



# Outcomes of Pregnancies in Mothers with Previous Miscarriage at Benghazi Medical Center: A Retrospective Study

Nagat Bettamer <sup>a+++</sup>, Zahia Elghazal <sup>a+++\*</sup>, Salwa Benkia <sup>b+++</sup>,  
Amna Attia Fadel <sup>b+++</sup> and Fathiyah Eltboli <sup>c++</sup>

<sup>a</sup> Faculty of Medicine, Aljamhoria Hospital, University of Benghazi, Libya.

<sup>b</sup> Faculty of Medicine, Benghazi Medical Center, University of Benghazi, Libya.

<sup>c</sup> Aljamhoria Hospital, Libya.

## Authors' contributions

*This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.*

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## ABSTRACT

**Background:** Spontaneous abortion is the most common complication of pregnancy, causing substantial consequences. The effects of miscarriage on the outcome of the next pregnancy is a rich subject for research.

**Aim:** to assess association between history of miscarriage and increase risk of adverse outcome in future pregnancy.

**Method:** A case series study among women with history of miscarriage and regular antenatal follow up, they had delivered at Maternity department (Benghazi Medical Center (BMC) during 1st may 2021 to 30th April 2022 (eleven months).

**Results:** The study included 103 mothers with a previous history of miscarriage. Advanced maternal age rate was 48.5%, working mothers were 39.8% of the study population and 42.72% were obese.

<sup>++</sup> Consultant of Obstetrics & Gynecology;

<sup>#</sup> Member of the Teaching Staff;

<sup>\*</sup>Corresponding author Email: [alzwai2010@yahoo.com](mailto:alzwai2010@yahoo.com);

Our results as following 28.0% of participates developed placenta previa. only one participate in our study developed preeclampsia and no one developed eclampsia and 9 participants their pregnancies end with miscarriage around 15 participants in this study developed vaginal bleeding in first trimester without significant impact on pregnancy outcome.

**Conclusion and Recommendation:** Although this study does not show much impact of history of miscarriage on pregnancy outcome, and because heterogeneity of results we need to evaluate pregnancy outcome following either a previous spontaneous or a recurrent miscarriage, the findings of the present and previous studies In addition to further research with large enough sample sizes and controlling for intervening factors.

*Keywords: Spontaneous abortion; miscarriage; pregnancies outcomes.*

## 1. INTRODUCTION

According to the World Health Organization, spontaneous abortion, also known as miscarriage, is defined as the spontaneous loss of a pregnancy before completion of 20 weeks gestational age. After miscarriage, women may experience intense grief and yearning for the lost future with the infant, with an emphasis on lost hopes and dreams [1].

“The effects of previous miscarriage on maternal emotional health during and after subsequent pregnancy are often studied in combination with women with a history of other types of perinatal loss including electively induced abortion, stillbirth, and neonatal death, or various combinations. Very few studies of the effects of previous miscarriage alone on subsequent pregnancy and birth are available. It is also called early pregnancy loss or spontaneous abortion. Miscarriage is fairly common. Between 15% and 20% (15 to 20 out of 100) of all confirmed pregnancies end in miscarriage” [1].

“About 125 000 miscarriages occur annually in the United Kingdom, resulting in 42000 hospital admissions. Although miscarriages mostly resolve spontaneously without treatment and rarely cause severe maternal morbidity, but the true rate of miscarriage is probably higher because many losses occur preclinically, before a menstrual period is missed” [2].

Miscarriage has a variety of causes such as chromosomal abnormalities, immunological thrombophilias, Uterine malformations, Infections and Lifestyle factors; Alcohol, coffee, smoking, advanced maternal age, and BMI  $\geq 30$  kg/m [2,3].

“Early loss of a pregnancy causes great distress to couples and undermines their confidence in achieving future reproductive success a single miscarriage has not traditionally been perceived as a major clinical problem. It is

rarely life threatening, its diagnosis and management is usually straight forward, and any prejudicial effect on future reproductive potential remains unproven on the other hand a retrospective analysis of prospectively collected data from the recurrent miscarriage and obstetric databases at the Jessop Wing, Royal Hallamshire Hospital between 2001 and 2007” [4].

Women with recurrent miscarriage had significantly increased odds of low Apgar scores at one (OR 1.57, 95% CI 1.20–2.05) and five minutes (OR 2.0, 95%

CI 1.23–3.27), SGA (OR 1.96, 95% CI 1.12–3.43), preterm delivery (OR 1.64, 95% CI 1.22–2.19) admission to SCBU (OR 1.75, 95% CI 1.29–2.36) and perinatal death (OR 3.08, 95% CI 1.44–6.58). Regarding maternal outcomes, there were significantly increased odds for only APH (OR 7.67, 95% CI 4.23–13.91) [5].

In addition to higher risk of pre-eclampsia in pregnant women with a history of miscarriage [6]. the overall risk of pre-eclampsia was 5.4% (1121/20 846). A total of 3159 women (15.2%) reported previous miscarriage, three or more consecutive miscarriages were reported by 0.6% (130/20 846) [6].

Several studies based on large populations suggest that the previous miscarriage is associated with adverse pregnancy outcomes [7,8].

In particular, previous miscarriage was found to be associated with an increase in the rate of pre-eclampsia [9].

Recurrent miscarriages may also impact the perinatal outcomes [10–13].

The purpose of the present study was to determine the effect of a spontaneous miscarriage on the outcome of the next pregnancy.

## 2. REVIEW OF THE LITERATURE

[7] showed that “the pregnancy complications following a previous spontaneous miscarriage were no different from those of the control group, except for abortion (16.5 vs. 11%,  $P = 0.003$ , RR = 1.15, CI 95% = 0.95–1.39), fetal deaths (1.5 vs. 0%,  $P = 0.004$ , RR = 1.51, CI 95% = 1.39–1.63), and vaginal bleeding during the first trimester (19 vs. 1%,  $P = 0.001$ , RR = 1.57, CI 95% = 1.41–1.75), which were more than those of the control group. Also, the rate of cesarean delivery (28.14 vs. 13.48%) was increased ( $p = 0.026$ , RR = 1.25, CI 95% = 1.07–1.47). Neonatal complications were not statistically significantly different in comparison with the control group. A prior spontaneous miscarriage is a risk for the next pregnancy, and the risk of abortion and intrauterine fetal death will increase. Therefore, careful prenatal care is mandatory”.

According to [8], “recurrent miscarriage (RM) is defined as  $\geq 3$  consecutive pregnancy losses before 22 weeks` gestation. Five to fifteen percent of RM women have significantly elevated anti-phospholipid antibodies, and 85% of the RM couples had elevated levels of sperm DNA damage. Endometrial stromal cells from women with RM are more receptive (super receptivity) for low-quality embryos. The risk of sporadic and/or RM increased in women with positive thyro-peroxidase antibodies (TPOAb), and the risk of miscarriage doubled in women with TSH  $>2.5$  mIU/L in the first trimester. A systematic review concluded that the prevalence of all uterine malformations was 15.4% among RM women. Women with body mass index  $\geq 25$  kg/m<sup>2</sup> have increased risk of miscarriage compared to women with BMI  $<25$  kg/m<sup>2</sup>. IVF with prenatal genetic testing suggested as treatment for RM due to chromosomal abnormalities”.

