

# THE IMPACT OF MATERNAL ANAEMIA ON BIRTH OUTCOMES, INCLUDING BIRTH WEIGHT, GESTATIONAL AGE, AND NEONATAL HEALTH

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## ABSTRACT

*This research mainly helps to better understand how maternal anemia affects delivery improvements, this study centers around three key areas which consist of the birth weight of the baby, the gestational period chronological age, and the well-being of the newborn. A process of the use of a combination of methodologies, it examines data that is quantitative to identify relationships and generates qualitative knowledge which helps to identify underlying mechanisms. The results highlight strong associations connecting maternal anemia and decreased pregnancy weight, elevated probability of preterm delivery, as well as weakened newborn health markers. These findings highlight how important it is for focused initiatives to raise maternal nutrition levels, further develop prenatal care, as well as ultimately raise birth quality as well as neonatal general well-being. A mixed-methods research strategy is used in this study, incorporating both qualitative and quantitative methods. The everyday experiences and viewpoints of expectant mothers and medical professionals are gathered by employing qualitative methodologies. The links between the anemia of the mother and the outcomes of labor and delivery are examined using methods that are quantitative. Utilizing a combination of data-driven research and experiential narrative, this mix of methods offers a comprehensive understanding of the subject.*

**Keywords:** “Maternal anemia”, “Birth outcomes”, “Birth weight”, “Gestational age”, “Neonatal health”, “Antenatal care”, “Preterm birth”, “Maternal nutrition”, “Mixed-methods approach” and “Healthcare interventions”.

## I. INTRODUCTION

### A. Background

A very important worldwide healthcare issue is maternal anemia, which is characterized by a lack of blood cell production or hemoglobin in pregnant women. Having anemia when pregnant appears to be harmful to both the pregnant woman and the growing fetus. The placenta, a structure which is essential for fetal development and development, is one of the tissues adhering to the body that receives oxygen in the atmosphere via hemoglobin. Due to having an increased need for iron and additional nutrients to maintain the woman's own physiological functions as well as their impact on the development of the fetus, pregnant women are more likely to be prone to anemia. Insufficient birth weight, premature birth, and poor neonatal health are just a few of the birth outcomes that anemia throughout pregnancy has been linked to.

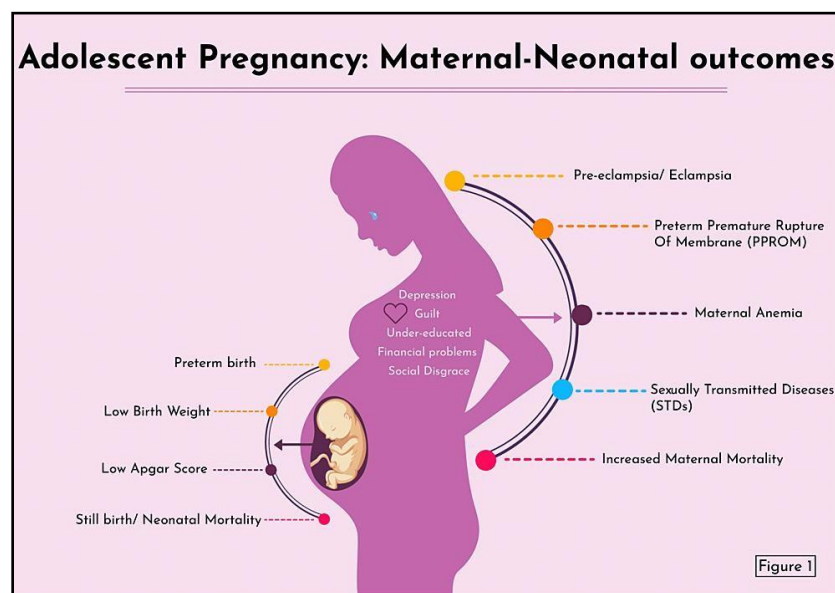


Figure 1: Visualization of the results of adolescent pregnancy for the mother and the unborn child

(Source: Chu et al. 2020)

In addition, at the center of the context of the health of mothers and their babies, the subject of "The Impact of Maternal Anemia on Birth Outcomes, Including Birth Weight, Gestational Age, and Neonatal Health" is of the greatest significance. As per the view of Bag (2020), labor and Delivery anemia, which is characterized by low levels of hemoglobin or blood cells that are red during pregnancy, has drawn attention since its discovery and had the potential to have significant impacts with respect to the development of the mother and the unborn child. The outcome associated with the pregnancy, the delivery process, and the future development of the baby are all greatly influenced by the condition of the pregnant woman. If without therapy, maternal hemoglobin levels can impair the placenta's ability to administer oxygen throughout pregnancy to the developing fetus, which is capable of producing harmful effects such as restricted intrauterine development, low birth weight at birth, as well as premature delivery.

