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# Evaluating the Impact of Various Factors in Pregnant Women on Infants' Low Birth-Weight

**Omarov Nazarbek Bakytbeko[1*], Thaiba Abdulrazzaq[2], Entsar Hachim Muhammad[3], Sundus Mohammed Ali Al Bazi[4], Mazin A.A. Najm[5], Talib Kh. Hussein[6], Zahraa Hamzaa Abd Alzahraa[7], Sarah A. Hamood[8]**

1. *Non-Profit Joint Stock Company "Semey Medical University, Department of Hospital Surgery, Semey, Republic of the Kazakhstan*
2. *Medical Technical College, Al-Farahidi University, Baghdad, Iraq*
3. *Department of Medical Laboratory Technics, Al-Noor University College, Nineveh, Iraq*
4. *Department of Dentistry, Al-Zahrawi University College, Karbala, Iraq*
5. *Pharmaceutical Chemistry Department, College of Pharmacy, Al-Ayen University, Thi-Qar, Iraq*
6. *Department of Medical Engineering, Al-Hadi University College, Baghdad, Iraq*
7. *College of Pharmacy, National University of Science and Technology, Dhi Qar, Iraq*
8. *Department of Medical Engineering, Al-Esraa University College, Baghdad, Iraq*

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**Corresponding Information:**
**Omarov Nazarbek Bakytbeko,**
Non-Profit Joint Stock Company "Semey Medical University, Department of Hospital Surgery, Semey, Republic of the Kazakhstan

**Email:**
amalhusseinabdullahamal@gmail.com

**ABSTRACT**

**Background & Objective:** The birth of a baby with a low birth-weight (LBW), which has numerous consequences, is one of the most significant problems associated with childbirth. By evaluating the factors influencing LBW in infants, therapeutic interventions can be improved to mitigate its effects. In this regard, the present study aims to identify the causes of LBW in infants and assess these causes' impact.

**Materials & Methods:** In the current retrospective observational study, the required data regarding demographic variables and history of pregnancy and childbirth was extracted from 730 electronic records of deliveries performed from Alwiyah Hospital for Obstetrics and Gynecology in Baghdad in 2021 involving infants with LBW. The SPSS.23 software,the t-test, independent t-test, and multiple logistic regression were used to analyze the data. The results' significance level was deemed to be less than 0.05.

**Results:** The multiple logistic regression analysis model included variables with a significance level of less than 0.05. The results show that the variables of mother's age at delivery, the number of babies born in the current delivery, history of infertility, and iron deficiency anemia increase the chances of LBW by 0.48, 3.12, 0.38, and 0.56, respectively, and had a significant relationship with LBW infants (P<0.001).

**Conclusion:** Paying particular attention to the treatment and improvement of the practical factors in LBW before birth in pregnant women is crucial.

**Keywords:** Low Birth-weight, Pregnant Women, Infertility, Genitourinary Infection



## Introduction

Pregnancy is one of the natural and vital occurrences that affect the health of women and their families, and providing high-quality care services is one of the most important aims of our time (1). This will occur once the threats of this era have been identified. Due to its adverse effects, the birth of a baby with low birth-weight (LBW) is one of the major problems in the field of public health, among the significant risks associated with pregnancy and delivery (2).

As a result of respiratory, cardiovascular, kidney, and central nervous system issues during the first year of life result in premature and LBW infants facing a high mortality rate and expensive health care costs (3). The growth and development of premature infants are of utmost importance, and weight is regarded as the most essential factor in their growth and development (4). Babies with LBW have a birth weight of less than 2,500 grams. Because LBW is linked to infant mortality and immediate or delayed disabilities, it is a significant public health issue (5). The World Health Organization estimates that the prevalence of LBW is 7% in developed countries and 16.5% in developing countries

**(6)**. Race, occupational activities, lifestyle, heart diseases, chronic kidney failure, uterine malformations, smoking, alcohol consumption, mother's age, and diabetes are all factors that can contribute to a baby's LBW **(7)**.

Due to the excretion of extracellular fluid from the body and a small amount of breast milk, the initial week of a baby's life may result in a 10% decrease in weight **(8)**. However, until two weeks of age, the infant's weight is equal to or greater than the birth weight, and after the first month of life, it increases by approximately 20 grams per day. During the first two weeks of life, premature infants lose more weight than their term counterparts, but after that, they will grow more **(9, 10)**.

