MAK HILL Publications Research Journal of Medical Sciences

Research Article
doi: 10.36478/makrjms.2025.1.515.522

OPEN ACCESS

Key Words
Short inter pregnancy interval, maternal and neonatal outcomes

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Received: 20 October 2024
Accepted: 15 December 2024
Published: 07 January 2025

Citation: P. Priyadarshene, C. Dheepikkha, K. Sofia Mercy, V. Kirtika, Chinnaiyan Ponnuraja and S. Padmanaban, 2025. Study on Feto Maternal Outcome in Short Inter Pregnancy Interval. Res. J. Med. Sci., 19: 515-522, doi: 10.36478/makrjms.2025.1.515.522

Study on Feto Maternal Outcome in Short Inter Pregnancy Interval

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ABSTRACT

Pregnancy spacing refers to the practice of maintaining an interval between births of two or more years. Inter pregnancy Interval- It is defined as the period between delivery of previous infant and conception of current pregnancy. (1) WHO has recommended the following to reduce the risk of adverse maternal and perinatal outcomes: After a live birth, the recommended minimum interval before attempting the next pregnancy is at least 24 months. Future research is essential to further elucidate the optimal IPI for various pregnancy outcomes and to refine current guidelines to enhance maternal and neonatal health. The primary objective of the study is to identify the adverse outcomes of short inter pregnancy interval and educating the mothers regarding the same. This was a cross-sectional study conducted in the Department of Obstetrics and Gynecology at Government R.S.R.M Lying-In Hospital, Government Stanley Medical College, Chennai, from February 2023 to November 2023 (10 months). The case group consisted of 115 women with a short inter pregnancy interval, while the control group comprised 115 women with a normal inter pregnancy interval. Our findings highlight the importance of targeted interventions and educational programs to promote optimal inter pregnancy intervals (IPI) and enhance maternal and child health outcomes in the region. Further research is necessary to gain a deeper understanding of the underlying causes and to identify additional risk factors.

INTRODUCTION

Pregnancy spacing refers to the practice of maintaining an interval between births of two or more years. Inter pregnancy Interval-It is defined as the period between delivery of previous infant and conception of current pregnancy[1]. WHO has recommended the following to reduce the risk of adverse maternal and perinatal outcomes: After a live birth, the recommended minimum interval before attempting the next pregnancy is at least 24 months. After a miscarriage or induced abortion, the recommended interval to next pregnancy is at least six months[2]. This recommendation has further been extrapolated to the time between two consecutive live births of at least 33 months, considering the nine-month duration of pregnancy[4-8]. The adverse consequences of a short birth interval for infant and child survival have centered on three causal mechanisms: Biological effects related to "maternal depletion syndrome" or more generally the woman not recuperating from one pregnancy before supporting the next. Behavioral effects associated with competition between siblings or the inability to give a child adequate attention Disease transmission[3]. Women who conceive within short duration after a previous birth may face higher risks of adverse perinatal outcomes, including preterm birth (PTB)[9], low birth weight (LBW)[10] and small-for-gestational-age (SGA)[10]. Such adverse outcomes can result in both immediate and long-term health problems. For instance, babies born preterm are at increased risk of hospitalisation[11], early mortality[12], and long-term complications, such as developmental delays[13] and chronic health problems in later life[14]. In addition to posing a significant health burden on children, adverse perinatal outcomes can also have negative impacts on psycho social well-being of families and care givers as well as on health care resources[15,16]. The theoretical mechanisms between short inter-pregnancy/birth interval and adverse perinatal and neonatal outcomes relate to intermediating risk factors such as maternal nutritional depletion, folate depletion, horizontal and vertical transmission of infections, cervical insufficiency, sub-optimal breast feeding and sibling competition[17-19]. For instance, previous studies reported positive association between short inter pregnancy/birth interval and maternal anemia during pregnancy[20,21], reduced maternal serum and erythrocyte concentrations of folate[22], under-five morbidities, such as acute respiratory illness and diarrhoea[23,24] and the risk of congenital cytomegalovirus infection[25]. The maternal nutritional depletion hypothesis argues that short inter-pregnancy or birth intervals do not allow women to have sufficient time to fully recover from the preceding pregnancy[26]. The infection transmission (horizontal) hypothesis states that closely spaced pregnancies or births increase the likelihood of infections for the younger sibling, thereby elevating the risk of mortality[27,28]. Furthermore, sub-optimal breast feeding and sibling competition is also associated with a higher risk of adverse outcomes, including neonatal mortality, due to breast feeding-pregnancy overlap and reduced amount of breast milk for the younger siblings. The purpose of this study was to assess the feto maternal outcomes in short inter pregnancy intervals. The ideal inter pregnancy interval (IPI) may vary depending on the outcome of the preceding pregnancy. Both the World Health Organization (WHO) and the United States Agency for International Development (USAID) recommend waiting >two years after a live, full-term birth before conceiving again. These organizations also highlight that an IPI exceeding five years may elevate the risk of adverse outcomes. Specific guidelines apply to women who have experienced an induced or spontaneous abortion or a stillbirth, as well as those considering a trial of labor after cesarean (TOLAC). For pregnancies following a live birth, evidence increasingly indicates that an IPI of <18 months is associated with higher risks of perinatal and maternal complications. Conversely, an IPI of 18-24 months, which is frequently used as a benchmark, is linked to the lowest relative risk of adverse outcomes. Although the WHO recommends a two-year interval partly to align with UNICEF's two-year breast feeding guidelines and to simplify public health messaging, it may be more accurate to advocate for a minimum IPI of 18 months based on current data. Additionally, for women over 35, a minimum IPI of 12 months could help mitigate complications related to advanced maternal age.