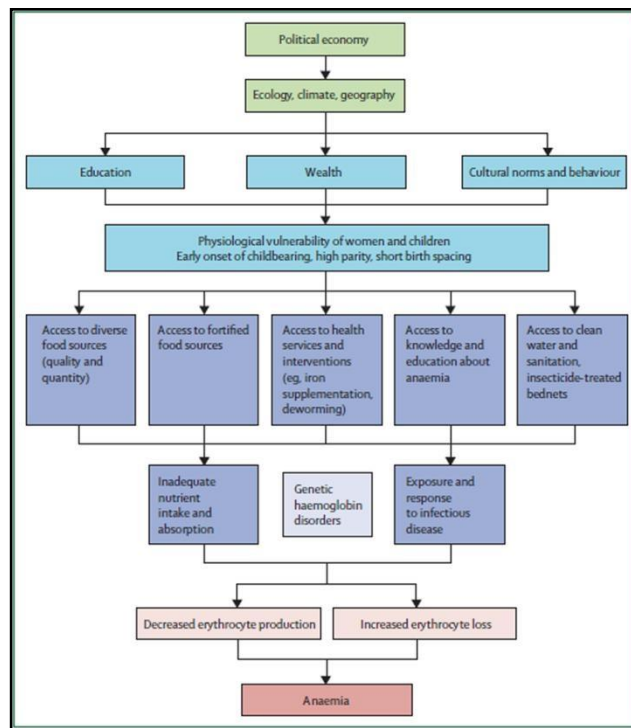


Figure 2: Visualization of the anemia determinants

(Source: Anwar et al. 2019)

The documentary is in line with worldwide initiatives designed to enhance the health of mothers and their babies and to address the effect of children's files anemia on birth outcomes. As per the view of Sancak (2022), medical personnel and politicians may create focused modifications, such as early prenatal counselling, nutritional supplements, and campaigns for education, by unravelling the complex factors behind the observed outcomes. The aforementioned treatments have been proposed to lower the number of cases of maternal anemia, which would eventually result in more healthy newborns, better birth outcomes, as well as improved quality of life to provide both mothers as well as their children. As per the view of Cornthwaite (2021), therefore, studying this subject is crucial for developing healthcare approaches that work and promoting more advantageous generations.

## B. Aims and Objectives

### Aims

The main objective of this study is to completely investigate how maternal anemia affects transportation outcomes, with special emphasis on birth weight, pregnancy-related tumor age, and the well-being of the

newborn. This study intends to identify the relationships between maternal files anemia and this important moment of conception characteristics by thorough analysis as well as correlation studies, offering insight into the various processes by which hemoglobin levels affect fetal development. With the help of attaining these goals, the present investigation is intended to provide crucial insights that can be used to guide healthcare practices, treatments, and programmers designed to improve overall pregnancy outcomes and maximize parental figures and the condition of newborns' well-being.

### ***Objectives***

- To evaluate the manner in which maternal hemoglobin deficiencies affect newborn development as well as the link between maternal hemoglobin levels as well as birth weight.
- To determine if maternal hemoglobin levels increase the risk throughout preterm delivery by looking at any possible relationships that exist between gestational ages in addition to maternal anemia.
- To examine how maternal files anemia affects the health of newborns metrics, including Apgar examination results and neonatal problems, which gauge the young children's current well-being.
- To give healthcare professionals together with governments evidence-based guidance regarding creating efficient methods for the early identification, and management, together with the prevention of parenting anemia, which will eventually enhance the outcomes of labor and the well-being of neonates.