“The majority of women (65-85%) with uterine malformations as bicornuate or septate uterus have successful pregnancy after metroplasty, and the hysteroscopic metroplasty should be done only for women with septate uteri, after failed previous IVF-ET trials. Empirical progesterone may be beneficial for women with  $\geq 3$  consecutive miscarriages immediately preceding their current pregnancy. Combination of lower

molecular weight heparin, and aspirin is superior to aspirin alone in the treatment of RM due to antiphospholipid syndrome”. [8]

In a study by [4] included “all women living in the Grampian region of Scotland with a pregnancy recorded in the Aberdeen Maternity and Neonatal Databank between 1986 and 2000, the miscarriage group faced a higher risk of pre-eclampsia (adj OR 3.3, 99% CI 2.6-4.6), threatened miscarriage (adj OR 1.7, 99% CI 1.5-2.0), induced labour (adj OR 2.2, 99% CI 1.9-2.5),

instrumental delivery (adj OR 5.9, 99% CI 5.0-6.9), preterm delivery (adj OR 2.1, 99% CI 1.6-2.8) and low birthweight (adj OR 1.6, 99% CI 1.3-2.1) than group A. They were more likely to have threatened miscarriage (adj OR 1.5, 99% CI 1.4- 1.7), induced labour (adj OR 1.3, 99% CI 1.2-1.5), postpartum hemorrhage (adj OR 1.4, 99% CI 1.2-1.6) and preterm delivery (adj OR 1.5, 99% CI 1.2-1.8) than group B. They concluded that an initial miscarriage is associated with a higher risk of obstetric complications”.

“Experience of one or more previous miscarriages can increase the risks in a subsequent pregnancy. Fortunately for most women, absolute risk of future complications remains low. However, this does suggest the need for greater vigilance in the next pregnancy and obstetric surveillance of women should not be restricted to those with recurrent miscarriage” [4].

[9] found that “an increased risk of pre-eclampsia, although not statistically significant, was found for women with recurrent miscarriages (adjusted OR 1.51, 95% CI 0.80-2.83). Women who had ever been treated for infertility also had increased risk (adjusted OR 1.29, 95% CI 1.05-1.60). When these two risk factors were combined, the adjusted odds ratio for pre- eclampsia was 2.40 (95% CI 1.11-5.18). Conclusions: The study supports the hypothesis that infertility, recurrent miscarriage and pre-eclampsia share elements of the same etiological factors”.

Ford HB, and Schust DJ [10] stated that “the diagnosis of Recurrent Pregnancy Loss (RPL) can be quite devastating, but rather; it can be helpful for the physician and patient to keep in mind the relatively high likelihood that the next pregnancy will be successful. Correction of

endocrine disorders, antiphospholipid antibody (APA), and anatomic anomalies have the highest success rates, approximately 60% to 90%. While patients with a cytogenetic basis for loss experience a wide range of success (20%–80%) that depends on the type of abnormality present. Even with the diagnosis of RPL and as many as 4 to 5 prior losses, a patient is more likely to carry her next pregnancy to term than to have another loss”.

[11] in “retrospective cohort study of 30 053 women with a singleton pregnancy who booked for antenatal care and delivery between January 2008 and July 2011 compared the obstetric and perinatal outcomes of 2030 women (6.8%) who had a history of three or more miscarriages (recurrent miscarriage) with the outcomes of 28 023 women (93.2%) who did not. Results showed that women with a history of recurrent miscarriage were more likely to be obese, to have undergone assisted conception, to have had a previous perinatal death, and to be delivered by scheduled Caesarean section. Recurrent miscarriage was associated with an increased incidence of preterm birth (<37 weeks gestation, 8.1 versus 5.5%, adj OR 1.54; 95% CI 1.29-1.84), very preterm birth (<32 weeks gestation, 2.2

versus 1.2%, adj OR 1.80; 95% CI 1.28-2.53), and perinatal death (1.2 versus 0.5%, adj OR 2.66; 95% CI 1.70-4.14). The results were similar for both primary and secondary recurrent miscarriage. The affected women have not been categorized according to etiology of recurrent miscarriage and it may be that adverse outcomes differ according to etiological subgroup. Wider implications of the findings: This study highlights the need for specialist obstetric care for women who have had three or more previous miscarriages, particularly in relation to the risk of preterm delivery. Study funding/competing interests: There was no specific funding obtained for this study and there is no conflict of interests”.

[12] investigated “obstetric and neonatal outcomes of women who had a history of recurrent miscarriage were compared with a control population from 1 January 1992 to 30 June 1998. Amongst a total of 162 pregnancies which progressed beyond 24 weeks gestation in women with a history of recurrent miscarriage, there were four perinatal deaths and 16 babies were admitted to the special care baby unit. The rates of preterm delivery (13%), small-for-gestational-age (13%), perinatal loss (2.5%) and

Caesarean section (36%) were significantly ( $P < 0.05$ ) higher than those of the control group (3.9, 2.1, 1 and 16.7% respectively). The ratio of male to female babies was equal. There was no significant difference in the incidence of hypertension or diabetes between the two groups. Patients with recurrent miscarriage represent a population at high risk of obstetric problems and close surveillance in the antenatal period is therefore required”.

[14] reviewed “the obstetric records of all 5,829 nulliparous pregnant women who delivered at > 14 weeks' gestation from 2008 through 2013 at perinatal center. Of these women, 74 had a history of recurrent miscarriage (1.3%). The control population consisted of 4,176 nulliparous women without a history of miscarriage. Demographic information and characteristics of labor were extracted from patient charts. The rate of maternal age > 40 years ( $p < 0.01$ ) and the rate of in vitro fertilization use ( $p < 0.01$ ) were higher in women with recurrent miscarriage than in women without miscarriage. Eleven women with recurrent miscarriage (14.9%) were treated with low-dose aspirin with and without subcutaneous heparin. In addition, the rate of cesarean delivery was higher in women with recurrent miscarriage than in women without miscarriage ( $p = 0.02$ ). However, fetal/neonatal outcomes did not differ significantly between the populations. The pregnancy of women with a history of recurrent miscarriage is not associated with adverse outcomes at our perinatal center”

[5] in a retrospective case control study that analyzed data collected prospectively between 2001 and 2007 from 400 women with history of recurrent miscarriage who achieved pregnancies progressing beyond 24 weeks gestation compared to 39,860 deliveries from the general obstetric database within the same time period. Results showed that women with recurrent miscarriage had significantly increased odds of low Apgar scores at one (odds ratios (OR) 1.57, 95% CI 1.20-2.05) and five minutes (OR 2.0, 95% CI 1.23-3.27), small for gestational age (OR 1.96, 95% CI 1.12-3.43), preterm delivery (OR 1.64, 95% CI 1.22-2.19) and antepartum hemorrhage (OR 7.67, 95% CI 4.23-13.91). The risks were increased in the presence of a male fetus but no difference was observed between primary and secondary miscarriage patients. In conclusion, women with recurrent miscarriage have an increased risk of several maternal and fetal complications and therefore may require closer monitoring during the

antenatal period particularly when pregnant with a male fetus [5].

[15] investigated 870 consecutive, non-pregnant women with a history of three or more pregnancy losses and normal parental karyotypes were investigated for the presence of thyroglobulin antibodies (TgAb) and for thyroid microsomal antibodies (TmAb). Thyroid antibodies were found in 162 (19%) women. TgAb only were found in eight women (5%); TmAb only in 98 (60%) and both TgAb and TmAb were found in 56 (35%). Thirteen women had a history of thyroid disease and a further 15 women were found to have abnormal thyroid function. All [16] were excluded from the pregnancy outcome study. Among the remaining 134 thyroid antibody positive women, 36 women were not tested and normal thyroid stimulating hormone results were obtained for 98. In the group proven euthyroid, 14 of 24 untreated pregnancies resulted in live births (58%). Among the 710 thyroid antibody negative women, 47 of 81 untreated pregnancies resulted in live births (58%). The future risk of pregnancy loss in women with unexplained recurrent miscarriage is not affected by their thyroid antibody status [15].

