 64.4%
Total	19 100.0%	24 100.0%	16 100.0%	59 100.0%
Chi-Square Tests	Degree of freedom	Point Probability		
1.216	2	.079		

Table.5 Distribution of Pregnancy Stage on Admission According to Years of Maternal Mortality

Pregnancy stage on admission	Year			Total
	2010	2011	2012	
Antepartum	2	5	5	12
	10.5%	20.8%	31.3%	20.3%
Intrapartum	6	5	2	13
	31.6%	20.8%	12.5%	22.0%
Postpartum	11	14	7	32
	57.9%	58.3%	43.8%	54.2%
After miscarriage	0	0	2	2
	.0%	.0%	12.5%	3.4%
Total	19	24	16	59
Percentage	100.0%	100.0%	100.0%	100.0%
Fisher's Exact Test	df	Point Probability		
7.096	6	.074		

Table.6 Distribution of Total Number of Deliveries According to the Place of Deliveries to Years of Maternal Mortality

the place of deliveries	Year		year		year	
	2010	%	2011	%	2012	%
Home	31740	48.5	26963	39.7	22633	35.5
Heath institutes	33688	51.5	40889	60.3	40946	64.5
Total	65428	100	67852	100	63579	100

Table.7 Distribution of Deliveries of Thi-Qar According to the Mode of the Deliveries

Mode of the delivery	Year		year		Year	
	2010	%	2011	%	2012	%
Caesarian section	11739	27.9	12282	18.1	11101	17.5
Vaginal delivery	48541	72.1	55570	81.9	52478	82.5
Total	65428	100	67852	100	63579	100

Table.8 Distribution of Mode of Delivery According to Years of Maternal Mortality

Mode of delivery	Year			Total
	2010	2011	2012	
vaginal delivery	6	7	6	19
	31.6%	29.2%	37.5%	32.2%
caesarian section	7	12	2	21
	36.8%	50.0%	12.5%	35.6%
not delivered	6	5	8	19
	31.6%	20.8%	50.0%	32.2%
Total	19	24	16	59
	100.0%	100.0%	100.0%	100.0%
Chi-Square Tests	Df	Point Probability		
6.555	4	.076		

Table.9 Distribution of Place of Delivery According to Years of Maternal Mortality

place of delivery		Year			Total
		2010	2011	2012	
at home	Count	3	4	10	17
	% within year	15.8%	16.7%	62.5%	28.8%
At Hospital	Count	10	16	3	29
	% within year	52.6%	66.7%	18.8%	49.2%
not delivered	Count	5	4	3	12
	% within year	26.3%	16.7%	18.8%	20.3%
Road	Count	1	0	0	1
	% within year	5.3%	.0%	.0%	1.7%
Total	Count	19	24	16	59
	% within year	100.0%	100.0%	100.0%	100.0%
Fisher's Exact Test	14.545				

Point Probability 0.003

Table.10 Distribution of Place of Death According to Years of Maternal Mortality in Detail

Place of death	Year			Total
	2010.00	2011	2012	
at home	4 21.1%	3 12.5%	5 31.3%	12 20.3%
Bint Al-huda Hospital	10 52.6%	8 33.3%	1 6.3%	19 32.2%
at Al-Rifae hospital	0 .0%	1 4.2%	2 12.5%	3 5.1%
Road	4 21.1%	4 16.7%	3 18.8%	11 18.6%
Al-HussainTeaching hospital	1 5.3%	5 20.8%	4 25.0%	10 16.9%
Al-Sader hospital	0 .0%	3 12.5%	0 .0%	3 5.1%
AlShatra hospital	0 .0%	0 .0%	1 6.3%	1 1.7%
Total	19 100.0%	24 100.0%	16 100.0%	59 100.0%

Chi-Square Tests

Fisher's Exact Test	df	Point Probability
18.041	12	.007

Figure.1 No. of the Maternal Deaths and MMR in Thi-Qar According to Years of the Study