### ***C. Research rationale***

There remains a need for a thorough investigation that precisely explores the complex interaction between maternal documents anemia and birth outcomes irrespective of the fact there appear to have been many studies on a mother's health throughout one's pregnancy. Recognizing how much maternal anemia affects the baby's weight at birth, gestational diabetes age, and newborn health could provide assistance with focused treatment methods and preventative measures. The lack of comprehensive knowledge regarding the complicated connection between maternal hemoglobin levels and labor and birth outcomes is what spurred this investigation to begin. Healthcare professionals may establish recommendations to improve the nutritional status of mothers and lower the possible risk of unfavorable birth outcomes by figuring out the manner in which that governs how maternal anemia impacts fetal development. Additionally, the investigation intends to add to the existing reservoir of knowledge on mother and child health, eventually aiding in facilitating the creation of evidence-based prenatal care policies as well as standards.

### ***D. Research Significance***

The research being conducted is significant because its results have the potential to advance maternal as well as neonatal healthcare procedures. The effects of maternal documents anemia on the newborn's birth weight, pregnancy-related tumor age, as well as newborn health, should be more thoroughly comprehended by nurses and physicians in order to help them recognize and handle high-risk pregnancies. The economic cost of newborn morbidity and fatalities can be decreased by early identification and care of maternal anemia, which can lead to therapies that reduce one's likelihood of preterm delivery along with decreased birth weight.

## II. LITERATURE REVIEW

### A. Impact on Birth Weight and Gestational Age and Neonatal Health

A newborn's premature weight is an essential sign of his or her well-being and growth. A decreased oxygen supply to the developing newborn as a result of the mother's anemia might potentially interfere with healthy growth and contribute to a decreased birth weight at birth. According to studies, anemia's poor distribution of oxygen may obstruct the fetal development of tissue including cellular functions. As per the view of Hu (2022), finding the correlation that exists between maternal hemoglobin levels along with birth weight can show how anemia affects the development of the child to what degree. Neonatal health is significantly affected by the precise moment of delivery, which is usually determined by gestational age. The impact of maternal anemia on the developmental stage is complex. As per the view of Yuan (2019), preterm births might take place in anemic moms to others as a result of inadequate placenta development or other issues responsible for early labor.

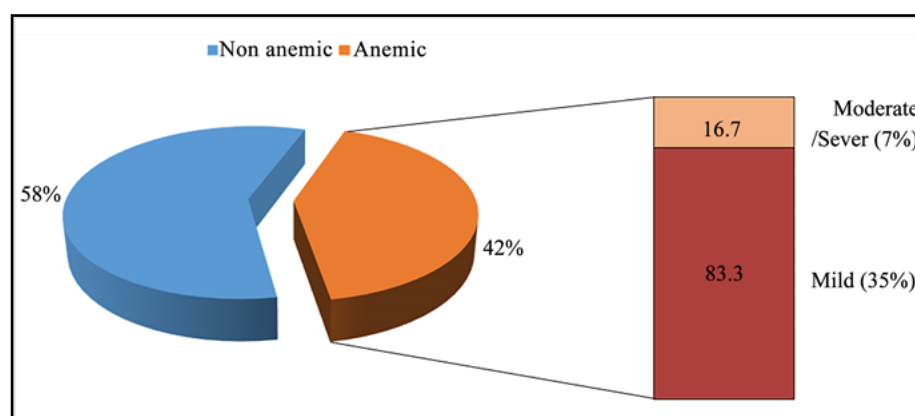


Figure 3: Displaying maternal anemia rate

(Source: Liu et al. 2022)

According to research, inflammatory responses brought on by anemia might accelerate the start of labor. Uncovering the processes behind the risk associated with preterm delivery can be accomplished by investigating the link that exists between maternal blood disorders and gestational age. As per the view of Jung (2019), the initial welfare programmers for newborns are of utmost importance. Neonatal physical well-being can be impacted by maternal hemoglobin deficiencies in a number of ways. As per the view of Alemu and Gashu (2020), lower Apgar, who was scores, a fast evaluation of a newborn's health, and a higher chance of the health of newborns problems including the syndrome of respiratory distress and infections may be seen in babies administered to anemic moms. Neonatal levels of saturation with oxygen may be affected if the maternal blood's ability to transport the supply of oxygen is reduced. Trying to determine how maternal hemoglobin deficiencies affect the health of premature babies might help identify viable countermeasures.