[17] evaluated “the impact of induced abortion and spontaneous abortion on the occurrence of placenta previa in later pregnancies in a population-based, case-control study conducted using 1984-1987 Washington state birth certificate data. The study population included 486 white women with a pregnancy complicated by placenta previa and 1598 randomly selected controls without placenta previa. After adjustment for confounding variables, the odds ratio in association with one or more induced abortions was 1.28 (95% CI 1.00-1.63). For one or more spontaneous abortions, the odds ratio was 1.30 (95% CI 1.01- 1.66). Women who report one or more induced or spontaneous abortions are 30% more likely to have a subsequent pregnancy complicated by placenta previa than women without such a history. The results should not be generalized to areas where suction curettage is not the preferred method of induced abortion”.

[18] evaluated “the association between spontaneous abortion and subsequent adverse birth outcomes. Adverse birth outcomes were examined for women with one spontaneous abortion before the index pregnancy (n= 2146) and for women with three or more prior spontaneous abortions and no other prior pregnancies (n = 638); compared with women

with no prior spontaneous abortions (n = 3099). Women with three or more prior spontaneous abortions were at higher risk for delivery at less than 37 weeks' gestation (relative risk 1.5, 95% confidence interval 1.1 to 2.1), placenta previa (relative risk 6.0, 95% confidence interval 1.6 to 22.2), having membranes ruptured greater than 24 hours (relative risk 1.8, 95% confidence interval 1.2 to 2.9), breech presentation (relative risk 2.4, 95% confidence interval 1.6 to 3.6), and having an infant with a congenital malformation (relative risk 1.8, 95% confidence interval 1.1 to 3.0). These findings suggest that common causes may underlie recurrent spontaneous abortion and certain adverse birth outcomes. They may also help guide clinical management of pregnancies in women with a history of recurrent spontaneous abortions”.

[19] evaluated “the association between fetal loss in the second trimester and subsequent adverse birth outcomes and compared these outcomes to two groups: women who delivered at 25-36 weeks in their index pregnancy and those who delivered at term in their index pregnancy. Thirty-nine percent of women who had a pregnancy loss at 13-24 weeks in the index pregnancy had a preterm delivery in their next pregnancy, 5% had a stillbirth, and 6% had a neonatal death, with all outcomes worse than those found in the two control populations. Delivery at 19-22 weeks in the index pregnancy was associated with a 62% preterm delivery rate in the subsequent pregnancy. A second-trimester loss, especially one occurring at 19-22 weeks, is associated with a poor prognosis in the subsequent pregnancy”.

[20] analyzed “data from 25,958 consecutive deliveries were to determine the effect of prior abortions and premature births on current pregnancy outcome. Perinatal death rate, combining stillbirths and neonatal deaths, increased more than threefold among women with at least one prior premature in birth and at least one prior abortion and approached 18 per cent of current deliveries when there were three or more prior premature births. Abnormal live births, defined as infants with either birth weight under 2,501 grams, gestational age less than 37 weeks, or congenital anomalies, significantly increased as the number of prior abortions and premature births increased, each in a range of 0 through 3 or more. For example, among women with at least three prior premature births, there were greater than 50 per cent abnormal live births. The risk was mostly that of low birth

weight and low gestational age, although there was a slight increase in congenital anomalies. The risk was reduced considerably when there were previous term births and was influenced variably by race, clinic classification, maternal illness, and prior pregnancy complications. This empirical data on pregnancy outcome should be useful in reproductive counseling among women with pregnancy losses and premature births”.

[21] evaluated “the risk for a clinical spontaneous abortion in a pregnancy following 0 to 4 consecutive spontaneous abortions was estimated in a large, unselected, Danish population, including approximately 300,500 pregnancies. The overall risk for spontaneous abortion was 11% and the risk for a spontaneous abortion was 16, 25, 45 and 54% after 1 to 4 previous consecutive spontaneous abortions, respectively. For women over 35 years, the risk for spontaneous abortion was significantly increased, but the almost identical abortion rates after repeated abortions in both young and old women indicate a risk factor which is not age-related”. [21] reviewed “5,003 records of consecutive deliveries in 1975 and 1976 at Boston Hospital for Women, abstracted demographic and obstetric data, and analyzed singleton deliveries at 27 weeks' gestation or greater. We compared women with exactly one prior proximate induced or spontaneous abortion with women of similar gravidity or parity with no prior pregnancy losses. Offspring of women with a proximate induced abortion had no higher frequency of short gestations, low Apgar scores, or congenital malformations than those born of women with no prior loss. Offspring of secundigravidas with a proximate abortion had birth weights similar to those of other primi gravidas. Thus we have found that women with a single prior induced abortion have no increased risk of poor outcome of the next pregnancy after 27 weeks' gestation. In contrast, offspring of secundigravidas with a proximate spontaneous abortion had an increased frequency of short gestations, low birth weights, low Apgar scores, and congenital malformations, indicating that these women are a high-risk group for subsequent poor late pregnancy outcomes”.

### 3. METHODS

#### 3.1 Patients and Methods

##### 3.1.1 Design of study and settings

Type of study: A prospective study among women with history of miscarriage and regular antenatal follow up, they had delivered at

Maternity department (Benghazi Medical Center (BMC) during 1st may 2021 to 30th April 2022 (eleven months)).

##### 3.1.2 Participants

All women already known with history of spontaneous miscarriage (either sporadic or recurrent).

Exclusion criteria:

Known case of uterine anomaly.

Cervical incompetence (by history or sonography).

Alcohol consumption, cigarette smoking and drug misuse.

History of congenital or genetic disorders in couples and their relatives.

Poor antenatal care.

Surgery or radiotherapy during current pregnancy.

#### 3.2 Pathway

All participants we review their past obstetric, medical and drug history. in addition to pregnancy outcome in form of maternal complications (spontaneous abortion; vaginal bleeding in the first trimester; placenta previa; premature rupture of the membrane; placental abruption; preeclampsia and eclampsia; preterm labor, cesarean delivery, and instrumental delivery), fetal outcome (low birth weight; Apgar score at 1 min; breech presentation; fetal death; congenital anomalies)

#### 3.3 Definitions

Advance maternal age  $\geq 35$  years.

Low Apgar score was defined as less than 6  
Perinatal mortality was defined as those born dead or died within 7 days of delivery.

#### 3.4 Ethical Considerations

Confidentiality of data was assured using anonymous form of data collection.

#### 3.5 Statistical Analysis

Data were analyzed using statistical package for social science (SPSS) version 23.

Descriptive statistics as frequency and percentage.

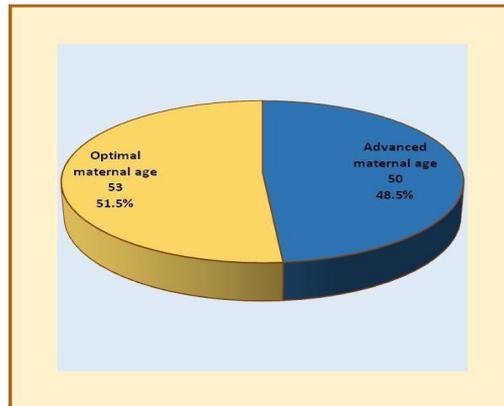
P-value were considered significant when  $\leq 0.05$ .