The most significant causes of LBW are genetic, environmental, fetal, placental, and maternal factors. In addition, economic and social status, the mother's age, racial characteristics, the mother's occupation, level of education, the season of birth, and domestic violence influence birth weight **(11)**. Research shows the likelihood of LBW in pregnancies involving women younger than 18 and older than 35 has been confirmed **(12)**. Maternal and fetal complications are more likely to occur in women aged 35 or older. Obesity and pregnancy-related hypertension are examples of maternal complications. In contrast, perinatal complications include premature birth, fetal death, LBW, intrauterine growth retardation, neonatal intensive care unit hospitalization, and congenital anomalies **(13, 14)**.

The gender of the baby has been identified as one of the influential factors in some studies, so the rate of LBW in female babies is higher than that of male babies **(15)**. Furthermore, studies have shown that LBW is associated with less than three years age difference between the baby and the previous child, the mother having diseases such as hypertension and urinary tract infection, premature birth, and the mother's employment **(16)**. In addition, women with a history of stillbirth or pregnancy complications are more likelyto have a LBW baby. Furthermore, the mother's consumption of various food groups is known to be a preventive factor in the occurrence of LBW **(17)**. Other studies show the impact of not receiving nutritional advice during care, premature delivery, mother's height less than 150 cm, type of delivery, and the presence of risk factors for cardiovascular disease in the mother, such as inactivity, fast-food consumption, a lack of fruits and vegetables, and high blood triglycerides have all been linked to LBW **(18)**.

Many genetic, biological, psychological, social, and environmental factors influence birth weight, and different studies have found different effects for each element. On the other hand, birth weight significantly impacts the baby's health in the later stages of his life **(19)**. As a result, it is critical to identify and modify modifiable factors related to birth weight, such as choosing the right age for pregnancy, being the right weight at the time of pregnancy, and so on **(20)**.

A variety of factors in LBW, as well as its consequences, physical and psychological effects, impact babies' health, growth, and survival. As a result, accurate identification of these factors is required to carry out more effective interventions in LBW prevention and control. The present study aims to identify the causes of LBW in infants and assess these causes' impact. The failure to conduct a similar study in Baghdad is the study's innovation.

## Methods

The current retrospective observational study investigated the incidence of infants with LBW and associated factors. The statistical population comprised all births at Alwiyah Hospital for Obstetrics and Gynecology in Baghdad in 2021, for which electronic records were accessible. As a statistical sample, 730 women were selected using a simple random sampling method. Exclusion criteria include non-Iraqi mothers and cases without prenatal blood tests and birth weight measurements. Following ethical considerations, the study participants' information remained confidential. In addition, the ethics committee of the Department of Obstetrics and Gynecology at Al-Kindi Medical College, University of Baghdad, has approved the current study.

Electronic files were used for data collection, with hospital personnel measuring and entering information into the files of pregnant mothers. The mentioned information includes the gestational age of the mothers, as determined and recorded by the first ultrasound between 11 and 14 weeks of pregnancy. Information related to the demographic characteristics of mothers who have given birth, includededucation, occupation, and age at delivery, and information about the mother's history of pregnancy and childbirth, such as the number of pregnancies, type of delivery (natural or cesarean section), history of genital diseases, and the interval between the previous and current pregnancies, weight gain during pregnancy, body mass index, current number of babies born, pre-pregnant weight, and the gap between the last and current pregnancies.

The T-test was used to determine the relationship between qualitative variables and babies with LBW. In contrast, an independent t-test was used to determine the relationship between quantitative variables and babies with LBW. The variables were then entered into the model for multiple logistic regression analysis. The analysis was conducted using the SPSS software (SPSS, version 23, IBM, USA), and the significance level of the results was deemed to be less than 0.05.

## Results

Table 1 presents the demographic variables of the women who participated in the study. According to

Table 1, 46.7% of women are between the ages of 20 and 30, 67.4% do not have children, 51.9% have a secondary education, 77% are unemployed, and 61.8% have a medium socioeconomic status. In addition, LBW infants have no significant relationship with any demographic variables (P>0.05). Noteworthy is that 12.4% of the infants had LBW, and the mean weight of infants was 3127.62 ± 483.35 grams.