### B. Pathways and Interventions

Birth-finished products are impacted by maternal hemoglobin levels through intricate biochemical mechanisms. As per the view of Sah (2022), the most common underlying cause of anemia, for instance, inadequate levels of iron can hinder the delivery of oxygen to a developing fetus, slowing development. Additionally, the oxidative stress brought on by the inflammation brought on by anemia could cause damage to fetal tissues. Negative effects could result as well from impaired placental to its intended purpose.

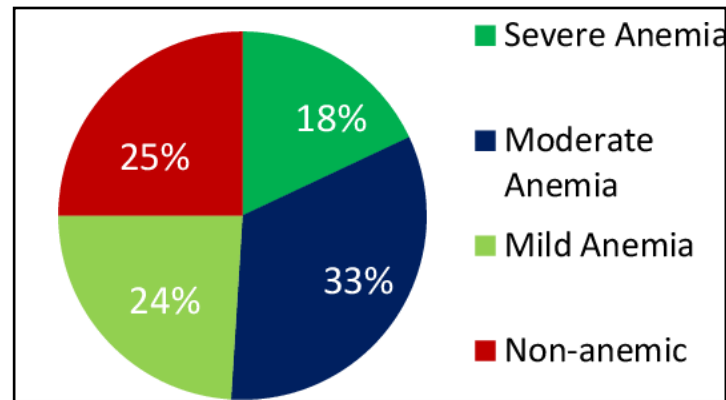


Figure 4: Displaying the rate of the maternal anemia

(Source: Rahman et al. 2020)

In addition, by looking at these different pathways, one can learn how maternal files anemia affects the final outcome of delivery. Being aware of the routes permits facilitating the development of focused therapies to lessen the effects of mother anemia. Supplementing the diet of pregnant women with the amino acids folic acid and iron and numerous other vital nutrients can help fill nutritional gaps and raise hemoglobin levels. As per the view of Sah (2022), during prenatal treatment, early anemia discovery may precipitate fast therapies, stopping the condition's development. Additionally, educating expectant mothers about the advantages of a balanced diet as well as regular prenatal appointments can help to lower the occurrence associated with anemia. Strategies used might be created that decrease the risks connected to unfavorable outcomes during pregnancy in addition to controlling anemia. Making choices regarding healthcare based on the development and overall health of the fetus can help achieve the greatest results. Improved newborn health can result from managing premature delivery and neonatal problems, especially for babies delivered to short-of-blood moms.

## III. METHODOLOGY

### A. Research Philosophy

The current investigation's research methodology is predominantly interpretivist. This perspective tries to understand the subtleties of this connection by carrying out qualitative examination while acknowledging the complexities of maternal anemia's influence on the outcome of delivery. As per the view of Sah (2022), Interpretivism supports efforts that help to identify the fundamental causes of poor delivery outcomes in this



environment of maternal anemia by acknowledging the personal perspectives of pregnant women as well as medical personnel.

### ***B. Research Approach***

This project uses a mixed-methods method of investigation that combines qualitative as well as quantitative information. The aforementioned approach captures the real-world observations and views of pregnant women and healthcare professionals in addition to enabling the quantitative analysis of relationships between maternal documents anemia and labor and birth outcomes. A deeper grasp of the subject can be attained through the inclusion of a combination of quantitative data and purely qualitative storytelling.

### ***C. Research Design***

In connection, triangulation is part of the investigation design. This phenomenon entails simultaneously gathering subjective information through focus groups and conversations along with numerical information on the prevalence associated with maternal anemia, baby weight at birth, gestational years, and neonatal welfare markers. An extensive as well as diverse view on the effect of maternal anemia affecting birth outcomes is provided by the combination of quantitative as well as qualitative evidence.

### ***D. Tools and Techniques***

The use of statistical approaches will be used in the quantitative approach to find relationships in the middle of maternal anemia as well as birth outcomes. Thematic analysis, a method of analysis that identifies recurrent trends and common themes in the recorded conversations of focus group talks as well as interviews, is one of the qualitative approaches. In addition, the effect of maternal anemia as well as its treatment options will be examined from the viewpoints of healthcare professionals using text analysis.

