

# Perinatal mortality rate in Al-Ramadi Maternity and Children's Hospital, western Iraq

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## ABSTRACT

**الأهداف:** دراسة معدل الوفيات (PMR) عند الولادة بمدينة الرمادي مع دراسة علاقتها بعوامل مسبباتها بعد احتلال العراق عام 2003.

**الطريقة:** تمت دراسة كافة الولادات الميتة والتي ولدت حيه ثم توفيت خلال الأسبوع الأول بعد الولادة الحاصلة في مستشفى الولادة والأطفال في الرمادي - محافظه الانبار - غرب العراق خلال الفترة من 15 يونيو حتى 15 ديسمبر 2005. البيانات المتعلقة بالأم تشتمل على عمر الأم، والسكن وعدد الولادات، وعدد الولادات المتعددة، والأمراض الباطنية، والنسائية التي أصابت الأم خلال فترة الحمل وتاريخ الرعاية الصحية (ANC) وفيما لو كانت لها ولادة سابقة ماتت بعد الولادة أيضا. المعلومات الخاصة بالطفل شملت عمر حمل الجنين، وجنسه، ووزنه عند الولادة، ومقياس أبقار بعد الولادة.

**النتائج:** مجموع الولادات في المستشفى خلال فترة الدراسة كانت 3249. عدد الوفيات الكلي 125 منها 43 ولادة ميتة و 82 ولادة حيه توفيت في الأسبوع الأول بعد الولادة، وكان معدل الوفيات PMR هو 38.5 لكل 1000 مولود، وكانت معدلات الوفيات PMR أكثر عند الذكور من الإناث (45.9، 29.1 لكل 1000 على التوالي). أثبتت الدراسة أن عدد ولادات الأطفال قليلي الوزن هي 939 (29.2%) ومعدل الوفيات PMR لديهم كانت (95.8 لكل 1000) وهي أعلى من الأطفال ذوي الوزن الطبيعي (15.1 لكل 1000). أثبت البحث علاقة قوية بين فترة الحمل، ووزن الطفل، وجنسه، ومقياس أبقار بعد الولادة، و عمر الأم، ونوع سكن الأم، وتاريخ الأم المرضية، وعدد الولادات الكلي للأم، وحدوث ولادة سابقة ميتة لأم مع معدل الوفيات حول الولادة. بينما لم تثبت الدراسة أية علاقة بين معدل الوفيات PMR وطريقه الولادة، وكذلك تاريخ متابعه الأم في مراكز الرعاية الصحي وعدد مرات الحمل للأم مع معدل الوفيات حول الولادة PMR.

**خاتمة:** هذه الدراسة هي الأولى في محافظه الانبار لمعدل الوفيات حول الولادة وبالرغم من أنها بينت معدلات قبل عام 2003 وتعتبر أعلى من معدلات الدول المجاورة ولكنها أقل من معدلات الدراسات الأخرى التي جرت في العراق قبل عام 2003.

**Objectives:** To estimate the perinatal mortality rate (PMR) in Al-Ramadi city, Iraq, and study its associated causative factors following the 2003 Coalition Forces occupation of Iraq.

**Methods:** All the hospital stillbirth, and early neonatal death deliveries at the Al-Ramadi Maternity and Children's Hospital, Al-Anbar Governorate, western Iraq, from 15th June to 15th December 2005 were included in the study. Data collected for the mother includes: age, residence, parity, plurality, mode of delivery, medical and obstetrical history, antenatal care (ANC), and previous perinatal death. For dead babies: gestational age, gender, birth weight, and Apgar scores were also collected.

**Results:** The total studied deliveries were 3,249 births. The perinatal mortalities were 125 (43 stillbirths, and 82 neonatal deaths), giving an overall PMR of (38.5/1000). Males showed higher PMR (45.9/1000) than females (29.1/1000). Low birth weight babies among live births were 939 (29.2%), and were of higher (95.8/1000) PMR than normal (15.1/1000) weight births. Significant association was found between the gestational age, Apgar score, maternal age, residence, previous medical history, previous perinatal death, and plurality with the PMR. While no association was found between the mode of delivery, parity, ANC, and PMR.

**Conclusion:** This study showed lower rates than some Iraqi studies applied before 2003, but still was of higher PMR when compared with the rates of most neighboring Arab and other developed countries.