Inferential statistics were used when needed Chi-square( $X^2$ ) test to find the difference in the distribution of the variables between the groups,

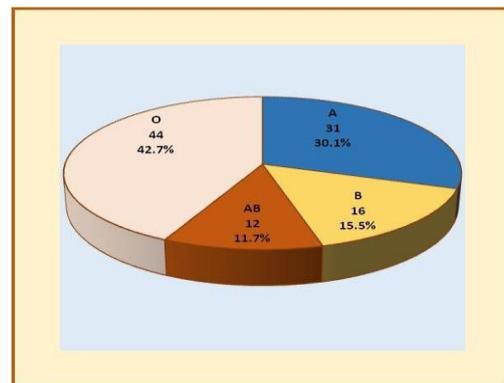
Data were presented in form of tables and figs, were the figs done by Microsoft Excel 2010.

## 4. RESULTS AND DISCUSSION

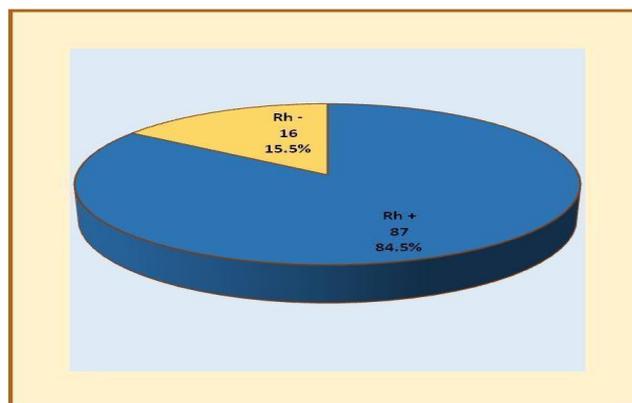
### 4.1 Maternal and General Characteristics



**Fig. 1. Distribution of the study population according to maternal age**  
Mother Age: ranges 21 – 47, Mean  $\pm$ SD 34.30  $\pm$ 6.018



**Fig. 2. Distribution of the study population according to maternal blood group**



**Fig. 3. Distribution of the study population according to maternal Rh status**

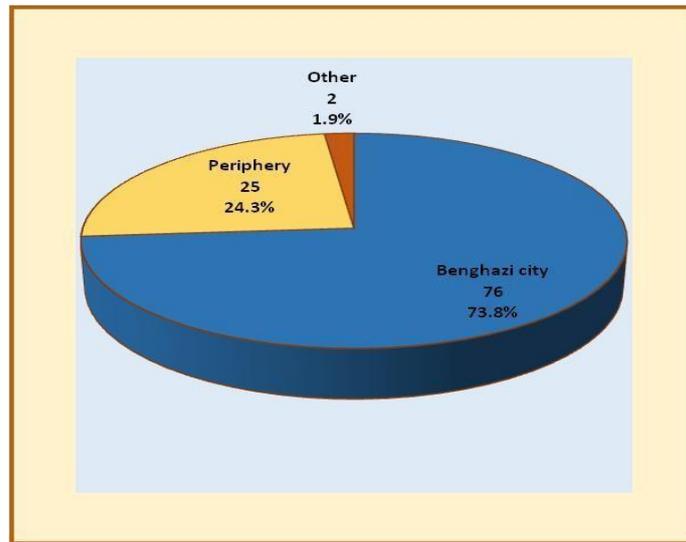


Fig. 4. Distribution of the study population according to couple residency

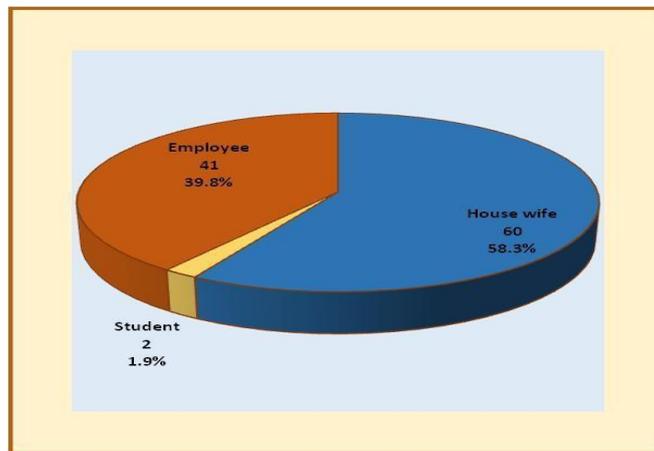


Fig. 5. Distribution of the study population according to maternal work status

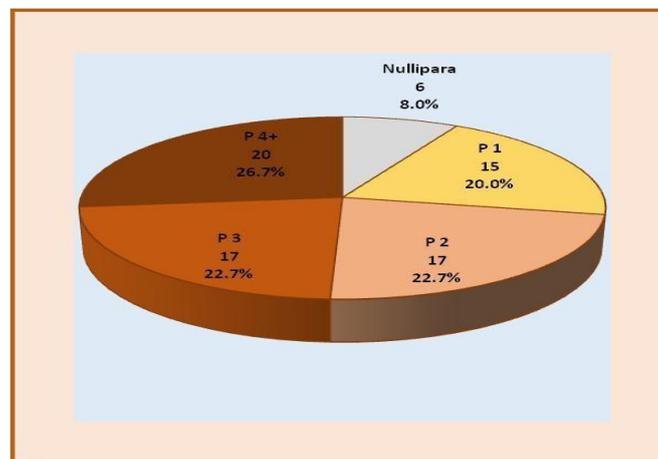
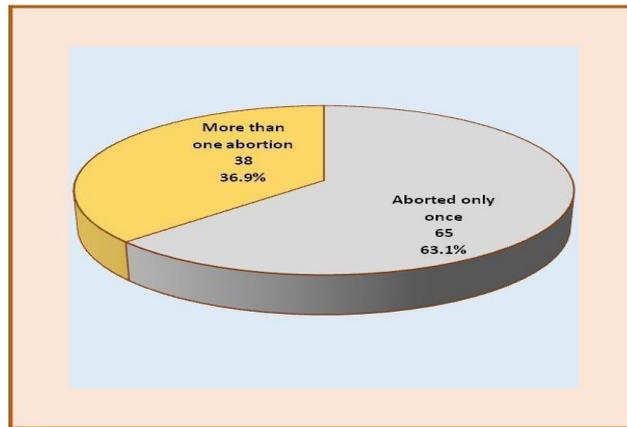
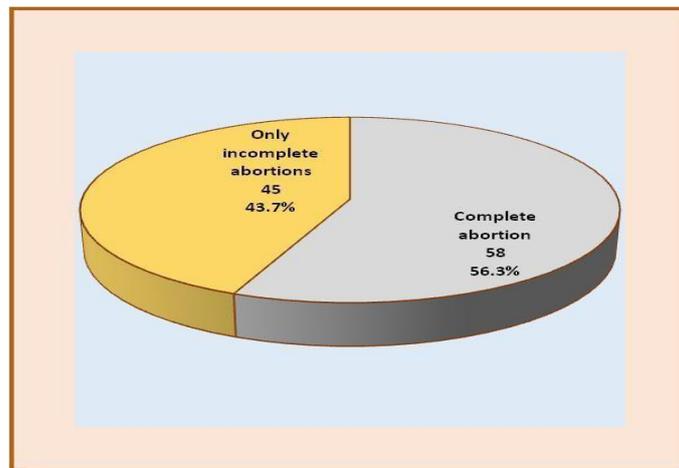