### ***E. Data Collection Method***

Through the process of medical records as well as prenatal clinic databases, data that is quantitative will be acquired, including population demographics, hemoglobin levels, the baby's birth weight, before delivery age, and premature infant health information. Semi-structured focus group conversations and interviews with expectant women and healthcare professionals will be the techniques used to get qualitative perspectives. As per the view of Sah (2022), These personal accounts will put the numerical information into context as well as reveal the fundamental causes influencing how maternal anemia affects the outcome of delivery.

### ***F. Project Management Approach***

This takes a methodical approach to improve project management and complete the task in phases. Determining the objectives of the research, creating data collection instruments, securing administrative permissions, collecting and analyzing data concurrently, as well as synthesizing results from both qualitative and quantitative sources are all examples of this. Contemporary progress will be ensured through regular team meetings as well as milestones. Consistently feedback loops are going to promote a team-based along with an iterative research approach, improving the study's validity and trustworthiness.

### G. Key Consideration

In this research endeavor, ethics will be of paramount significance. Participants are going to ask for their informed permission, protecting their freedoms and maintaining their confidentiality. In order to represent a wide variety of viewpoints, an equal representation of various childbearing women and healthcare professionals will be the goal attempted. As per the view of Sah (2022), the robustness of results will be improved by thorough validation as well as triangulation of findings using qualitative and quantitative information. In order to comply with the norms of scientific ethical conduct and address the delicate characteristics of maternal anemia's influence on the outcome of delivery, the study approach will place a priority on communication and accountability.

## IV. RESULTS

### A. Result analysis

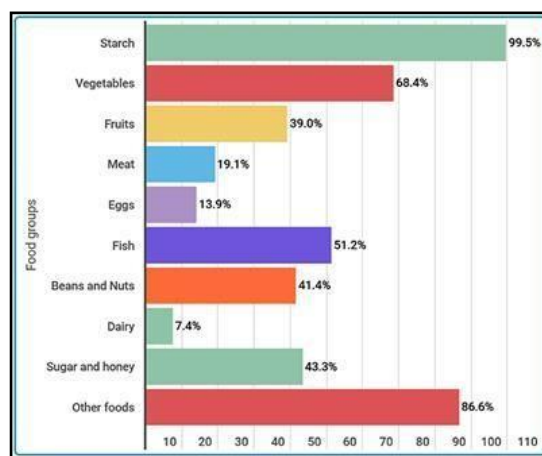


Figure 5: Displaying the issues of anemia for women during pregnancy

(Source: Finkelstein et al. 2020)

The above image shows the issues in the duration of pregnancy by using a bar plot. This plot helps to understand the issue rate which has been developed in the pregnancy trimester.

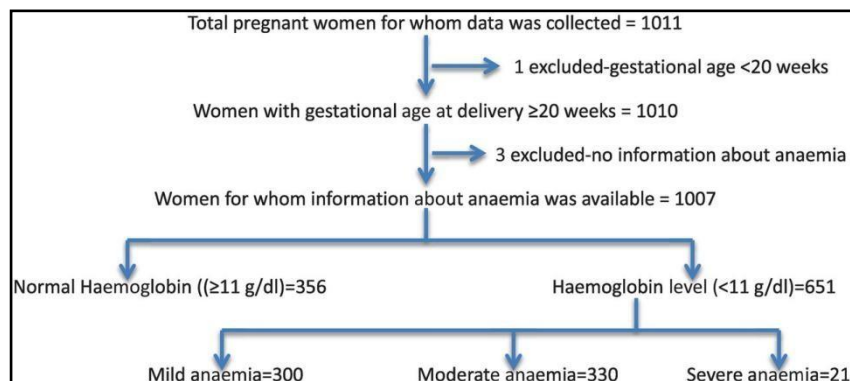




Figure 6: Showing the flow diagram of the anemia stage

(Source: Smith et al. 2019)

Implementation of the anemia stage has been shown in the above diagram which helps to understand the different types of parameters regarding anemia. This flow chart also helps to critically understand the stage significance.