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Mortality rates are useful indicators of population health. The perinatal mortality rate (PMR) is defined as the number of still birth ( $\geq 28$  weeks of gestation), and early neonatal death (within 7 days after birth) per thousand total births.<sup>1,2</sup> The maternal health, nutrition, and socioeconomic status will affect the intrauterine environment, and also affects the PMR.<sup>1,3</sup> The risk factors affecting the perinatal mortality and morbidity includes: the mother's age (less than 20 and over 35 years), parity, birth interval, the progress, course and outcome of the current pregnancy, the mother's health and nutrition, and the availability and utilization of the health services.<sup>4</sup> Such risk factors endanger the mother's life, increasing her mortality, and also increase the perinatal mortality of the motherless baby.<sup>1</sup> Other direct causes of increasing PMR are: low birth weight (LBW) infants, birth injuries, anoxia, congenital malformations, and neonatal infections.<sup>3</sup> In developed countries, the PMR had fallen to a lower level reaching to one digit per thousand, and still decreasing.<sup>5</sup> As a target to lower the PMR, the European Council of Member States set a plan in 1977 to decrease the PMR by improving the social standard of living, environmental sanitation, nutrition, and education, followed by the establishment of the population health care systems, such as the immunization programs, screening of high risk pregnancy, provision of health supervision facilities, growth monitoring systems, and the improvement of the obstetric and perinatal care technologies.<sup>6</sup> Iraq, a country, that after a decade of war and conflicts that started in the 1980's, was placed under comprehensive United Nations (UN) economic sanction in the early 1990's for 13 years until 2003.<sup>7,8</sup> In 1996, in a study for the Iraqi population economic status, the UN Economic and Social Commission for Western Asia reported that poverty affected 3.2% urban, and 8.3% of the rural population in Iraq in 1988, and that rate increased sharply to 21% in the urban and 22% in the rural population in 1996.<sup>7</sup> In another study in 2001, the World Bank reported that 27.2% of the Iraqi population were living on less than \$2 per day.<sup>8</sup> Such a unique disastrous situation of the country lead the infant mortality to show an upward trend.<sup>9-11</sup> Also, many reports in Iraq demonstrated an increase in the prevalence of LBW in the past 3 decades, and so, adding another factor for the increase of PMR.<sup>12-15</sup> The aim of this descriptive cross-sectional study is to calculate the PMR, and study its associated causative factors in Al-Ramadi Maternity and Children's Hospital, and also to evaluate the effect on child health of the Coalition Forces occupation of the country after 2003, in Al-Ramadi City, Al-Anbar Governorate, Iraq.

**Methods.** The Al-Ramadi Maternity and Children's Hospital is the main referral maternity and neonatology hospital in Al-Anbar Governorate, western Iraq. It covers the Ramadi city (the center of the governorate, 450000 populations) deliveries and neonatal care, and the referred cases from other districts of the governorate. The neonatal care unit has a capacity of 20 incubator/cot, and caters for ill neonates, whether in-born or out-born of the hospital. During the study period from 15th June to 15th December 2005, all stillbirths and early neonatal deaths of the hospital deliveries were included in the study. The perinatal mortalities of the out-hospital deliveries were excluded. Information regarding the dead infants and their mothers were collected. Data for mothers include: age, residence, parity, plurality, mode of delivery (normal vaginal delivery [NVD], cesarian section [CS], forceps delivery, and vacuum delivery), medical and obstetrical history (hypertension, diabetes mellitus, fever, skin rash, pre-eclampsia, premature ruptured membrane, heart disease), antenatal care (ANC) (booked and unbooked), and history of previous perinatal death. Data of stillbirths and neonatal deaths include gestational age, gender, birth weight (LBW <2500 gm, normal birth weight  $\geq 2500$  gm), and Apgar scores for neonates that died early after delivery. The research was approved by the College Ethical Research Committee.

Data were analyzed using the Statistical Package for Social Sciences version 11 for Windows (SPSS Inc., Chicago, IL., USA). Chi-square was used for statistical analysis, and a  $p < 0.05$  was considered significant.

