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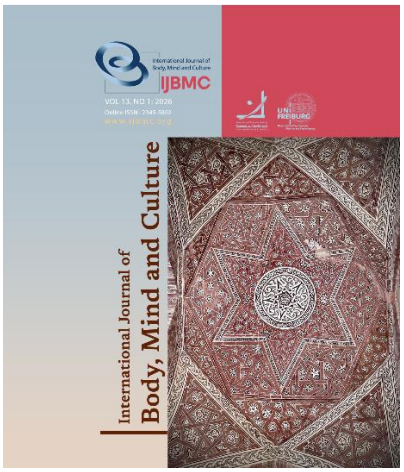
Maternal Complications and Care Utilization Before and After Delivery in Iraq: A Cross-Sectional Study

Ban Nadhum. Abdul-Fatah[1], Badea´a. Yahya[1], Rafal. Mustafa[1], Dhyauldeen Aftan. ALHayani[2]

1 The University of Anbar-Medical College- Iraq
2 College of Health and Medical Technology. Universityof Al-Maarif, Al-Anbar, 31001, Iraq

Corresponding author email address:
ban.nadum@uoanbar.edu.iq



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ABSTRACT

Objective: To assess maternal complications and utilization of maternal healthcare services before and after delivery among women attending a primary healthcare center in Ramadi, Iraq.

Methods and Materials: A cross-sectional study (non-probability sampling) was conducted at Al-Andallus Primary Healthcare Center, Ramadi (Anbar Governorate), from February to June 2022. Two independent groups were interviewed: 300 third-trimester pregnant women and 300 postpartum women. A structured questionnaire captured sociodemographic characteristics, antenatal/postnatal conditions (e.g., hypertension, diabetes, bleeding, anemia, urinary/vaginal infections, BMI), and service utilization (number of visits; place of delivery). Data were analyzed using descriptive statistics and bivariate tests (chi-square and correlation), with $p<0.05$.

Findings: Most participants were aged 18–35 years (mean 27.5±1.5), urban residents, and housewives; 29% had college education. During pregnancy, hypertension (30%), diabetes (20%), bleeding (40%), urinary/vaginal infections (55%), anemia (60%), and BMI>25 (70%) were reported; obesity correlated with infections and bleeding. Only about half attended two antenatal visits, and visit coverage was associated with sociodemographic factors and complications. Postpartum, hypertension (20%), diabetes (10%), bleeding (55%), urinary/vaginal infections (70%), BMI>25 (60%), anxiety/sleep disturbance (70%), and depression (40%) were reported. Many delivered outside hospitals and sought postnatal care late (around four months).

Conclusion: Maternal healthcare utilization before and after delivery was suboptimal and co-occurred with multiple complications linked to age, education, occupation, residence, and delivery site. Strengthening health education, timely ANC/PNC follow-up, and referral pathways is recommended.

Keywords: maternal complications, antenatal care, postnatal care, healthcare utilization, primary healthcare.

Introduction

Obstructed labor, hemorrhage, and sepsis contribute to high rates of mother and infant's mortality, mostly in developing countries (Organization, 2003). By World Health Organization, of all disorders, the maternal problems form 14.5%. Among reproductive age women that maternal problems form 22% of the global burden of diseases (Organization, 1998). The mothers and and their infants need a special care and attention after delivery, so need strategies to increase there survival (Jakovljevic et al., 2022).

Antenatal care (ANC) coverage is an indicator of access and use of health care during pregnancy. By WHO, (ANC-4+) means, covering of antenatal care at least four times during pregnancy for receiving health education about: nutrition, personal hygiene,breast feeding, family planning, supplements, and site of delivery also checking for ultrasound, blood pressure, urine exam, anemia, receiving tetanus vaccine and intervention with the complicated cases (Organization, 2018).

After giving birth, the mother may be at risk due to blood loss, infection, injury, and tiredness that 2/3 maternal postnatal complications and deaths occur during the first 24 hours after delivery in low-income countries (Iyengar et al., 2009; Mosley et al., 2000; Organization, 2014).