**Table 1. Demographic variables of the studied women**

| Demographic variable | | Number (percentage) | P-value |
|---|---|---|---|
| **Age** | <2 | 108 (14.8%) | 0.24 |
| | 2-3 | 341 (46.7%) | |
| | >3 | 281 (38.5%) | |
| **Number of children** | 0 | 492 (67.4%) | 0.17 |
| | 1 | 155 (21.2%) | |
| | >1 | 83 (11.4%) | |
| **Education** | Illiterate | 32 (4.4%) | 0.32 |
| | Secondary | 379 (51.9%) | |
| | College | 319 (43.7%) | |
| **Job** | Employed | 168 (23%) | 0.29 |
| | Unemployed | 562 (77%) | |
| **Socioeconomic status** | Poor | 121 (16.6%) | 0.61 |
| | Medium | 451 (61.8%) | |
| | Good | 158 (21.6%) | |

Table 2 displays the mean and standard deviation of variables related to mothers' pregnancy and childbirth history. Table 2 clearly shows that the mean age of mothers is 27.63 ± 6.21 years. Mother's age at delivery, termination of pregnancy, and the number of infants born in the current delivery variables significant relationship with babies' LBW (P<0.001).

**Table 2. Mean variables of mothers' pregnancy and childbirth history**

| Variable | Mean ± SD* | P-value |
|---|---|---|
| **Mother's age at delivery (year)** | 27.63 ± 6.21 | <0.001 |
| **Termination of pregnancy (week)** | 39.18 ± 2.34 | <0.001 |
| **Current and previous pregnancy interval (year)** | 3.46 ± 1.87 | 0.26 |
| **The number of babies born in the current delivery** | 1.18 ± 0.36 | <0.001 |
| **The number of pregnancies of the mother** | 1.52 ± 1.19 | 0.41 |
| **Weight gain during pregnancy** | 11.16 ± 3.43 | 0.32 |
| **Body mass index (BMI)** | 26.38 ± 5.11 | 0.67 |

*SD= Standard deviation

Table 3 contains additional information regarding the mothers' previous and current pregnancies. According to Table 3, type of delivery, history of infertility, and history of LBW variables have a statistically significant relationship with LBW infants (P<0.05).

**Table 3. The distribution of the frequency of mothers suffering from some diseases**

| Variable | | Number (percentage) | P-value |
|---|---|---|---|
| **Gender of the baby** | Male | 408 (54.2%) | 0.53 |
| | Female | 345 (45.8%) | |
| **Type of delivery** | Natural | 298 (40.8%) | 0.01 |

| Variable | | Number (percentage) | P-value |
|---|---|---|---|
| | Cesarean | 432 (59.2%) | |
| **Blood incompatibility** | Yes | 6 (0.8%) | 0.67 |
| | No | 724 (99.2%) | |
| **History of abortion** | Yes | 106 (14.5%) | 0.24 |
| | No | 624 (85.5%) | |
| **History of infertility** | Yes | 23 (3.2%) | <0.001 |
| | No | 707 (96.8%) | |
| **History of stillbirth** | Yes | 61 (8.4%) | 0.09 |
| | No | 669 (91.6%) | |
| **History of LBW** | Yes | 26 (3.6%) | 0.007 |
| | No | 704 (96.4%) | |
| **History of premature birth** | Yes | 11 (1.5%) | 0.43 |
| | No | 719 (98.5%) | |

Table 4 shows the frequency distribution of mothers suffering from various diseases. According to Table 4, iron deficiency anemia and kidney variables have a statistically significant relationship with LBW (P<0.05).

**Table 4. Distribution of diseases in pregnant mothers**

| Variable | | Number (percentage) | P-value |
|---|---|---|---|
| **Cardiovascular** | Yes | 8 (1.1%) | 0.38 |
| | No | 722 (98.9%) | |
| **High blood pressure** | Yes | 12(1.6%) | 0.52 |
| | No | 718 (98.4%) | |
| **Iron deficiency anemia** | Yes | 67 (9.2%) | <0.001 |
| | No | 663 (90.8%) | |
| **Hypothyroidism** | Yes | 47(6.4%) | 0.49 |
| | No | 683 (93.6%) | |
| **Diabetes** | Yes | 17 (2.3%) | 0.42 |
| | No | 713 (97.7%) | |
| **Kidney** | Yes | 13 (1.8%) | 0.02 |
| | No | 717 (98.2%) | |
| **Urinary tract infection (UTI)** | Yes | 135 (18.5%) | 0.26 |
| | No | 595 (81.5%) | |
| **Psychopathy** | Yes | 19 (2.6%) | 1.74 |
| | No | 711 (97.4%) | |

The multiple logistic regression analysis model included variables with a significance level of less than 0.05. Variables of mother's age at delivery, the number of babies born in the current delivery, history of infertility, and iron deficiency anemia in Table 5 had a significant relationship with the birth of LBW infants (P<0.001). According to Table 5, the mother's age increases the chance of having an LBW infants by 0.48 times. Variables of the number of babies born in the current delivery, history of infertility, and iron deficiency anemia also increase the chances of LBW by 3.12, 0.38, and 0.56, respectively.