**Results.** The overall deliveries in the study period were 3249 births, 2196 singleton, and 55 multiple. The total perinatal deaths were 125 (83 were male, and 42 were female), giving a male to female ratio of 2:1. Dead babies composed of 43 stillbirths (PMR = 13.2/1000), and 82 early neonatal deaths (PMR = 25.8/1000). The overall PMR was 38.4/1000. Males showed significantly higher PMR than females. Among the live born deliveries, LBW babies were 939 (29.2%), and were significantly of higher PMR than the normal weight deliveries. The number of preterm deliveries was 175, and showed significantly higher PMR than the 3074 term deliveries. Asphyxiated low Apgar score (0-3) infant's were found of higher PMR than of normal (8-10) scores (Table 1). Table 2 shows the maternal variables related with PMR. There was a significant increase of PMR among mothers above 35 years, and less than 20 years when compared with those of 20-35 years age. Also, the rural residence, maternal illnesses, previous perinatal death history, and the plurality were found to significantly increase the PMR. While no significant effect was found by the mode of delivery, ANC attendance during pregnancy, and the number of deliveries on the PMR.

**Table 1** - The effect of the babies' gender, gestational age, birth weight, and Apgar score on the perinatal mortality rate (PMR).

Variables	Total deliveries	Still birth n (%)	Neonatal death n (%)	PMR	Odds ratio	95% Confidence interval	P-value
<i>Gender</i>					0.4168	0.1914-0.9076	<0.020
Male	1806	23 (1.3)	60 (3.3)	45.9			
Female	1443	20 (1.4)	22 (1.5)	29.1			
<i>Gestational age</i>					0.9174	0.4386-1.919	<0.001
Preterm	175	19 (10.8)	38 (21.7)	325.7			
Term	3074	24 (0.78)	44 (1.4)	22.1			
<i>Birth weight, gms</i>					1.007	0.441-2.2832	<0.001
<2500	939	31 (3.3)	59 (6.3)	95.8			
≥2500	2310	12 (0.5)	23 (1.0)	15.1			
<i>Apgar score</i>					-	-	<0.001
0-3	52		21 (40.3)	403			
4-7	295		45 (15.2)	152.2			
8-10	2859		16 (0.5)	5.5			

**Table 2** - Maternal variables effect on the perinatal mortality rate (PMR).

Variables	Total deliveries	Still birth n (%)	Neonatal death n (%)	PMR	P-value
<i>Age</i>					<0.001
<20	354	5 (1.4)	18 (5.1)	64.9	
20-35	2700	25 (0.9)	56 (2.0)	29.9	
>35	195	13 (6.6)	8 (4.1)	107.7	
<i>Residence</i>					<0.02
Urban	1650	20 (1.2)	31 (1.9)	30.9	
Rural	1599	23 (1.4)	51 (3.2)	46.3	
<i>Antenatal care</i>					>0.22
Booked	1267	17 (1.3)	25 (1.9)	33.1	
Unbooked	1982	26 (1.3)	57 (2.9)	41.8	
<i>Mode of delivery</i>					>0.95
Normal vaginal delivery	2373	33 (1.4)	58 (2.4)	38.3	
Cesarian section	876	10 (1.1)	24 (2.7)	38.8	
Vacuum	0	0	0	0	
Forceps	0	0	0	0	
<i>Medical and obstetric history</i>					0.00
Bad	615	18 (2.9)	33 (5.4)	82.9	
Normal	2634	25 (0.9)	49 (1.8)	28.1	
<i>Previous perinatal death</i>					<0.001
Yes	321	29 (9)	15 (4.6)	137	
No	2928	14 (0.5)	67 (2.2)	27.6	
<i>Parity</i>					>0.08
<4	2103	27 (1.2)	54 (2.6)	38.4	
>4	1146	16 (0.7)	28 (2.4)	38.4	
<i>Plurality</i>					<0.01
Singleton	3194	43 (1.3)	76 (2.3)	37.2	
Multiple	55	0	6 (16.9)	109	

**Discussion.** The PMR in the Eastern Mediterranean region varies greatly with the variation of the economic status of such countries. Low rates were found in rich countries, such as Oman (8/1000) and UAE (7.4/1000) since the 1980's,<sup>1,16,17</sup> while high rates were seen in poor countries, such as Pakistan (60.9/1000) and Afghanistan (67/1000) since the late 1970's.<sup>1,4,18</sup> The developed countries' PMR at the first years of the 20th century are similar to the rates of most of the developing countries in 1995.<sup>19</sup> The recent PMR is between 8-15/1000 in

most developed countries.<sup>1,2</sup> The PMR in our study (38.5/1000) is lower than that reported in Al-Yarmook Hospital in Baghdad (44.6/1000) in 1995,<sup>14</sup> but it is higher than that of the nearby Arab countries, such as Saudi Arabia (31/1000), Bahrain (15/1000), Jordan (20.9/1000), and the previously mentioned Oman and UAE studies.<sup>1,16,17,20,21</sup> It is much higher also than that reported in far away countries, such as Shanghai (15/1000), Western Australia (12.5/1000), Sweden (6.3/1000), and Scotland (8.7/1000).<sup>21</sup>