The post delivery healthcare services are the health promotion, regular visits, personal hygiene, education about proper nutrition, supplements of lactating mother, family planning, and immunizations of the newborn. These services allow for mother's health evaluation, start effective therapy to correct the deficiency, and the baby's monitoring and mostly should be covered during the 6 weeks after delivery (Kearns et al., 2014). A survey conducted in Nepal 2011, only 46% of post delivered women had access care on the first day, and 54% of them did not go for the required checkups (Karkee & Khanal, 2016). A lack of sufficient postnatal care may result in impairment or death or promote good behavior which harming both mother and here newborn. The pains after delivery start as mild to moderate but if become intense may need medical attention (Gebreslassie Gebrehiwot et al., 2020). Vaginal bleeding is normal to be heavy for up to ten days after birth, and then subside to light bleeding for the next six weeks (Catalano et al., 1999). Obesity may effect on pregnancy, that causes insulin resistance greater than normal weight (Catalano et al., 2018; Catalano et al., 1999), that affects lipid, glucose, and protein metabolism (Lisonkova et al., 2017) and may associated with many complications such as type 2 diabetes, pre-eclampsia,bleeding, maternal death, and stillbirth (Platner et al., 2021).

The aim of the study was to assess the maternal complications before and after delivery regarding healthcare services Utilization.

Methods and Materials

A cross-sectional descriptive study-convenience sampling technique was conducted in AL-Andalus Primary Healthcare Center, Ramadi City, Anbar Governorate through February-June 22, after approval from the ethics review committee of Anbar University, Al Anbar, Iraq.

Inclusion and exclusion criteria were as follows: The target population was the 3rd trimester pregnant and delivered females who attended AL Andalus Primary Healthcare Center and were willing to participate. The non pregnant and non-delivered females, and who were unwilling to participate were excluded.

Sample size: With A confidence Interval 95%, the study's sample size was rated according to the prevalence of pregnancy complications as per the following formula:

$N = (1.96)^2 X P(1-P) \quad m^2$

(Humphry et al., 2004; Whitfield, 2020),

Instruments

The study instrument was a questionnaire formed by the researchers for 3rd trimester pregnant and delivered females attended the primary health center which consisting of three parts, the first part was designed to assess the social- demographic features such as age, sex, occupation, education, and residence, the second part was formed about the diseases and complications before and after delivery. All pregnant females were checked for hypertension, diabetes mellitus, urinary tract infections, vaginal infections, bleeding, anemia, obesity, and asked about other diseases such as heart disease, asthma, hyperemisis gravidarum, and abdominal pain, also asked if had deep venous thrombosis or urgent complications. For delivered females were checked for hypertension, diabetes mellitus, anemia, obesity, and had asked if they had urinary tract infections, vaginal infections, bleeding,

heart disease, asthma, hyperemisis gravidarum, and abdominal pain, also asked about anxiety, depression, and sleep disturbance and if there was deep venous thrombosis or urgent complications. The third part was about the natal care utilization as number of visits for checking, vaccination, and site of delivery. The questionnaire was presented in English and later translated into the local language (Arabic). A pilot test was performed with ten patients not included in the final sample and there was no conflicts of interest.

There might be a call bias because some information had taken directly from the talk of the delivered females, and using of non-probability sampling, the study might be can not be generalized to the population.

Measurements

Body Mass Index: Weight was calculated by using digital weighing scale and the height by using a digital tape. The equation = weight(kg)/height(m^2), that regarded BMI 18-25 considered normal, from 25-30 considered overweight, and above 30 considered obese (Zong et al., 2022).

Blood pressure: A calibrated sphygmomanometer was used. Normal systolic blood pressure considered 120/80. Elevated blood pressure occur when systolic blood pressure was between *140-159*, and diastolic blood pressure was between *90-99*. High blood pressure when SBP is ≥160 and DBP was ≥100 (Pierpont et al., 2018).

The normal PP glucose level was <140 mg/d, >140 mg/dL means glucose intolerance. A PP glucose level between 140–199 mg/dL suggested prediabetes. A reading of ≥ 200 mg/dL confirmed diabetes (de Koning & Rabelink, 2002).

Data Analysis

The SPSS (v. 25) software used to analyze the data. The age scores and continuous variables were presented as mean and standard deviation, while the categorical variables were reported as frequency and percentage. Bi-variate analysis, including the X^2, correlation coefficient were used to study the relationship between complications, healthcare utilization and age, education, residence, occupation, Confidence Interval was 95% and statistically significant was considered < 0.05.

Findings and Results

The study showed that 90.7% the all participants (600)were between the age 18-35, with the average mean was 27.5±1.5 but there was 9.3 % over 35. (63%)was from urban area while 37% was from rural area. 71% completed 1st and 2nd schools and 29% completed college. 67% of women were non-workers and 33% were workers (Table 1).