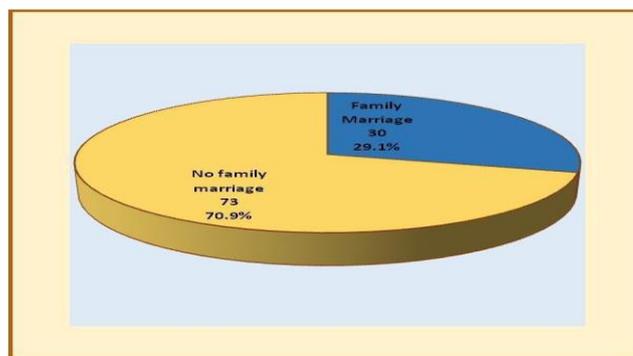
Fig. 6: Distribution of the study population according to parity of the mother  
Parity: ranges 0 – 7, Mean  $\pm$ SD 3.09  $\pm$ 1.788



**Fig. 7. Distribution of the study population according to number of abortions**  
*Abortions: ranges 1 – 7, Mean  $\pm$ SD 1.72  $\pm$ 1.263*



**Fig. 8. Distribution of the study population according to history of incomplete abortion**



**Fig. 9. Distribution of the study population according to family marriage**

#### 4.2 Maternal Health Characteristics

PIH: pregnancy induced hypertension, GDM: Gestational diabetes, Insufficient Vitamin D: defined according to Institute of Medicine <20 ng/dL, Obesity: defined according to World

Health Organization with body mass index  $\geq$  30 kg/m<sup>2</sup>, BMI: ranges 18 - 53 kg/m<sup>2</sup> Mean  $\pm$ SD 29.65  $\pm$ 5.762 kg/m<sup>2</sup>, Vitamin.D3: ranges 4.0 - 98.0Mean  $\pm$ SD 20.810  $\pm$ 12.2512 ng / dL.

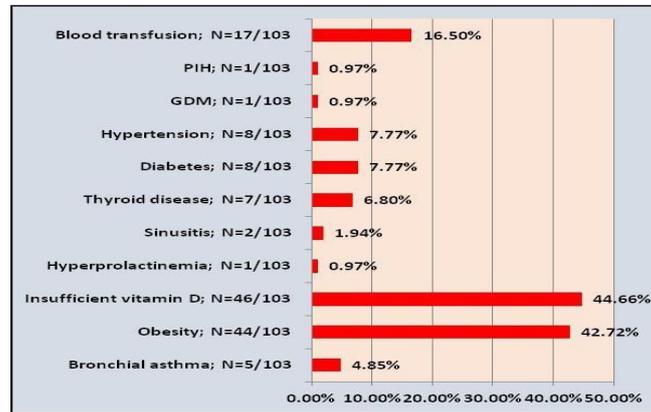


Fig. 10. Rates of morbid conditions and past adverse events among the study population

### 4.3 Father Related Characteristics

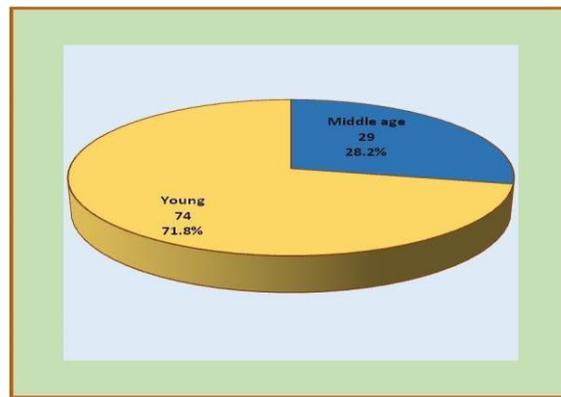


Fig. 11. Distribution of the study population according to paternal age  
 Middle age: 45 – 64 years. Father Age: ranges 23 – 59, Mean  $\pm$ SD 39.95  $\pm$ 6.465

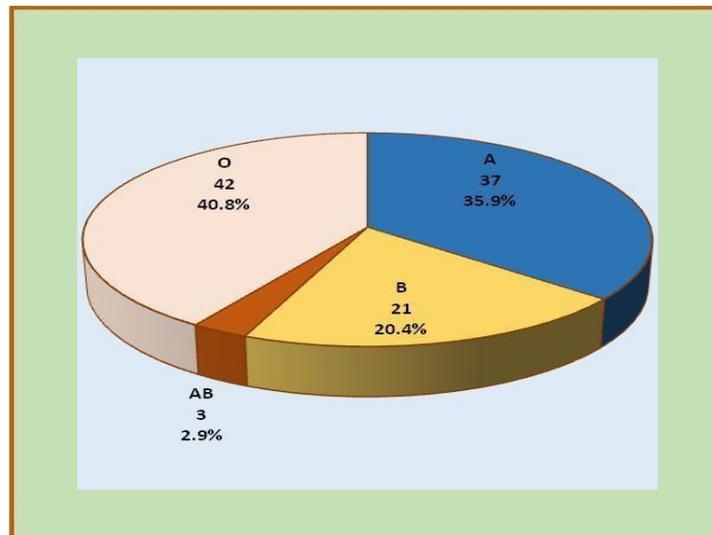


Fig. 12. Distribution of the study population according to paternal blood group

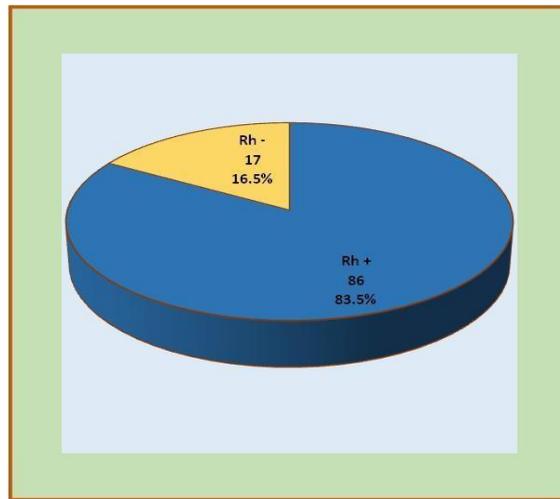


Fig. 13. Distribution of the study population according to paternal Rh status

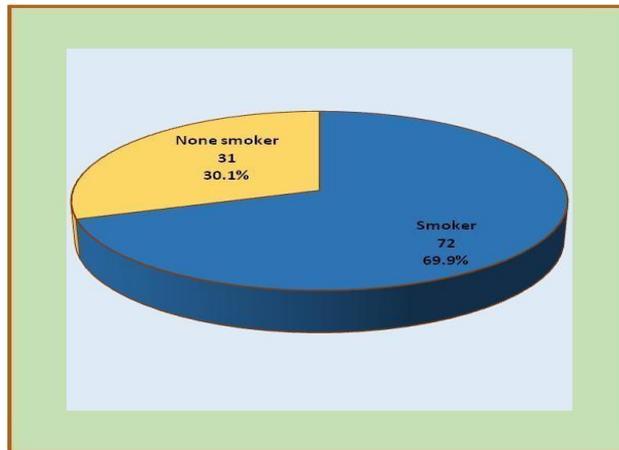


Fig. 14. Distribution of the study population according to paternal age

#### 4.4 The Pregnancy Outcomes Analysis

#### 4.5 Maternal Outcomes

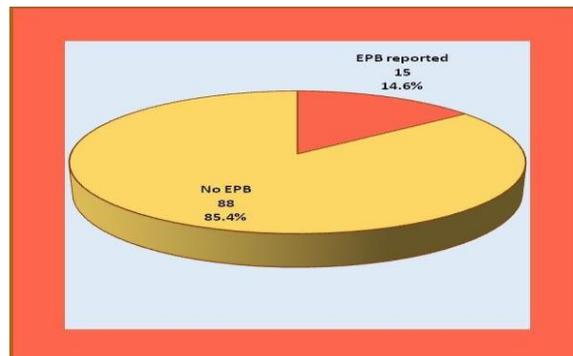


Fig. 15. Distribution of the study population according to event of early pregnancy bleeding (EPB)