**Table 5. The results of the multiple logistic regression test for factors affecting LBW in infants**

| Variable | Odds ratio | 95% confidence interval | P-value |
|---|---|---|---|
| **Mother's age at delivery (year)** | 0.48 | 0.42-0.62 | <0.001 |
| **Termination of pregnancy (week)** | 0.54 | 0.44-0.68 | 0.17 |
| **The number of babies born in the current delivery** | 3.12 | 1.38-6.09 | <0.001 |
| **Type of delivery** | 0.47 | 0.24-0.83 | 0.25 |
| **History of infertility** | 0.38 | 0.23-0.72 | <0.001 |
| **History of LBW** | 0.61 | 0.35-1.12 | 0.08 |
| **Iron deficiency anemia** | 0.56 | 0.28-1.19 | <0.001 |
| **Kidney** | 1.64 | 0.87-3.36 | 0.12 |

## Discussion

The present study aims to identify the causes of LBW in infants and assess these causes' impact. The results show that the variables of the mother's age at delivery, the number of babies born in the current delivery, history of infertility, and iron deficiency anemia have the most significant impact on LBW for infants. The results are consistent with the findings of many studies **(21-24)** and are inconsistent with some studies **(25, 26)**.

The different levels of this index in other studies can be attributed to the influence of various factors such as socioeconomic factors, population density, nutritional status, and differences in services and health care provided during pregnancy in various locations. To design effective interventions, it is necessary first to determine the prevalence of LBW in each geographical region and then identify the risk factors that influence it. More attention has been paid to the issue of maternal and infant mortality in recent years, and special attention to the delivery of health care has resulted in a significant reduction in LBW and maternal and infant mortality compared to the past.

According to the current study, the weight of babies born to mothers under the age of 20 is lower than in other age groups, and there is a significant relationship between the age of the mother and the LBW of babies. As a result, it is critical to pay attention to the pregnancy age and avoid the problems that can arise as a result. According to studies, one of the essential factors contributing to the risk of premature babies is the mother's age at the time of delivery, which should be between 18 and 35 **(27)**.

In the current study, the variable of the number of babies born in the current delivery affected the baby's birth weight. Various studies have shown that babies from multiple pregnancies are more likelyto die than singleton babies due to risks such as suffocation during childbirth (birth asphyxia), low weight, prematurity, birth injuries, and respiratory distress syndrome **(28)**. Women who have multiple pregnancies are at a higher risk of premature birth and, as a result, LBW babies **(29)**. As a result, special attention must be paid to monitoring and providing health care to these mothers, focusing on maternal weight gain, anemia, iron deficiency, maternal diet, signs of premature birth, and so on.

In the current study, the variable of infertility history influenced the birth of LBW babies among the studied samples. Studies have linked infertility and assisted reproductive methods to LBW **(30)**. Given the scarcity of research in this area, it appears necessary to conduct additional studies on the relationship between infertility and LBW babies, and thus more attention should be paid to mothers with a history of infertility. It is also critical to provide psychological counseling to women with an account of infertility to reduce their stress. Women with a history of infertility must be considered high-risk groups, and more attention should be paid to this group when providing health care and services.

Iron deficiency anemia was discovered to be one of the factors with a high effect that has a significant relationship with LBW in the current study. This study defines iron deficiency as ferritin levels less than five g/liter. According to the findings, an iron deficiency prevention program can be valuable and practical because increasing women's iron reserves before pregnancy is critical and should be emphasized, as it can impact the future health of women and their children-strategies for increasing iron intake through supplementation and improving dietary habits. Increasing iron bioavailability can significantly impact the quality of iron obtained through food. It is possible to enhance iron absorption by increasing the consumption of animal sources of iron, such as meat, or iron absorption enhancers, such as vitamin C, in the diet.

## Limitations of this Study

One of the study's limitations is that it only included women who gave birth in one hospital and one city. Another area for improvement is the need for comparison with similar studies conducted in other

parts of the world to investigate the effect of race, nutrition, climate, etc. In this regard, it is suggested that future studies be conducted for other cities, and the current research results be compared.

## Conclusion

The findings show that the mother's age at delivery, the number of babies born in the current delivery, a history of infertility, and iron deficiency anemia have the greatest impact on infants' low birth-weight. As a result, the treatment staff must pay special attention to the variables mentioned above during prenatal consultations. In addition, informing through the media can play an essential role in improving the condition of mothers and babies.

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## Conflict of Interest

The authors declared no conflict of interest.

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