Table 1

Socio-demographical distribution

Age		Education			Occupation		Residence	
18-35yrs	>35yrs	1st school	2nd school	college	No-work	Work	Rural	**Urban**
544	56	210	216	174	400	200	220	**380**
90.7%	9.3% **Mean 27.5±1.5**	35%	36%	29%	67%	33%	37%	**63%**

40(13) had GIII obesity. For delvered females, (60)20% had hypertension, 5०% had bleeding. 70%. had vaginal and urinary tract infections. 10% had diabetes mellitus, asthma and heart diseases. 70% was anxieties, and sleep disturbed while 40% was depressed. Regarding body mass index, 100(33%) had normal weight, 100(33%) had overweight, 50(17%) had GI obesity, and 50(17%) had GII obesity (Table 2).

The study showed that (90)30% had hypertension during pregnancy. 40% had bleeding. 55% had vaginal and urinary tract infections. 20% had diabetes mellitus, and only10% had asthma and heart disease. For BMI 80(27%) had normal weight, 60(20%) had overweight, 70 (23%) had GI obesity, 50(17%) had GII obesity, and

Table 2

Before-after delivery Complications and Diseases

Complications	Peri-natal		Total	Post-natal		Total
	Yes	No		Yes	No	
	no. %	no. %		No. %	No. %	
Hypertension	90 (30)	210 (70)	300	60 (20)	240 (80)	300
Bleeding	120 (40)	180 (60)	300	165 (55)	135 (45)	300
Vaginal infection	165 (55)	135(45)	300	210 (70)	90 (30)	300
U T I	165 (55)	135 (45)	300	210 (70)	90 (30)	300
Hospital delivery				150 (50)	150 (50)	300
BMI	---	---	300	---	---	300
Normal	80(27)	---	---	100(33)	---	---
Overweight	60(20)	---	---	100(33)	---	---
GI	70 (23)	---	---	50 (17)	---	---
GII	50 (17)	---	---	50 (17)	---	---
GIII	40 (13)	---	---	---	---	---
Diabetic Mellitus	60 (20)	240 (80)	300	30 (10)	270 (90)	300
Asthma	30(10)	270 (90)	300	30 (10)	270 (90)	300
Heart disease	30 (10)	270 (90)	300	30 (10)	270 (90)	300
hyperemisis gravidara	----	----	----	----	----	----
Abdominal pain	30 (10)	270 (90)	300	30 (10)	270 (90)	300
Sleep disturbance and Anxiety	----	----	----	210 (70)	90 (30)	300

Regarding intake of ferrofole tablets showed that 20% had taken the tablet with anemia while 40% didn't intake the tablet with anemia. 27% had taken the tablet without anemia. In comparison, 13% didn't intake the tablet without anemia (Table 3).

Table 3

Perinatal anemia regarding intake of ferrofole tablets

Ferofole Intake	Anemia +v		Anemia -v		Total	$*X^2$, df, p-value
	No.	%	No.	%	No.	
Yes	**60**	**40**	**100**	**67**	**160**	
No	**90**	**60**	**50**	**33**	**140**	
Total	**150**	**100**	**150**	**100**	**300**	**X^2 21.4 , 1, 0.001**

**Significant using Pearson Chi-square test at 0.05 level of significance*

The study showed that 27% delivered in hospitals and 47% outside hospitals completed primary school. 33% delivered in hospitals and 33% outside hospitals completed secondary school. 53% delivered in hospitals and 20% outside hospitals who had college graduation (Table 4).

Table 4

The Association between the site of delivery and education

Education	Site of delivery					
	Hospital		Outside hospital		Total	
	No.	%	No.	%	No.	*X^2, df, P-value
Primary	40	27	70	47	110	
Secondary	50	33	50	33	100	
Graduation	80	53	30	20	90	
Total	150		150		300	40.38, 2, 0.001

**Significant using Pearson Chi-square test at 0.05 level of significance*

Table 5

Correlations between socio-demographycal data with perinatal complications and diseases