Objectives: The primary objective of the study is to identify the adverse outcomes of short inter pregnancy interval and educating the mothers regarding the same.

Considerations after Abortion or Stillbirth: Guidelines for optimal IPI after a spontaneous or induced abortion have evolved. In 2005, the WHO reviewed available evidence and recommended that couples wait at least six months before attempting to conceive again after an abortion, based on a large-scale Latin American study. However, this study had limitations, including recall bias and a lack of distinction between induced and spontaneous abortions, which complicates causal interpretations. Recent research presents mixed findings. Love *et al.* found that conceiving within six months after a spontaneous abortion was associated with better outcomes, including lower rates of subsequent spontaneous abortions, preterm deliveries, cesarean sections and low birth weight (LBW) infants. On the other hand, Conde-Agudelo[29,30] extensive study reported that an IPI of <six months after either spontaneous or induced abortions significantly increased the risk of both maternal and perinatal adverse outcomes. Despite some recent reviews suggesting no minimum IPI is necessary based on studies by Love *et al.* and DaVanzo *et al.*, the substantial evidence from Conde-Agudelo *et al.* supports maintaining the WHO's recommendation of a six-month minimum IPI following an abortion. Data regarding the optimal IPI after a stillbirth remain limited and inconclusive. While some studies suggest that the risk of adverse outcomes does not significantly change with varying IPIs after a stillbirth, the evidence is not robust enough to deviate from the general recommendation of a six-month minimum IPI until larger studies provide more definitive insights.

Management Strategies: Currently, there are no universally accepted guidelines for managing pregnancies with short IPIs. It is recommended that the management be tailored to address the specific maternal and fetal risks identified. This might include:

- **Enhanced Fetal Surveillance:** Implementing biophysical profiles and detailed ultrasonography to screen for fetal anomalies associated with short IPIs.
- **Third-Trimester Ultrasounds:** Monitoring fetal growth to detect low birth weight (LBW) and other growth-related issues.
- **Cervical Length Assessments**: Evaluating the risk of preterm birth (PTB).

For women considering TOLAC after a short IPI, it is crucial to inform them about the increased risks of TOLAC failure and uterine rupture. Ultrasonographic measurements of the lower uterine segment may be beneficial, as thinning in this area has been linked to higher rupture risks. Women with a history of cesarean delivery should be counseled on these risks to make informed decisions about their subsequent pregnancies.

Summary: Assessing IPI as an independent risk factor for adverse pregnancy outcomes requires careful consideration of confounding variables. Early studies suggested that short IPIs might merely reflect underlying issues such as low socioeconomic status or lifestyle factors, which independently contribute to negative perinatal outcomes. However, recent research that controls for factors like residential neighborhood, education and marital status still finds short IPI to be an independent risk factor for poor outcomes. Additionally, the interaction between short IPI and maternal age has been a focus of recent studies, especially as the age of first-time mothers has increased in many developed countries. Findings indicate that short IPIs are more common among women having their first delivery after age 30, likely due to a desire to have more children before fertility declines. Importantly, short IPI and advanced maternal age independently contribute to higher risks of preterm birth (PTB) and LBW, without interacting with each other. The outcome of the previous pregnancy also serves as a potential confounder, influencing the risk of similar adverse outcomes in subsequent pregnancies. Nonetheless, short IPIs have been consistently shown to significantly increase the risk of PTB, LBW and small for gestational age (SGA) infants even after adjusting for multiple maternal reproductive factors, including the outcome of the most recent pregnancy. Future research is essential to further elucidate the optimal IPI for various pregnancy outcomes and to refine current guidelines to enhance maternal and neonatal health.