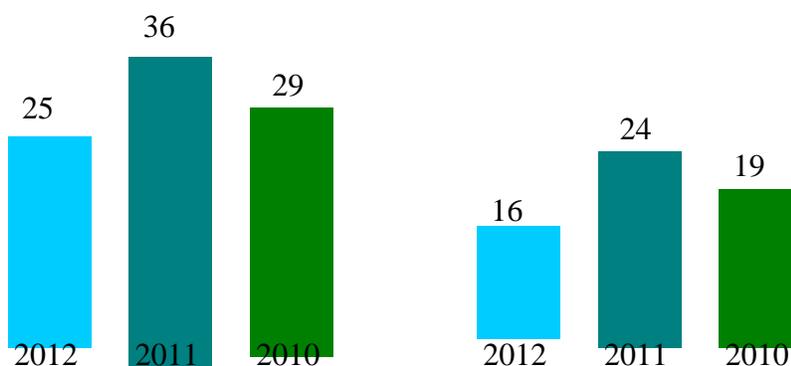


Table.11 Distribution of Place of Death According to Years of Maternal Mortality

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			year			Total
			2010.00	2011	2012	
Place Of death	at home	Count	4	3	5	12
		% within year	21.1%	12.5%	31.3%	20.3%
	At Hospital	Count	11	17	8	36
		% within year	57.9%	70.8%	50.0%	61.0%
	road	Count	4	4	3	11
		% within year	21.1%	16.7%	18.8%	18.6%
Total		Count	19	24	16	59
		% within year	100.0%	100.0%	100.0%	100.0%
Fisher's Exact Test		2.637				

Point Probability 0.047

Table.12 Distribution of Cause of Death According to Years of Maternal Mortality

Cause of death	Year			Total
	2010	2011	2012	
Direct cause	12	15	10	37
	63.2%	62.5%	62.5%	62.7%
Indirect cause	7	9	6	22
	36.8%	37.5%	37.5%	37.3%
Total	19	24	16	59
	100.0%	100.0%	100.0%	100.0%

Chi-Square Tests

Pearson Chi-Square	df	Point Probability
.002	2	.137

Table.13 Causes of Death Detail for the Years of the Study

	Frequency	Percent
Cardiac disease PE	9	15.3
Myocardial infarction	5	8.5
Heart failure	1	1.7
Antepartum haemorrhage	8	13.6
Postpartum haemorrhage	15	25.4
Eclampsia	8	13.6
Sepsis	2	3.4
Anesthesia	2	3.4
Rupture uterus	2	3.4
Others	7	11.9
Total	59	100.0

Table.14 Direct Causes of Death Detail for the Years of the Study

Direct deaths	2010 n.	%	2011 n.	%	2012 n.	%	Total n.	%
postpartum haemorrhage	5	41.67	6	40	4	40	15	40.54
Antepartum haemorrhage	3	25	3	20	2	20	8	21.63
Rupture uterus	1	8.33	1	6.67	0	0	2	5.4
Anesthesia	0	0	2	13.33	0	0	2	5.4
Sepsis	0	0	1	6.67	1	10	2	5.4
Eclampsia	3	25	2	13.33	3	30	8	21.63
Total	12	100	15	100	10	100	37	100

Table.15 Indirect Deaths Causes of Death Detail for the Years of the Study

Indirect deaths	2010 n.	%	2011 n.	%	2012 n.	%	Total n.	%
Cardiac disease	6	85.71	6	66.67	3	50	15	68.17
Sever asthma	1	14.29	0	0	0	0	1	4.55
Rupture spleen	0	0	1	11.11	0	0	1	4.55
Cerebral vascular accident	0	0	1	11.11	0	0	1	4.55
Hepatitis	0	0	1	11.11	1	16.67	2	9.08
Renal failure	0	0	0	0	1	16.67	1	4.55
Meningitis	0	0	0	0	1	16.67	1	4.55
Total	7	100	9	100	6	100	22	100

Figure.2 Distribution of Age According to Years of Maternal Mortality

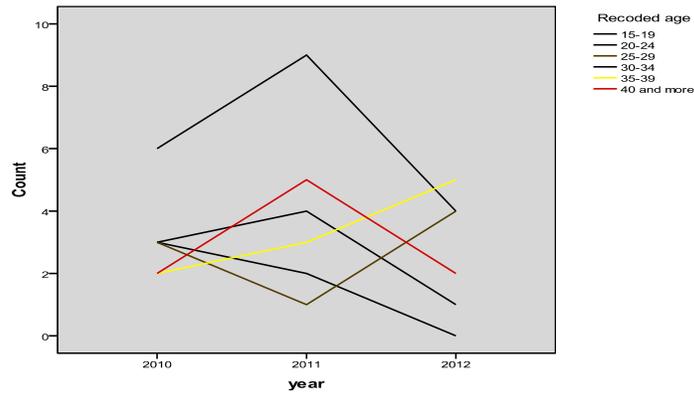


Figure.3 Distribution of Recoded Gravida According to Years of Maternal Mortality