Variables	Statistics	Variables										
		age	occupation	education	bleeding	vagina	urine	resience	visits	diabetes	hypertension	obesity
age	Pearson Correlation	1.000**	-.190	-.151	.500**	-.388*	-.388*	.500**	-.388*	-.092	-.246	-.146
	Sig. (2-tailed)		.324	.425	.005	.034	.034	.005	.034	.627	.191	.442
	Sum of Squares and Cross-products	746.667	-12.379	-10.667	-37.333	-29.000	-29.000	-37.333	-29.000	-6.667	-18.333	-10.000
	Covariance	25.747	-.442	-.368	-1.287	-1.000	-1.000	-1.287	-1.000	-.230	-.632	-.345
	N	300	300	300	300	300	300	300	300	300	300	300
occupation	Pearson Correlation	-.190	1.000**	.925**	.694**	.648**	.648**	.694**	.648**	.016	-.051	1.000**
	Sig. (2-tailed)	.324	.000	.000	.000	.000	.000	.000	.000	.933	.791	.000
	Sum of Squares and Cross-products	-12.379	6.207	5.897	4.655	4.345	4.345	4.655	4.345	.103	-.345	6.207
	Covariance	-.442	.222	.211	.166	.155	.155	.166	.155	.004	-.012	.222
	N	300	300	300	300	300	300	300	300	300	300	300
education	Pearson Correlation	-.151	.925**	1.000**	.756**	.707**	.707**	.756**	.707**	.098	.047	.926**
	Sig. (2-tailed)	.425	.000	.000	.000	.000	.000	.000	.000	.607	.804	.000
	Covariance	-.368	.211	.230	.184	.172	.172	.184	.172	.023	.011	.207
	N	300	300	300	300	300	300	300	300	300	300	300
bleeding	Pearson Correlation	.500**	.694**	.756**	1.000	.935**	.935**	1.000**	.935**	.296	.330	.700**
	Sig. (2-tailed)	.005	.000	.000		.000	.000	.000	.000	.113	.075	.000
	Sum of Squares and Cross-products	-37.333	4.655	5.333	7.467	7.000	7.000	7.467	7.000	2.133	2.467	4.800
	Covariance	-1.287	.166	.184	.257	.241	.241	.257	.241	.074	.085	.166
	N	300	300	300	300	300	300	300	300	300	300	300
vaginal	Pearson Correlation	.388*	.648**	.707**	.935**	1.000**	1.000**	.935**	1.000**	.346	.401*	.655**
	Sig. (2-tailed)	.034	.000	.000	.000	.000	.000	.000	.000	.061	.028	.000
	Sum of Squares and Cross-products	-29.000	4.345	5.000	7.000	7.500	7.500	7.000	7.500	2.500	3.000	4.500
	Covariance	-1.000	.155	.172	.241	.259	.259	.241	.259	.086	.103	.155
	N	300	300	300	300	300	300	30	300	300	300	300
urine	Pearson Correlation	.388*	.648**	.707**	.935**	1.000**	1.000**	.935**	1.000**	.346	.401*	.655**
	Sig. (2-tailed)	.034	.000	.000	.000	.000	0.000	.000	.000	.061	.028	.000
	Sum of Squares and Cross-products	-29.000	4.345	5.000	7.000	7.500	7.500	7.000	7.500	2.500	3.000	4.500
	Covariance	-1.000	.155	.172	.241	.259	.259	.241	.259	.086	.103	.155
	N	300	300	300	300	300	300	300	300	300	300	300
residence	Pearson Correlation	.500**	.694**	.756**	1.000**	.935**	.935**	1.000**	.935**	.296	.330	.700**
	Sig. (2-tailed)	.005	.000	.000	.000	.000	.000	0.000	.000	.113	.075	.000
	Sum of Squares and Cross-products	-37.333	4.655	5.333	7.467	7.000	7.000	7.467	7.000	2.133	2.467	4.800
	Covariance	-1.287	.166	.184	.257	.241	.241	.257	.241	.074	.085	.166
	N	300	300	300	300	300	300	300	300	300	300	300
visits	Pearson Correlation	-.388*	.648**	.707**	.935**	1.000**	1.000**	.935**	1.000	.346	.401*	.655**
	Sig. (2-tailed)	.034	.000	.000	.000	.000	.000	.000		.061	.028	.000
	Sum of Squares and Cross-products	-29.000	4.345	5.000	7.000	7.500	7.500	7.000	7.500	2.500	3.000	4.500
	Covariance	-1.000	.155	.172	.241	.259	.259	.241	.259	.086	.103	.155