In the year 2000, the PMR of some countries was reduced, such as Pakistan (59/1000), Saudi Arabia (21/1000), UAE (9/1000), Jordan (26/1000), Sweden (5/1000), and Australia (6/1000), while that of Afghanistan was 96/1000, and Iraq was 76/1000 (national figure).<sup>19</sup> Such high rates in Afghanistan and Iraq may be due to the long destructive internal and external wars of Afghanistan, and the decades of war, and the 13-year (1990-2003) economic sanction in Iraq.

During the 1990-1997 sanction period, the caloric intake of the Iraqi population decreased to 1000 calories per person per day, causing a very high PMR reaching 107/1000 at that time.<sup>15</sup> The intake increased lastly after 2003, after the termination of the economic sanction, to reach 2475 calories per day.<sup>22,23</sup> Such nutritional improvement is complicated by the migratory security deterioration between Iraqi cities, (including Ramadi city in the study year [2005]), causing emigration of some of the population to a safer area, or the preference for home and midwife deliveries, which reduced the number of the studied hospital deliveries, and may explain the lower perinatal rate in the study year, when compared with the 1990s sanction period studies. The study showed significantly higher PMR among male deliveries than females. This was consistent with the Bahrain report in 1989,<sup>18</sup> and Abuekteish et al's<sup>21</sup> study in Jordan. As expected, and in agreement with Abdul Latif et al,<sup>13</sup> Said,<sup>14</sup> and Nashiet<sup>15</sup> studies in Iraq, higher PMR was noticed with preterm deliveries in our results.

Restricted fetal growth is determined by several factors, the most important of them are the low pregnancy body mass index, and the low gestational weight gain.<sup>24,25</sup> Several reports showed increasing LBW rates in the last decade in Iraq,<sup>10,13,26</sup> which significantly increases the PMR.<sup>9,10</sup> The same result was noticed in our study. The PMR was found significantly higher in rural than in urban areas. It was consistent with other reports.<sup>27,28</sup> Low Apgar score (<3) neonates showed high PMR. This was similar to the Ondoa and Tumwine's 2003 study in Uganda.<sup>29</sup>

Maternal age was seen significantly associated with PMR. It is consistent with the classical U-shaped association with the mother's age.<sup>1,2</sup> The early female marriage trend in Iraq, and the tendency of the father to have several offspring will shorten the period between the pregnancies, and prolong the conception age of the mother, making her susceptible to early and late conception complications, and increase her pregnancy product mortality rate. Several reports showed that health facilities were deteriorating in Iraq, including ANC.<sup>13,26</sup> Poor ANC was found not associated with increased PMR. This was different from the Harfouche et al<sup>1</sup> and Stoll and Kliegman's<sup>3</sup> studies. The absence of

a relation between parity and PMR was different from that of Abuekteish's<sup>21</sup> study in Jordan, and Njokanama et al's<sup>30</sup> in Nigeria. Also, we found the PMR similar in both NVD and CS delivery, which was different from Said's study<sup>14</sup> in Iraq, who showed higher PMR with NVD. Such diverse results from other studies are due to the preference for the home and midwife delivery, specially the rural areas, which are of lower ANC facilities, leading to the diverse ANC relation with the PMR. Also, the midwife and home deliveries associated with a high possibility of complicated delivery, referred late to the hospital, and ended with a CS, of high birth mortality rate.

In conclusion, consistent with Diyyay and Al-Hade,<sup>24</sup> and Kramer's<sup>31</sup> studies, bad medical and obstetrical history of the mother was found associated with higher PMR. Also, a high PMR was noticed in mothers having a history of perinatal death, which was in agreement with the Diyyay and Al-Hade,<sup>24</sup> Kramer,<sup>31</sup> and Hertz et al's<sup>32</sup> studies. Lastly, PMR was found high among multiple gestation deliveries. The same result was noticed with the Abuekteish's et al,<sup>21</sup> and Ondoa and Tumwine<sup>29</sup> studies.

This study was conducted in only one Governorate in Iraq, and this limits our study. Further studies must include other Governorates of the country for a more comprehensive comparison on the mortality rate and all other causative factors.

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