MATERIALS AND METHODS

Comparative Observational Study. Government R.S.R.M Lying-In Hospital, Government Stanley Medical College, Chennai. 10 months (February 2023-November 2023).

Study Sample: 115 Cases 115 Controls.

Inclusion Criteria: All pregnant women with previous pregnancy, irrespective of outcome of pregnancy who attend the ANC clinic-booked, unbooked and referred at our Institute.

Exclusion Criteria: Primigravidas.

Methodology: This was a cross-sectional study conducted in the Department of Obstetrics and Gynecology at Government R.S.R.M Lying-In Hospital, Government Stanley Medical College, Chennai, from February 2023 to November 2023 (10 months). The case group consisted of 115 women with a short inter pregnancy interval, while the control group comprised 115 women with a normal inter pregnancy interval. Participants were matched based on demographic characteristics such as age, height, weight and socioeconomic status. The study aimed to assess pregnancy outcomes along with maternal and fetal complications. Participants were informed about the nature of the study and informed consent was obtained in their own language. A detailed history was taken and routine investigation findings were noted. Complete information about the patients, including name, age, weight, blood pressure measurements, urine analysis and treatment history, was obtained from outpatient and inpatient records.

Sampling Technique: After data collection, the information was compiled and entered into a Microsoft Excel sheet. The analysis was performed using the Statistical software SPSS version 16. All continuous variables were expressed as mean and standard deviation, while categorical variables were expressed as percentages and proportions. The test was considered significant if p<0.05 at a 95% confidence interval.

RESULTS AND DISCUSSIONS

Table 1: Age Distribution Among the Groups

Age (years)	Short ICP (N=115)	Normal ICP (N=115)
≤20	15 (13)	2 (1.7)
21-30	88 (76.5)	75 (65.2)
31-40	12 (10.5)	38 (33.1)

(Table 1) represents the age distribution among two groups: In short ICP </=20 consist of 15 in short ICP and 2 participants were in normal ICP group. 21-30 comprises of 88 in short ICP and 75 in normal ICP group. 31-40 consists of 12 participants in short ICP group and 38 participants in normal ICP.

Table 2: Socio-Economic Status Distribution Among the Groups

Socio-economic status	Short ICP N=115 (%)	Normal ICP N=115 (%)	P value
Class - 3	34 (29.5)	41 (35.6)	0.522
Class - 4	58 (50.4)	56 (48.7)	
Class - 5	23 (20.1)	18 (15.7)	
Total	115 (100.0)	115 (100.0)	

(Table 2) represents the socio-economic status distribution between the short ICP and normal ICP groups. Among the short ICP group, 29.5% fall into Class 3, 50.4% in Class 4 and 20.1% in Class 5. In contrast, the normal ICP group has 35.6% in Class 3, 48.7% in Class 4 and 15.7% in Class 5.

Table 3: Booking Status Among the Groups

Booking status	Short ICP N=115 (%)	Normal ICP N=115 (%)	P value
Booked	106 (92.2)	110 (95.7)	0.269
Un booked	9 (7.8)	5 (4.3)	
Total	115 (100.0)	115 (100.0)	

(Table 3) represents booking status, revealing that 92.2% of the short ICP group were booked for care, compared to 95.7% in the normal ICP group. Unbooked patients accounted for 7.8% and 4.3%, respectively.

Table 4: Distribution of Gestational Diabetes Mellitus Among the Groups

Gestational diabetes mellitus	Short ICP N=115 (%)	Normal ICP N=115 (%)	P value
Yes	4 (3.5)	3 (2.6)	0.701
No	111 (96.5)	112 (97.4)	
Total	115 (100.0)	115 (100.0)	

(Table 4) represents the distribution of gestational diabetes mellitus among the groups, with 3.5% in the short ICP group and 2.6% in the normal ICP group indicating this condition.