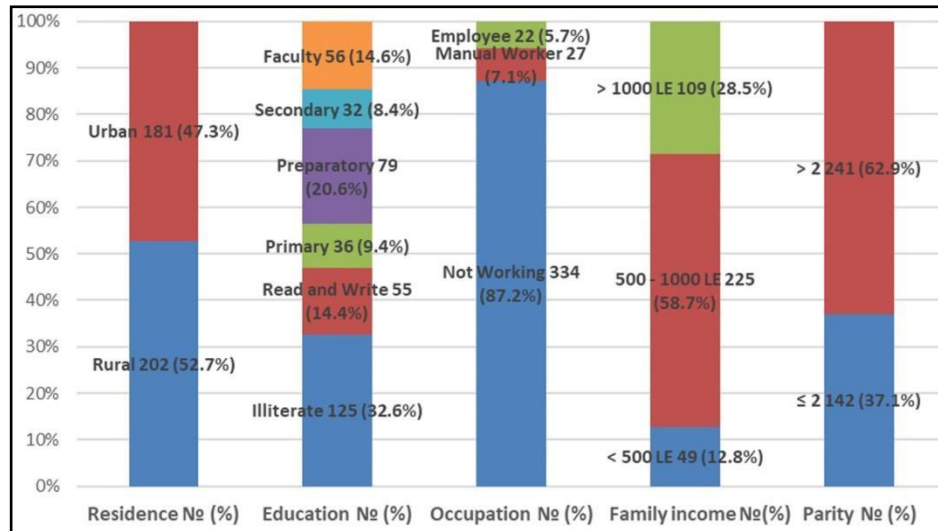


Figure 7: Visualization of the affected rate of women with anemia

(Source: Bukhari et al. 2022)

The above image shows the visualization of the affected rate of women with anemia where each individual color signifies a different rate of affected.

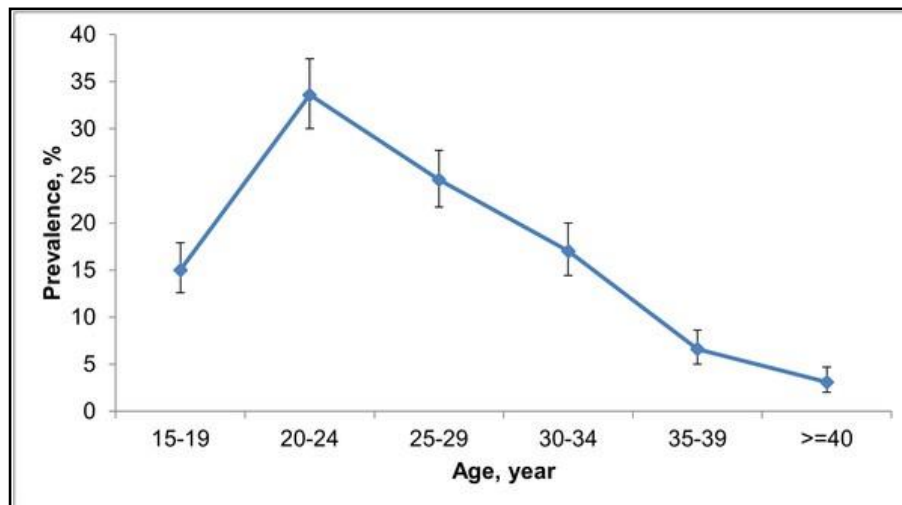


Figure 8: Showing the chances of anemia-affected age for pregnant women

(Source: Mohammad et al. 2022)

The above statistical diagram helps to critically understand the chances of anemia-affected age for pregnant women where the x-axis shows the age range and the y-axis shows the affected rate. The line plot defines the frequency of the affected rate.

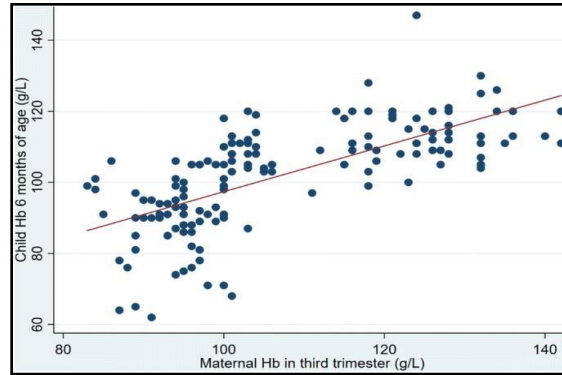


Figure 9: Showing scatter plot for the affected rate of anemia in the third trimester

(Source: Wałędziak et al. 2021)

The above-attached image shows the scatter plot for the affected rate of anemia in the middle of the pregnant women. The scatter plot shows the affected rate where the x-axis denotes the rate of the material hemoglobin in the third trimester. The y-axis denotes the rate of hemoglobin in the 6th month of the baby. The line denotes the increased rate of the risks in anemia.