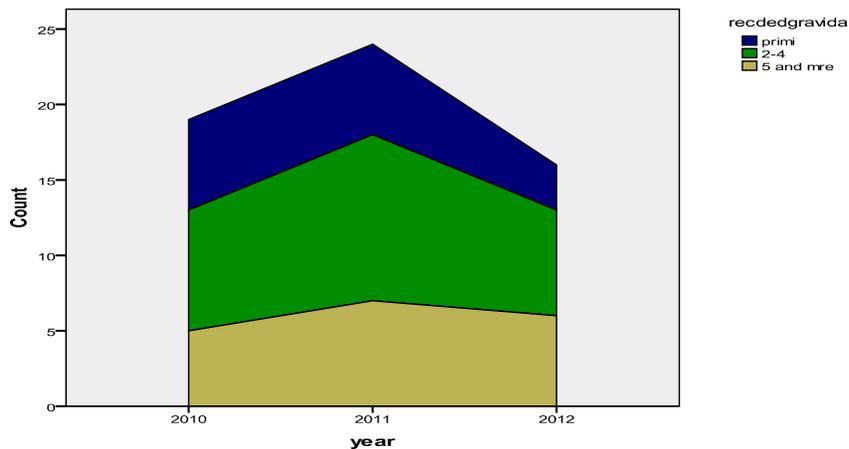


Figure.4 Percentages of Deliveries at Health Institutes in Thi-Qar

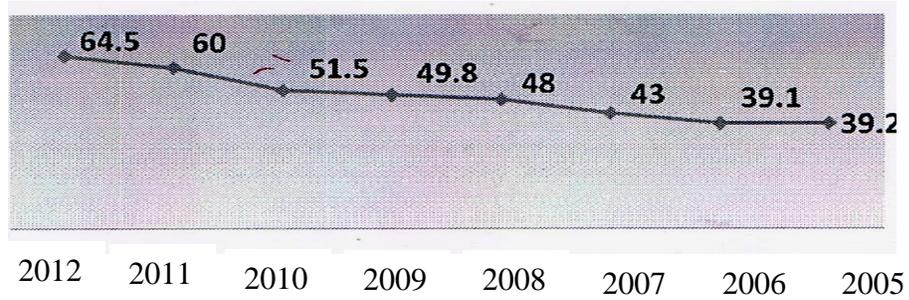


Figure.5 Number of Deliveries at Labour Wards in Health Institutes in Thi-Qar

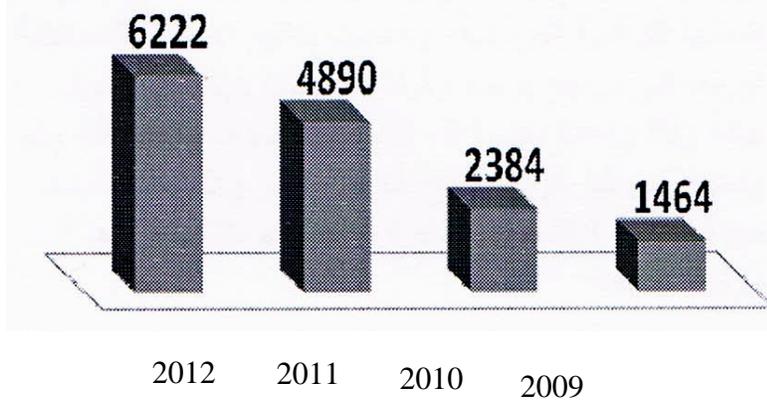


Figure.6 Distribution of the Modes of Delivery According to the Studies Years of Mortality