Table 5: Distribution of Premature Rupture of Membranes Among the Groups

Premature rupture of membranes	Short ICP N=115 (%)	Normal ICP N=115 (%)	P value
Yes	21 (18.3)	9 (7.8)	0.018*
No	94 (81.7)	106 (92.2)	
Total	115 (100.0)	115 (100.0)	

*p value <0.05-statistically significant.

(Table 5) represents the distribution of premature rupture of membranes among the groups, reporting 18.3% in the short ICP group compared to 7.8% in the normal ICP group.

Table 6: Distribution of Oligohydramnios Among the Groups

Oligohydramnios	Short ICP N=115 (%)	Normal ICP N=115 (%)	P value
Yes	4 (3.5)	6 (5.2)	0.517
No	111 (96.5)	109 (94.8)	
Total	115 (100.0)	115 (100.0)	

(Table 6) represents the distribution of oligohydramnios among the groups, revealing that 3.5% of the short ICP group had this condition, whereas 5.2% were noted in the normal ICP group.

Table 7: Distribution of Scar Dehiscence Among the Groups

Scar dehiscence	Short ICP N=115 (%)	Normal ICP N=115 (%)	P value
Yes	19 (16.5)	4 (3.5)	0.0009*
No	96 (83.5)	111 (96.5)	
Total	115 (100.0)	115 (100.0)	

*p value <0.05-statistically significant.

(Table 7) represents data on scar dehiscence, where 16.5% of the short ICP group experienced it, compared to just 3.5% in the normal ICP group.

Table 8: Distribution of Mode of Delivery Among the Groups

Mode of delivery	Short ICP N=115 (%)	Normal ICP N=115 (%)	P value
LSCS	59 (51.3)	51 (44.3)	.0001*
NVD	55 (47.8)	57 (49.6)	
VBAC	1 (0.9)	7 (6.1)	
Total	115 (100.0)	115 (100.0)	

*p value <0.05-statistically significant.

(Table 8) represents the distribution of mode of delivery among the groups, indicating that 51.3% of the short ICP group underwent cesarean section (LSCS), while 44.3% of the normal ICP group had this procedure.

Table 9: Indication of LSCS Among the Groups

Indication of LSCS	Short ICP N=59 (%)	Normal ICP N=51 (%)
APH	3 (5)	3 (5.8)
CPD	8 (13.5)	4 (7.8)
Failure of induction	2 (3.4)	1 (1.9)
Failure to progress	4 (6.7)	5 (9.8)
Fetal distress	8 (13.5)	5 (9.8)
Malpresentation	4 (6.7)	7 (13.7)
Scar dehiscence	28 (47.4)	24 (47.1)
Twins	2 (3.4)	2 (3.9)
Total	59 (100.0)	51 (100.0)

Table 10: Gestational Age at Delivery Among the Groups

Term status	Short ICP N=115 (%)	Normal ICP N=115 (%)	P value
NICU (with Preterm)	21 (18.3)	10 (8.7)	**0.013***
Preterm	16 (13.9)	8 (7.0)	
Term	78 (67.8)	97 (84.3)	
Total	115 (100.0)	115 (100.0)	

*p value <0.05-statistically significant.

(Table 10) represents the term status among the groups, revealing that 18.3% of the short ICP group required NICU admission, compared to 8.7% in the normal ICP group, with 67.8% of short ICP patients being full-term.

Table 11: Fetal Birth Weight Among the Groups

Fetal birth weight	Short ICP N=115 (%)	Normal ICP N=115 (%)	P value
AGA	83 (72.2)	94 (81.7)	**0.013***
LBW	29 (25.2)	13 (11.3)	
LGA	3 (2.6)	8 (7.0)	
Total	115 (100.0)	115 (100.0)	

*p value <0.05-statistically significant.

(Table 11) represents fetal birth weight distribution, where 72.2% of the short ICP group were classified as appropriate for gestational age (AGA), compared to 81.7% in the normal ICP group.

Table 12: NICU Admission Among the Groups

NICU admission	Short ICP N=115 (%)	Normal ICP N=115 (%)	P value
Yes	21 (18.3)	10 (8.7)	**0.033***
No	94 (81.7)	105 (91.3)	
Total	115 (100.0)	115 (100.0)	

*p value <0.05-statistically significant.

(Table 12) represents the NICU admissions, showing that 18.3% of the short ICP group required NICU care, higher than the 8.7% in the normal ICP group.