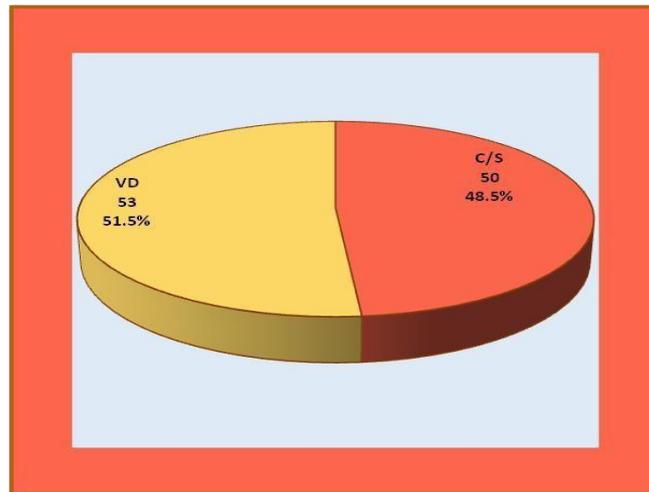


Fig. 16. Distribution of the study population according to vaginal delivery (VD) and caesarean section (C/S)

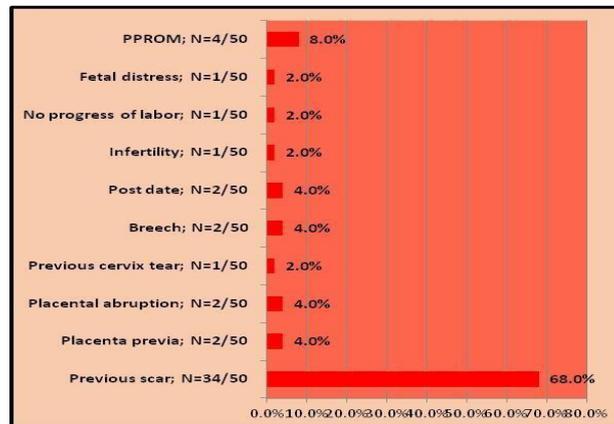


Fig. 17. Rates of pregnancy outcomes (indications) among the study population delivered with caesarean section

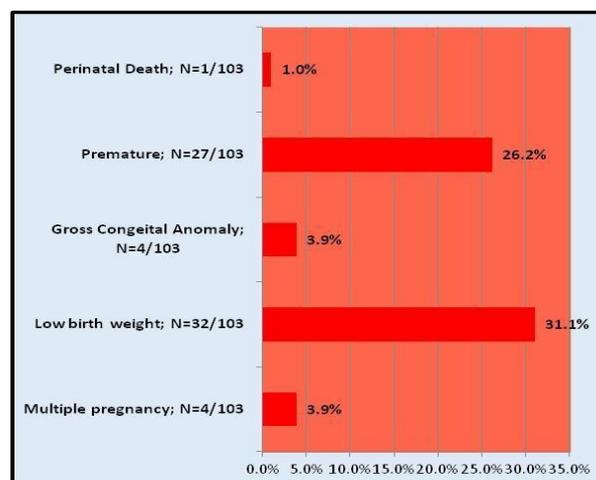


Fig. 18. Rates of perinatal outcomes among the study population  
 Low birth weight: <2.5 according to World Health Organization Birth Weight: ranges 0.60- 4.53 kg, Mean  $\pm$  SD 2.9288 $\pm$ 0.794 kg

**Table 1. Demographic and environmental factors and the event of early pregnancy bleeding**

Factor		Early pregnancy bleeding N %	P
Advanced maternal age	Yes	8 16.0%	0.688†
	No	7 13.2%	
Middle age fathers	Yes	2 6.9%	0.223‡
	No	13 17.6%	
Low education	Yes	2 9.1%	0.516‡
	No	13 16.0%	
Working mother	Yes	7 17.1%	0.557†
	No	8 12.9%	
Family Marriage	Yes	2 6.7%	0.220‡
	No	13 17.8%	
Passive smoking	Yes	5 6.9%	0.002* ‡
	No	10 32.3%	

\* Significant at level of confidence of 95%. † Pearson's Chi square test. ‡ Fisher's exact test.

N: number of cases with outcomes out of those with factor. %: proportion of cases withoutcomes among those with factor  
Advanced maternal age: ≥35 years. Low education: below secondary level. Middle age: 45 – 64 years.

**Table 2. Factors of parity and abortions and the event of early pregnancy bleeding**

Factor		Early pregnancy bleeding N %	P
Parity 0 to 1	Yes	3 14.3%	1.000‡
	No	12 14.6%	
Abortions more than one	Yes	5 13.2%	0.757†
	No	10 15.4%	
Incomplete abortions	Yes	6 13.3%	0.755†
	No	9 15.5%	

\* Significant at level of confidence of 95%. † Pearson's Chi square test. ‡ Fisher's exact test.

N: number of cases with outcomes out of those with factor. %: proportion of cases with outcomes among those with factor

**Table 3. Maternal morbidity factors and the event of early pregnancy bleeding**

Factor		Early pregnancy bleeding N %	P
Common morbidity	Yes	1 3.6%	0.063‡
	No	14 18.7%	
Obesity	Yes	7 15.9%	0.738†
	No	8 13.6%	
Insufficient vitamin D	Yes	3 6.5%	0.038†
	No	12 21.1%	

\* Significant at level of confidence of 95%. † Pearson's Chi square test. ‡ Fisher's exact test.

N: number of cases with outcomes out of those with factor. %: proportion of cases with outcomes among those with factor  
Advanced maternal age: ≥35 years. Low education: below secondary level. Middle age: 45 – 64 years. Common morbidity: hypertension, diabetes, hypothyroidism, bronchial asthma, pregnancy induced hypertension or gestational diabetes. Obesity: body mass index ≥30.0 kg/m<sup>2</sup>. Insufficient serum vitamin D3: < 20.0 ng/dL

**Table 4. Demographic and environmental factors and pregnancy outcomes**

Factor		Pregnancy outcomes N %	P
Advanced maternal age	Yes	6 12.0%	0.647†
	No	8 15.1%	
Middle age fathers	Yes	4 13.8%	1.000‡
	No	10 13.5%	
Low education	Yes	7 31.8%	0.010*‡
	No	7 8.6%	
Working mother	Yes	2 4.9%	0.036*†
	No	12 19.4%	
Family Marriage	Yes	4 13.3%	1.000‡
	No	10 13.7%	
Passive smoking	Yes	8 11.1%	0.347‡
	No	6 19.4%	

\* Significant at level of confidence of 95%. † Pearson's Chi square test. ‡ Fisher's exact test.  
Pregnancy outcomes: Indications for caesarean section related only to the current pregnancy. Advanced maternal age: ≥35 years. Low education: below secondary level. Middle age: 45 – 64 years.