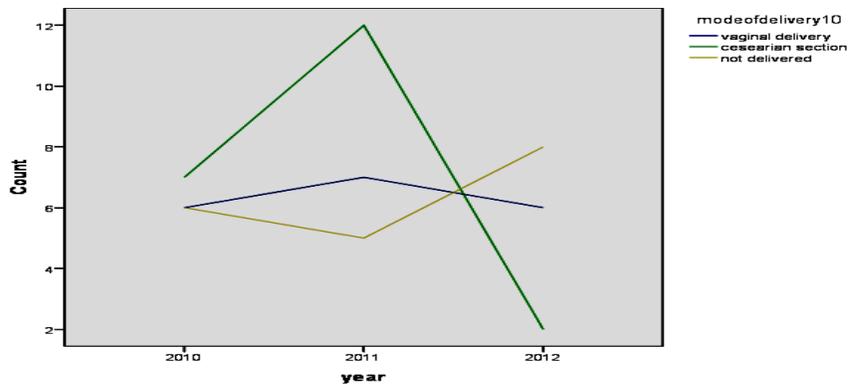


Figure.7 Distribution of Place of Delivery According to Years of Maternal Mortality

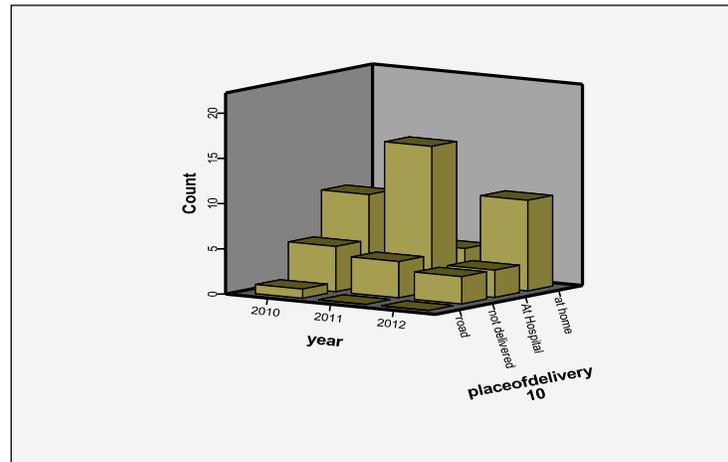


Table (12), (13), Summarize the leading causes of maternal death overall, direct death rates were the most common cause (62.7%) and postpartum haemorrhage (PPH) was the most common cause followed by cardiac disorders 25.4%, eclampsia 13.6% & antepartum haemorrhage (APH) 13.6%.

Table (14), summarizes the leading cause the of direct death, which shows the most common cause of direct death was postpartum haemorrhage in all 3 years of the study 41.67%, 40%, 40%. respectively.

Which account about 40.54% from the total % of direct death followed by antepartum haemorrhage and eclampsia 21.63, 21.63 respectively.

Table (15), shows the cardiac cause is the leading cause of indirect deaths was account 68.17% of the total indirect deaths, and about 85.71%, 66.67%, 50% in 2010, 2011, 2012 respectively. And followed by hepatitis was account 9.08%.

Maternal mortality is one of the world's most neglected problems. Every day around 1600 women die due to complications of pregnancy. Eighty percent of these deaths

are largely preventable or treatable at little or no extra cost, even in resource-poor settings.⁽⁴¹⁾

The current study exposed that the maternal mortality ratio in Thi-Qar Hospitals was 29/100,000 live births, 36/100,000 live births, 25/100,000 live births in 2010,2011&2012 respectively.In Iraq, the national maternal mortality ratio in 2010 was 63.00/100 000 live births; compared with 7 in Qatar, 24 in Saudi Arabia,70 in Syria, 66 in Egypt,63 in Jordan,32 in Oman,20 in Turkey, 21 in Iran, and 200 in Yemen.⁽⁴²⁾Thi-Qar Governorate fourth largest city in Iraq, with an estimated above 2000, 500 inhabitants. Thi-Qar is surrounded by villages and rural areas where *dayas* attend deliveries at home and complicated cases are referred to Hospitals.We have found that direct causes are responsible for 62.7% of all maternal deaths in Thi-Qar compared to 80% of maternal deaths worldwide.⁽⁴³⁾ In France, Direct obstetric causes largely dominate (73%), mostly hemorrhage (25%)and amniotic embolism(11%).⁽⁴⁴⁾The majority of maternal deaths in developing countries are caused by five major direct obstetric complications: hemorrhage, infection,