Table 13: Reason for NICU Admission Among the Groups

Reason for NICU admission	Short ICP N=21 (%)	Normal ICP N=10 (%)
Anomalous baby	3 (14.3)	1 (10)
Big baby	1 (4.7)	2 (20)
Hyperbilirubinemia	2 (9.5)	2 (20)
LBW	6 (28.5)	1 (10)
PROM	5 (23.8)	1 (10)
Respiratory distress	4 (19)	3 (30)
Total	21 (100.0)	10 (100.0)

(Table 13) represents the reasons for NICU admission, with LBW being the most common reason in the short ICP group at 28.5%, compared to 10% in the normal ICP group.

In the present study the mean age in patients with short ICP was 27.45±3.75 and in patients with normal ICP was 28.47±3.31 years and the difference between both the groups had statistical significance. In various studies, majority of the study participants were between the age of 25-30 years. (72). Majority of the patients in both the groups were in class-4 socioeconomic status. Among the patients, majority of the patients who had normal ICP were booked, compared to patients who had short ICP. Among the groups, 67.8% patients in short ICP group had anemia and 43.5% of the patients who were in normal ICP group had anemia. The National Family Health Survey (2015-2016) estimated the incidence of anemia among pregnant women in India to be 50%. (73) In a study done by Preeti Lewis *et al.,* the incidence of anemia was notably higher at 66% among women with a short inter pregnancy interval, compared to 52% among those with a normal inter pregnancy interval. (72). Among the groups, 7% patients in short ICP group had gestational hypertension and 21.7% of the patients who were in normal ICP group had gestational hypertension. Hypertensive disorders of pregnancy are linked to both short (<12 months) and long (>72 months) inter pregnancy intervals. These disorders can complicate 3-10% of all pregnancies, with varying incidence rates across different hospitals and countries. In a study done by Preeti Lewis *et al.*, the incidence of hypertensive disorders was 6.8% in women with a short inter pregnancy interval and 19.2% in those with a normal inter pregnancy interval. (72). Among the groups, 3.5% patients in short ICP group had Gestational diabetes mellitus and 2.6% of the patients who were in normal ICP group had gestational diabetes mellitus. 18.3% patients in short ICP group had premature rupture of membranes, and 7.8% of the patients who were in normal ICP group had premature rupture of membranes. 3.5% patients in short ICP group had Oligohydramnios and 5.2% of the patients who were in normal ICP group had Oligohydramnios. There was no difference in both the groups in concern with post datism, where 7 (6.1%) patients in both the groups had post datism deliveries. There was increased cases of scar dehiscence in short ICP patients with 16.5% and 3.5% of the patients had scar dehiscence in normal ICP patients. Several studies have shown that women with shorter inter pregnancy intervals are at a higher risk of maternal mortality, hypertensive disorders of pregnancy, bleeding and anemia. (74) Research conducted in developing countries recommends an optimal inter pregnancy interval of 3-5 years (75). The incidence of uterine scar dehiscence ranges from 0.2-4.3% in pregnancies following a previous cesarean section. In a study done by Preeti lewis *et al.,* scar dehiscence was observed in up to 16% of patients with a prior cesarean and a short inter pregnancy interval (72). Comparable studies have reported a 65% incidence of scar dehiscence in women with an inter pregnancy interval of <18 months, compared to only 6.66% in those with an interval of

>24 months. (76). 51.3% of the patients had LSCS in short ICP group and 44.3% of the patients had LSCS in normal ICP group. Majority of the patients in normal ICP group has normal vaginal delivery with 49.6%. 7 patients had VBAC delivery in normal ICP group and 1 patient had VBAC in short ICP. A longer inter pregnancy interval after a cesarean section is associated with better scar quality. In this study, scar dehiscence was observed in up to 6% of women with a normal inter pregnancy interval. In short ICP group, 18.3% of the babies had NICU admission, 13.9% of them had pre term and 67.8% were term. In normal ICP group, 8.7% of the babies had NICU admission, 7% of them had preterm and 84.3% of them had term babies. The incidence of preterm labor has been reported to range between 5.8% and 7-9% in various studies. In study done by Preeti lewis *et al.,* 17.6% of patients experienced preterm labor, highlighting short inter pregnancy interval as a significant risk factor. In contrast, only 9.6% of patients with a normal inter pregnancy interval went into preterm labor. (1) The prevalence of low birth weight in developing countries (16.5%) is more than double that of developed regions (7%). (77). In short ICP group, 72.2% of the babies were AGA, 25.2% of them had LBW babies and 2.6% were LGA babies. In normal ICP group, 81.7% of the babies were AGA, 11.3 % of them had LBW babies and 7% of them had term babies. In a study done in Maharashtra, 20.8% of patients with a short inter pregnancy interval delivered low birth weight babies, compared to 11% of those with a normal inter pregnancy interval. (78). A short inter pregnancy interval is linked to a higher incidence of anemia, preterm labor, scar dehiscence and low birth weight babies. Conversely, hypertensive disorders are more frequently observed in women with a normal inter pregnancy interval. (79).