Figure 10: Visualization of the risks in neonatal, offspring ad maternal stages for anemia

(Source: Mahmood et al. 2019)

The risks in neonatal, offspring and maternal stages of anemia have been shown in the above-attached picture. Neonatal risks have several types of risks which consist of minimum weight at birth, distress in fetal structure, gestational age being very low and premature birth of fetal. In addition, there are several off-spring risks which include disorder in memory, disability in intellectual matter and deficiency in iron and many more. Additionally, there are huge maternal risks in anemia which include return labor, abruption of the placenta, hemorrhage in the postpartum severely and many more factors.

### ***B. Summary***

The study's findings that are looked at how maternal hemorrhaging affected birth outcomes show a strong correlation in the middle of maternal anemia and inconvenient birth characteristics. The adverse effect of anemia on fetal growth has been demonstrated by quantitative analysis, which shows a significant link in the middle of lower maternal hemoglobin levels as well as decreased birth weight at birth. The research study also finds a significant association in the middle of maternal anemia as well as a higher risk of preterm delivery, pointing out that anemia plays a role in challenging circumstances related to the gestational age of the baby. These results in numbers are complemented by qualitative research results that illustrate the difficulties that anemia presents in order to expectant mothers and medical professionals. The necessity of early treatments in addition to prenatal care is emphasized by medical specialists as a way to reduce the hazards connected to a mother's anemia.

Additionally, newborns born short of blood women consistently have impaired health of newborns with health indicators with the value Apgar scores as well as neonatal problems. In summary, the findings examine how very important it is to take care of maternal hemoglobin deficiencies as a preventative intervention for improving the outcome of deliveries. The findings draw attention to the need for focused measures to enhance nourishment for mothers, ensure early anemia identification, as well as thorough prenatal care. In addition, by reducing the effect of children's files anemia on the outcome of delivery, these findings have significant consequences on healthcare regulations and practice and can improve the health of mothers and children.

## **V. CONCLUSION**

### ***A. Linkage to Objective***

The evaluation of the manner in which maternal hemoglobin deficiencies affect newborn development as well as the link between maternal hemoglobin levels as well as birth weight has been successfully analyzed. The determination, of maternal hemoglobin levels increase the risk throughout preterm delivery by looking at any possible relationships that exist between gestational ages in addition to maternal anemia has been critically analyzed with the help of statistical measures. The examination of how maternal files anemia affects the health of newborns metrics, including Apgar examination results and neonatal problems, which gauge the young children's current well-being has been successfully determined in this research. After analyzing the outcome of the research, the healthcare professionals together with government evidence-based guidance regarding creating efficient methods for early identification, and management, together with the prevention of parenting anemia, will eventually enhance the outcomes of labor and the well-being of neonates has been analyzed.

This study focuses on three essential areas: the baby's birth weight, the gestational period's chronological age, and the newborn's health. Its main goal is to better understand how maternal anemia influences delivery improvements. It is a process that combines a number of approaches, analyses quantitative data to find links, and produces qualitative information that aids in the discovery of underlying mechanisms. The findings show a clear correlation between maternal anemia and lower pregnancy weight, a higher risk of preterm birth, and weaker infant health indicators. These results underline the significance of targeted interventions to improve mother nutrition, advance prenatal care, and eventually improve birth quality and neonatal health.