**Table 5. Factors of parity and abortions and pregnancy outcomes**

Factor		Pregnancy outcomes N %	P
Parity 0 to 1	Yes	14 13.6%	1.000‡
	No	3 14.3%	
Abortions more than one	Yes	11 13.4%	0.197†
	No	3 7.9%	
Incomplete abortions	Yes	11 16.9%	0.220†
	No	4 8.9%	

\* Significant at level of confidence of 95%. † Pearson's Chi square test. ‡ Fisher's exact test.  
Pregnancy outcomes: Indications for caesarean section related only to the current pregnancy.

**Table 6. Maternal morbidity factors and pregnancy outcomes**

Factor		Pregnancy outcomes N %	P
Common morbidity	Yes	10 17.2%	1.000‡
	No	4 14.3%	
Obesity	Yes	10 13.3%	0.079†
	No	9 20.5%	
Insufficient vitamin D	Yes	5 8.5%	0.665†
	No	7 15.2%	

\* Significant at level of confidence of 95%. † Pearson's Chi square test. ‡ Fisher's exact test.  
Pregnancy outcomes: Indications for caesarean section related only to the current pregnancy. Advanced maternal age: ≥35 years. Low education: below secondary level. Middle age: 45 – 64 years. Common morbidity: hypertension, diabetes, hypothyroidism, bronchial asthma, pregnancy induced hypertension or gestational diabetes. Obesity: body mass index ≥30.0 kg/m<sup>2</sup>. Insufficient serum vitamin D3: < 20.0 ng /dL

**Table 7. Demographic and environmental factors and low birth weight**

Factor		Low birth weight N%	P
Advanced maternal age	Yes	17 34.0%	0.532†
	No	15 28.3%	
Middle age fathers	Yes	9 31.0%	0.996†
	No	23 31.1%	
Low education	Yes	12 54.5%	0.007*†
	No	20 24.7%	
Working mother	Yes	15 36.6%	0.325†
	No	17 27.4%	
Family Marriage	Yes	9 30.0%	0.881†
	No	23 31.5%	
Passive smoking	Yes	26 36.1%	0.092†
	No	6 19.4%	

\* Significant at level of confidence of 95%. † Pearson's Chi square test. ‡ Fisher's exact test.  
 Low birth weight: birth weight < 2.5 kg. Advanced maternal age: ≥35 years. Low education: below secondary level. Middle age: 45 – 64 years.

**Table 8. Factors of parity and abortions and low birth weight**

Factor		Low birth weight N%	P
Parity 0 to 1	Yes	11 52.4%	0.018*
	No	21 25.6%	
Abortions more than one	Yes	11 28.9%	0.722†
	No	21 32.3%	
Incomplete abortions	Yes	18 40.0%	0.084†
	No	14 24.1%	

\* Significant at level of confidence of 95%. † Pearson's Chi square test. ‡ Fisher's exact test.  
 Low birth weight: birth weight < 2.5 kg.

**Table 9. Maternal morbidity factors and low birth weight**

Factor		Low birth weight N%	P
Common morbidity	Yes	32 31.1%	0.271†
	No	11 39.3%	
Obesity	Yes	21 28.0%	0.887†
	No	14 31.8%	
Insufficient vitamin D	Yes	18 30.5%	0.112†
	No	18 39.1%	

\* Significant at level of confidence of 95%. † Pearson's Chi square test. ‡ Fisher's exact test.  
 Low birth weight: birth weight < 2.5 kg. Common morbidity: hypertension, diabetes, hypothyroidism, bronchial asthma, pregnancy induced hypertension or gestational diabetes. Obesity: body mass index ≥30.0 kg/m<sup>2</sup>. Insufficient serum vitamin D3: < 20.0 ng/dL

**Table 10. Demographic and environmental factors and the prematurity**

Factor		Prematurity N %	P
Advanced maternal age	Yes	13 26.0%	0.962†
	No	14 26.4%	
Middle age fathers	Yes	7 24.1%	0.764†
	No	20 27.0%	
Low education	Yes	10 45.5%	0.021*†
	No	17 21.0%	
Working mother	Yes	13 31.7%	0.303†
	No	14 22.6%	
Family Marriage	Yes	7 23.3%	0.670†
	No	20 27.4%	
Passive smoking	Yes	17 23.6%	0.360†
	No	10 32.3%	

\* Significant at level of confidence of 95%. † Pearson's Chi square test. ‡ Fisher's exact test.  
Prematurity: birth at gestational age < 259 days. Advanced maternal age: ≥35 years. Low education: below secondary level. Middle age: 45 – 64 years.

**Table 11. Factors of parity and abortions and the prematurity**

Factor		Prematurity N %	P
Parity 0 to 1	Yes	7 33.3%	0.406†
	No	20 24.4%	
Abortions more than one	Yes	11 28.9%	0.630†
	No	16 24.6%	
Incomplete abortions	Yes	14 31.1%	0.319†
	No	13 22.4%	

\* Significant at level of confidence of 95%. † Pearson's Chi square test. ‡ Fisher's exact test.  
Prematurity: birth at gestational age < 259 days.

**Table 12. Maternal morbidity factors and the prematurity**

Factor		Prematurity N %	P
Common morbidity	Yes	12 42.9%	0.019*†
	No	15 20.0%	
Obesity	Yes	13 29.5%	0.507†
	No	14 23.7%	
Insufficient vitamin D	Yes	13 28.3%	0.671†
	No	14 24.6%	

\* Significant at level of confidence of 95%. † Pearson's Chi square test. ‡ Fisher's exact test.  
Prematurity: birth at gestational age < 259 days. Common morbidity: hypertension, diabetes, hypothyroidism, bronchial asthma, pregnancy induced hypertension or gestational diabetes. Obesity: body mass index ≥30.0 kg/m<sup>2</sup>. Insufficient serum vitamin D3: < 20.0 ng/dL

The study included 103 mothers undergone child birth in Benghazi medical center and they had a previous medical history of miscarriage.

Mean age of mothers with was 34.30(Std. Deviation 6.018) years, with age ranged from 21 to 47 years, maternal BMI ranged from 18.4 to 52.7 kg/ m<sup>2</sup> and mean 29.654 kg/m<sup>2</sup> ± SD 5.7627. 30.1% of mothers had BMI 30-34.9kg/m<sup>2</sup>, 6.8% had BMI 35-39.9kg/m<sup>2</sup> where 63.1% of study members had BMI =>40kg/m<sup>2</sup>, the last one classified as Class III (high-risk) obesity, that may involve in the biases for this study as we know and well established by evidence-based facts that the obesity specially the sever one (class II, class III) has a major role in development of many of obstetrics complications as an independent risk factor [22].

The mean of father age 39.95years +/- 6.465 minimum age 23 years and maximum age was 59 years. most of study members their hemoglobin level range (minimum 10.4g/dl and maximum11.6g/dl) +/-1.46, vitD range minimum 4 ng/mL and maximum 98 ng/mL+/-12.25 SD.

Regarding ABO blood type, the mothers blood groups distributed as following A<sup>+</sup> 24.3%, A<sup>-</sup> 7.8%, AB<sup>+</sup> 11.7%, B<sup>+</sup> 13.6%, O<sup>-</sup> 6.8%, O<sup>+</sup> 35.9% where the father blood group distribution A<sup>+</sup> 32%, A<sup>-</sup> 3.9%, AB<sup>+</sup> 2.9%, B<sup>-</sup> 6.8%, B<sup>+</sup>13.6%, O<sup>-</sup>4.9%, O<sup>+</sup>35.9%, the significance of that according to [23].

Systematic literature analysis was only related to pre-eclamptic disorders which was infrequent in this study [23].