Summary: In the present study, the mean age of patients with a short inter pregnancy interval (IPI) was 27.45±3.75 years, while those with a normal IPI averaged 28.47±3.31 years, with a statistically significant difference between the two groups. Most participants were aged 25-30 years and the majority from both groups belonged to the class 4 socioeconomic status. A notable observation was that a higher proportion of patients in the normal IPI group were booked for antenatal care compared to those with a short IPI. Anemia was prevalent in 67.8% of the short IPI group, compared to 43.5% in the normal IPI group. The National Family Health Survey (2015-2016) reported a 50% incidence of anemia among pregnant women in India. Supporting this, a study by Preeti Lewis et al. found a higher incidence of anemia among women with a short IPI (66%) compared to those with a normal IPI (52%). Regarding gestational hypertension, 7% of the short IPI group experienced this condition, contrasted with 21.7% in the normal IPI group. Hypertensive disorders are associated with both short (<12 months) and long (>72 months) IPIs, complicating 3-10% of pregnancies. Preeti Lewis *et al.* reported a 6.8% incidence of hypertensive disorders among women with a short IPI, compared to 19.2% with a normal IPI. The study also found that 3.5% of patients in the short IPI group had gestational diabetes mellitus, while the figure was 2.6% for the normal IPI group. Additionally, 18.3% of the short IPI group experienced premature rupture of membranes, compared to 7.8% in the normal IPI group. The incidence of oligohydramnios was 3.5% in the short IPI group and 5.2% in the normal IPI group. Both groups had similar rates of postdatism, with 6.1% experiencing this complication. Scar dehiscence was notably higher in the short IPI group at 16.5%, compared to 3.5% in the normal IPI group. Previous studies indicate that shorter inter pregnancy intervals increase the risk of maternal mortality, hypertensive disorders, bleeding, and anemia. Research suggests an optimal inter pregnancy interval of 3-5 years. Scar dehiscence rates after a cesarean section vary, with some studies reporting a 65% incidence in women with an interval of <18 months. In terms of delivery methods, 51.3% of patients in the short IPI group underwent lower segment cesarean section (LSCS), while 44.3% in the normal IPI group had LSCS. The majority of women in the normal IPI group had normal vaginal deliveries (49.6%). The study also observed that 18.3% of infants in the short IPI group required NICU admission, compared to 8.7% in the normal IPI group. Preterm labor was reported in 17.6% of the short IPI group versus 9.6% of the normal IPI group, emphasizing the short IPI as a significant risk factor. The incidence of low birth weight was also higher in the short IPI group, with 25.2% of babies classified as low birth weight compared to 11.3% in the normal IPI group. Overall, the findings suggest that short inter pregnancy intervals are associated with higher rates of anemia, preterm labor, scar dehiscence and low birth weight. In contrast, hypertensive disorders were more commonly observed in the normal IPI group, highlighting the need for careful management and planning of pregnancy intervals to optimize maternal and neonatal outcomes.

CONCLUSION

Our findings highlight the importance of targeted interventions and educational programs to promote optimal inter pregnancy intervals (IPI) and enhance maternal and child health outcomes in the region. Further research is necessary to gain a deeper understanding of the underlying causes and to identify additional risk factors. The results underscore the need for targeted public health interventions, including educational programs aimed at promoting optimal birth spacing. By encouraging longer inter pregnancy intervals of 18-24 months, healthcare providers can potentially reduce the risks of adverse outcomes like anemia, preterm birth and low birth weight. Further research is recommended to better understand the complex mechanisms contributing to these risks and to explore additional factors that may influence feto maternal outcomes. Addressing these issues could lead to improved maternal and child health in regions with high rates of short IPI pregnancies.

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