### ***B. Future Scope***

The discoveries of this study can be used to upgrade approaches for coping with and avoiding maternal anemia. Future research should examine the beneficial effects of particular nutritional supplementation techniques in greater detail, proactively taking into consideration various demographics as well as cultural circumstances. Healthcare providers can optimize maternal hemoglobin levels as well as therefore enhance the outcome of labor by customizing treatments. Future studies might concentrate on the trajectory of development of infants born to improve anemic women because of the possible long-term effects of unfavorable outcomes during delivery. In order to identify any lasting effects of maternal files anemia and to direct focused treatment, longitudinal investigations might evaluate the cognitive, physical nature and psychological well-being of these kids. It might become intriguing to look at the genetic as well as epigenetic influences on maternal anemia as well as newborn outcomes. Researchers might uncover fundamental mechanisms and perhaps find biomarkers that predict vulnerability to undesirable birth outcomes by analyzing how epigenetics and genetic factors communicate regarding maternal anemia. It is also vital to investigate the effects of children's files anemia on the economy. In the future, studies may examine the financial burden revived on by the medical expenses incurred in controlling newborn complications resulting from maternal anemia in children. Illustrating the possible cost-effectiveness of techniques aimed at preventing maternal anemia, for instance, might influence healthcare legislation. It could be accomplished to gain a greater comprehension of how maternal anemia affects birth outcomes and how this differs between communities by expanding the study's coverage across different contexts of culture. Cross-cultural research might provide substantial information into contextual factors that may affect the association concerning anemia as well as birth outcomes, including cultural practices, food preferences, as well as accessibility to healthcare. The main comprehension of how children's files anemia impacts cortical shape and function can be improved by incorporating cutting-edge medical imaging tools. The use of Doppler ultrasonography is one technology that can provide light for understanding vascular alterations brought on by the mother's anemia by giving insights into the blood circulation patterns between the mother as well as the fetus.

### ***C. Limitations of the research study***

Data Availability which defines the accuracy along with the accessibility of the prenatal clinic databases as well as medical records are essential to the study's period of validity. The precision of relationships in the middle of maternal anemia as well as birth outcomes might be compromised by incomplete or insufficient information. Sampling bias which mainly defines the sample used for the purpose of the research might not accurately reflect

the diverse population of pregnant women. The results could not be generalized to the overall population if some demographic organizations are either disproportionately represented or underrepresented. Confounding Factors define the efforts help to control confounding variables, elements which include the mother's age, socioeconomic status, as well as comorbidities that may affect the final outcomes of births. It can be difficult to account for every potential confounder, which could change how accurate the relationships that have been found discovered are.

Retrospective which defines the study's dependence on retrospectively implemented data hinders it from being able to demonstrate causal links. Although resource- as well as time-intensive, prospective longitudinal research project investigations, offer greater opportunities for causal inference. The recollection Bias is where the qualitative insights rely on those who responded to the recollection of their experiences, which may be biased or distorted with regard to their memory. This perhaps renders stories about the effects of maternal anemia on the delivery process less accurate. Determined Newborn Health and Safety Scope Even though newborn health indicators will be the focus of looking at, the study might not completely encompass all possible neonatal well-being manifestations, potentially missing some elements of straightforward neonatal well-being. The context of the research might restrict the applicability of the investigated findings by underrepresenting the multidimensional interaction of cultural nature regional, and healthcare system variables that have an impact on maternal hemoglobin levels and the outcome of delivery.

#### ***D. Summary***

The current investigation uses a combination of methodologies, incorporating quantitative analysis along with qualitative insights, to more fully comprehend how parenting anemia influences the newborn's birth weight, gestational diabetes age, and well-being of newborns. The research intends to provide additional insight into the complex links between maternal document health and infant psychological well-being by examining paths of having an effect and potential treatments. The immediate significance of the study is demonstrated in its capacity to influence healthcare practices as well as policy. The results of this study can help to inform methods to facilitate the early identification, preventative measures, and therapeutic treatment of anemia during pregnancy by revealing the connections that exist between maternal hemoglobin levels and pregnancy outcomes. In order to guarantee both scientific rigor as well as the confidentiality of participants are respected, the research becomes ethical issues into consideration and uses a methodical administration of projects approach. The research project nevertheless acknowledges its limitations, which somewhat may impact the applicability and ability to generalize the results. These include an insufficient amount of data, bias inside the sampling process, and confounding factors. Overall, this research project adds to the corpus of information on the well-being of mothers and babies, paving the path for more effective approaches to therapy, focused administration, and eventually, better birth outcomes together with neonatal wellbeing.



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