Mother education in our study as following, preparatory 4.9%, primary 12.6%, secondary 50.5%, university 32%. In David A. Savitz, et (POVERTY, EDUCATION, RACE, AND PREGNANCY OUTCOME) [24].

The association between education and preterm birth by race differed in the area population, compared to study participants. Among area African- American women, more education was predictive of lower risk, whereas among study participants, little difference was observed in relation to education. Among White women, both in the area and among PIN participants, there was a clear inverse gradient for risk of preterm birth with advancing education. For White women, a similar inverse risk gradient for SGA

was observed in both study participants and women residing in the area. Among African American women in the area, there was a clear inverse gradient in risk of SGA with rising education; however, that pattern was not nearly as pronounced among PIN participants, due to an anomalous absence of high risk in the lowest education group. Considering poverty index and education jointly among PIN participants, White participants who were disadvantaged on both (low income and ,12 years education) were at greatest risk for preterm delivery (21.3%). Among Whites, being poor was associated with increased risk for SGA births, regardless of education. in our study the education level show no significant association {p-value 0. 092}, but with comparing to the association between level of education and spacing p=0.049 statistically significant, as well as mother education and family marriage p=0.049.

Regarding maternal occupation during pregnancy, in concordance with th present study, Casas M et al. [25] employees had a lower risk of preterm delivery than non-employees [adjusted odds ratio (OR adj) 0.86, 95% confidence interval (95% CI) 0.81–0.91]. working in most of the occupational sectors studied was not associated with adverse birth outcomes, this study suggests that, overall, employment during pregnancy is associated with a reduction in the risk of preterm birth and that work in certain occupations may affect pregnancy outcomes. This exploratory study provides an important platform on which to base further prospective studies focused on the potential consequences of maternal occupational exposures during pregnancy on child development [25]. in our study we classified the mothers as employee 39.8% and housewife 60.2%, the results as following mother occupation and antenatal booking early not statistically significant p=0.065, mother occupation and spacing p=0. 076 not significant, mother occupation and family marriage p=0.104 not significant.

With respect to living place mothers divided into 2 groups live in Benghazi (2<sup>nd</sup> city in Libya) 73.8% and out Benghazi 26.2%, 84.2% of Benghazi members attend early booking clinic compering to 63.0% of other group with p= 0.021, around 67.1% of 1<sup>st</sup> group had a pregnancy spacing compering to 2<sup>nd</sup> only 40.7% only attend early booking with p= 0.016.

C Oliver-Williams.... Etc [26] previous miscarriage was associated with an increased

risk of all-cause preterm birth (adjusted odds ratio, aOR 1.26; 95% confidence interval, 95% CI 1.22–1.29). This arose from associations with all subtypes. The strongest association was found with extreme preterm birth (aOR 1.73; 95% CI 1.57–1.90). Risk increased with the number of miscarriages. Women with three or more miscarriages had the greatest risk of all-cause preterm birth (aOR 2.14; 95% CI 1.93–2.38), and the strongest association was with extreme preterm birth (aOR 3.87; 95% CI 2.85–5.26). The strength of the association between miscarriage and preterm birth decreased from 1980 to 2008. [26] with us in this study we show that 28.2% of participates had preterm delivery where 71.8% had term one.50.5% gave delivery by cesarean section comparing to 43.7% gave vaginal delivery that mode of delivery regardless the gestational age (term vs preterm). According to Ali N et al. [27]; women with a history of recurrent miscarriage (RM) were twice as likely to undergo cesarean section and seven times more likely to deliver prior to 32 weeks of gestation than women without a history of recurrent miscarriage, history of RM had independently significant increased odds of cesarean section (adjusted odds ratio (aOR) 1.81, 95% CI 1.24– 2.65) and preterm (< 37 weeks, aOR: 2.52, 95% CI 1.56– 4.08)

or very preterm delivery (< 32 weeks, aOR: 7.02 95% CI 2.41– 20.46) in subsequent pregnancies than women who did not have a history of RM [27].

According to Dempsey JC et al. [28] women, both with a history of abortion and without, experienced decreases of 60% (adjusted OR = 0.40, 95% CI.23-.71) and 71% (adjusted OR = .29, 95% CI .16-.53), respectively, in risk of preeclampsia when compared to nulliparous women with no history of abortion. Type (spontaneous and/or induced), number and timing of prior abortion did not appear to influence the risk of preeclampsia among nulliparous women [29] regarding that only one participate in our study developed preeclampsia and no one developed eclampsia.

According to RCOG (2011) in Green-top Guideline No.17.

Previous reproductive history is an independent predictor of future pregnancy outcome. The risk of a further miscarriage increases after each successive pregnancy loss, reach approximately 40% after three consecutive pregnancy losses,

and the prognosis worsens with increasing maternal age. A previous live birth does not preclude a woman developing recurrent miscarriage. With us around 9 participants their pregnancies end with miscarriage [30].

According to Momo RJ et al. [31] independent risk factors for : Intrauterine fetal death (IUFD) are age over 30 years (ORa = 2.1, P = 0.052), (ORa = 2.4497, p = 0.01), household occupation (ORa = 2.0097, p = 0.0282), hypertension disorders (ORa = 2.11, p = 0.0176), antepartal haemorrhage (ORa = 3.9635, p = 0.000), multiparity (ORa = 13.3089, p = 0.0056),The main risk factors for IUFD identified in our study are maternal age greater than 30 years, hypertension, antepartum hemorrhage, multiparity, and the household profession. Any pregnant woman who has one of these factors should be follow-up closely during pregnancy with a weekly assessment of fetal well- being by the 28th week [31]. that support our results as miscarriage is n't an independent risk factor for IUFD.

According to Hasan R et al. [32] Heavy bleeding in the first trimester, particularly when accompanied by pain, is associated with higher risk of miscarriage. Spotting and light episodes are not, especially if only lasting 1–2 days. [32], around 15 participants in this study developed vaginal bleeding in first trimester without significant impact on pregnancy outcome.

Lower maternal education (below secondary) was associated with higher level of pregnancy adverse outcomes warranting caesarean delivery (31.8% for 8.6%).

Lower maternal education and low parity (0,1) were found significantly associated with low birth weight (54.5% for 24.7% and 52.4% for 24.1%).

Lower maternal education (below secondary) and the presence of common co-morbid condition (hypertension, diabetes or thyroid disorder) were associated with significant increase in prematurity (45.5% for 21.0% and 42.9% for 20.0%).

Limitations in the current study included poor reporting or missing in registering some parameters and the lack of some important laboratory testing for inflammation. Another stronger design study is warranted.

## 4. CONCLUSION AND FUTURE RECOMMENDATIONS

### 4.1 Conclusion

Mothers with history of previous abortion shows a rate of caesarean delivery of 48.5%, early pregnancy bleeding of 14.6% prematurity of 26.2%, and low birth weight of 31.1%. number of previous abortions and parity seem not affecting outcomes but maternal age, education and comorbid conditions.

### 4.2. Recommendations

1. Multicenter prospective study to verify predictors of outcomes among women with previous miscarriage.
2. Planning for pregnancy and delivery with good monitoring and care for mothers with previous abortions.

### AIMS OF THE STUDY

To determine the effect of a spontaneous miscarriage on the outcome of the next pregnancy

### ETHICAL APPROVAL

As per international standard or university standard written ethical approval has been collected and preserved by the author(s).

### CONSENT

As per international standards or university standards, respondents' written consent has been collected and preserved by the author(s).

### COMPETING INTERESTS

Authors have declared that no competing interests exist.

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