unsafe abortion, hypertensive disorders of pregnancy and obstructed labor. Obstetrical hemorrhage represents 30% of all causes of maternal death, and hypertensive crises are the origin of another 15%. Callister (2005) established that the most frequent direct causes of global maternal deaths were hemorrhage, infection, unsafe abortion, pregnancy-induced hypertension, and obstructed labor.⁽⁴⁵⁾ In this investigation, we found that postpartum hemorrhage formed the biggest single cause of maternal mortality, responsible for 25.4% of all deaths & 40.54% of the direct deaths. This concurs with the finding of Khan et al who reported that hemorrhage was the leading cause of death in Africa (33.9%) and in Asia 30.8%.⁽⁴⁶⁾ Likewise, it has been estimated that approximately 25% of maternal deaths are caused by hemorrhage, 15% by infection, 13% by unsafe abortion, 12% by pregnancy-induced hypertension, 8% by obstructed labor and 8% by other direct causes. Twenty percent are ascribed to indirect causes, including malaria and iron deficiency anemia.⁽⁴³⁾⁽⁴⁷⁾⁽⁴⁸⁾ In addition, several studies also confirmed that postpartum hemorrhage is the most important single cause of maternal death, with 88% of deaths from hemorrhage occurring within four hours of giving birth.⁽⁴⁷⁾ In the United States, the most common causes of maternal death vary somewhat from region to region. They include pulmonary thromboembolism, amniotic fluid embolism, primary postpartum uterine hemorrhage, infection and complications of hypertension, including preeclampsia and eclampsia.⁽⁴⁹⁾ We found that hypertensive diseases complicating pregnancy (pre-eclampsia and eclampsia) accounted for 13.6% of all maternal deaths & 21.63% of direct maternal deaths. This is in agreement with the results of studies done in Colombia, where up to 42% of maternal deaths are

from pre-eclampsia or eclampsia.⁽⁵⁰⁾ Pre-eclampsia and eclampsia probably account for more than 50,000 maternal deaths worldwide each year.⁽⁵⁰⁾⁽⁵¹⁾ Murray and Lopez stated that pre-eclampsia and eclampsia remain two of the most common reasons for women dying during pregnancy worldwide, as 12% of all maternal deaths are caused by eclampsia.⁽⁵²⁾ In Bahrain, hypertensive disease was the second most common cause of maternal deaths and the leading direct cause of death.⁽⁵³⁾ Sepsis was responsible for 3.4% of all maternal deaths & 5.4% of direct maternal deaths in Thi-Qar. Sepsis remains a primary cause of maternal mortality in the developing world, mostly as a result of illegal abortions. According to the World Health Organization, about 68,000 women die each year from complications from unsafe abortions, with sepsis being the main cause of death.⁽⁵⁴⁾ Vinita et al reported that maternal mortality caused by septic abortion in India was 23.21%.⁽⁵⁵⁾ Meningitis, rupture spleen, severe asthma, cerebral vascular accident and renal disease each one constituted 4.55% of total indirect maternal deaths in Thi-Qar. Hepatitis constituted 9.08% of indirect deaths. In Malaysia, 2.15% of maternal deaths were caused by liver disease.⁽⁵⁶⁾

Today, the desire to show progress in reducing the burden of mortality is universal: across developing and developed countries; at international, national and local levels; and for all causes and conditions.⁽⁵⁶⁾ We attribute the MMR in Thi_Qar, to several factors, the first of which is that our study is a hospital based study and in such a study, maternal mortality usually under- or overestimates real levels, depending upon patient population and coverage. The second cause is that many of our patients give birth under the supervision of untrained personnel (*dayas*). The other

causes of increased maternal deaths include deficient antenatal care, deficient emergency obstetrics, an increase in the rate of Caesarean sections and absence of therapeutic protocols. We conclude that vital managerial change is required; including formulation of therapeutic protocols for primary obstetric health care services. Without these, our efforts will be useless, with little impact on saving women's lives.

Recommendations

1. Examine ways to ensure that all maternal death data from hospitals are included in the DOH death registry which is then forwarded to the MOH.
2. Devise approaches to ensure that details concerning deaths recorded at the hospital level are fully represented at the DOH level, and introduce a back checking mechanism. This could be addressed with an electronic reporting system where primary data were entered at the hospital, and the risk of data degradation could be minimized.
3. Assess the completeness of data transfer from the forensic medicine units to the DOH.

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