	N	300	209	300	300	30	300	300	300	300	300	300
diabetes	Pearson Correlation	-.092	.016	.098	.296	.346	.346	.296	.346	**1.000**	.434*	.045
	Sig. (2-tailed)	.627	.933	.607	.113	.061	.061	.113	.061		.016	.812
	Sum of Squares and Cross-products	-6.667	.103	.667	2.133	2.500	2.500	2.133	2.500	6.967	3.133	.300
	Covariance	-.230	.004	.023	.074	.086	.086	.074	.086	.240	.108	.010
	N	300	300	300	300	300	300	300	300	300	300	300
hypertension	Pearson Correlation	-.246	-.051	.047	.330	.401*	.401*	.330	.401*	.434*	**1.000**	-.029
	Sig. (2-tailed)	.191	.791	.804	.075	.028	.028	.075	.028	.016	.075	.0878
	Sum of Squares and Cross-products	-18.333	-.345	.333	2.467	3.000	3.000	2.467	3.000	3.133	7.467	-.200
	Covariance	-.632	-.012	.011	.085	.103	.103	.085	.103	.108	.257	-.007

Table 5 shows correlations between socio-demmography, visits and perinatal complications: Regarding age, the study should that there was a correlation with bleeding. Regarding age, education, occupation, residence there was a correlation with bleeding, vaginal discharge, urine infection, and obesity. Regarding visits, only half of the pregnant females covered two visits which was correlated with age, education, occupation, vaginal discharge, urine infection, bleeding, and obesity. Regarding age, education, occupation, residence there was a correlation with bleeding. vaginal discharge, urine infection, and obesity. Regarding visits, only half of the pregnant females covered two visits which was correlated with age, education, occupation, vaginal discharge, urine infection, bleeding, and obesity.

Discussion and Conclusion

Over all the participants, most of them aged between18-35years which was correlated with bleeding but in another study, they found that there was no correlation between bleeding and maternal age (Matar et al., 2025), also most of them there were from urban areas, and not working. In a study, they said that the utilization of healthcare services is poor in low and middle-income families (Jakovljevic et al., 2022). Less than half completed college with a statistical significance with healthcare utilization. Regarding pregnant females, more than a quarter had hypertension and 20% had diabetes, in a study they found that only 7.7% of pregnant women had hypertension and 1% had diabetes mellitus (Bateman et al., 2012; Feig & Palda, 2002). Less than half of them had bleeding while in other studies, only 2-5% of all pregnancies had bleeding (Qrg, 2021), also more than half of them had vaginal discharge and urinary tract infection while in another study, the prevalence of these infections was 22.5% (Lavrinenko et al., 2016), this might be due to inadequate healthcare utilization, that half of pregnant females covered only 2 visits. In another study had done in Kurdistan Region-Iraq 2020, in Sulaymaniya, they noted that only 27% of pregnant females covered adequate visits while in another Kurdistan Region- Iraq, in Duhok increased to 56% (Al Janabi, 2023). There were a correlation between residence, occupation, education, and visits with bleeding, urine infection, vaginal discharge, and obesity. In a study, they found that age, education, and knowledge were one of the determinants of maternal death (Fegita et al., 2022).

Obesity in our study formed 50%, but in another study, they found that only (30%) of women enter pregnancy with a body mass index≥30 (Nodine & Hastings-Tolsma, 2012). By WHO survey, found that perinatal Maternal complications can increase mortality rate (Vogel et al., 2014). More than half of the pregnant females were anemic with a statistical significance with ferrofole tablet intake while in another study, they found that 46% of pregnant women were anemic (Nair et al., 2017).

For delivered women, the study found that 20% had hypertension, 10% had diabetes millitus. A high percentage of vaginal discharge and urinary tract infection, but another studies said that there were less complications (Namutebi et al., 2024), this .might be due to delivered outside hospitals and delayed in the healthcare utilization with a statistical significance with education while in another study they found that only 27% were delivered outside hospitals and had infections (Diana et al., 2018). Most of the delivered females said there were anxieties and sleep disturbing but less depressed (40% while in Middle East, the prevalence of these problems was 27% , depression may lead to sleep disturbance and anxiety (Alshikh Ahmad et al., 2021).

There was no follow-up after delivery and half of the women attended the care center after a long delivery time with a statistical significance with education and a high prevalence of complications, the same finding in a study found that only 31% of females attended the care centers for follow-up after delivery (Sacks et al., 2022).

Our study highlighted a poor healthcare utilization before and after delivery with multiple complications that correlated with age, education, occupation, residence, and site of delivery.

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Declaration of Interest

The authors of this article declared no conflict of interest.

Ethical Considerations

The study protocol adhered to the principles outlined in the Helsinki Declaration, which provides guidelines for ethical research involving human participants. Ethical considerations in this study were that participation was entirely optional.

Transparency of Data

In accordance with the principles of transparency and open research, we declare that all data and materials used in this study are available upon request.

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Authors' Contributions

All authors equally contribute to this study.

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