

Maternal Outcomes Associated with Short Birth–Pregnancy Interval: A Prospective Observational Study at a Tertiary Care Centre in South Gujarat

Gatha Gadhvi [1*], Saral Bhatia [2], Bhoomika Chaudhari [3], Charu Bararia [4], Pinal Pipalava [5]
[1-5] Department of Obstetrics and Gynaecology, Government Medical College and New Civil Hospital, Surat, Gujarat, India

* Corresponding Author: **Gatha Gadhvi**

Article Info

P-ISSN: 3051-3367
E-ISSN: 3051-3375
Volume: 2
Issue: 4
Received: 08-08-2026
Accepted: 06-09-2026
Published: 04-10-2026
Page No: 07-10

Abstract

Background: A short birth–pregnancy interval (BPI) may limit maternal recovery after childbirth and is associated with concern for maternal morbidity. This study evaluated maternal outcomes among women with BPI <24 months and assessed associations across three BPI categories.

Methods: This prospective observational study included 300 women with BPI <24 months who delivered at ≥28 weeks of gestation at a tertiary care centre in South Gujarat. Participants were grouped as BPI <12 months, 12–17 months, or 18–23 months. Maternal outcomes were recorded from admission through delivery and hospital discharge. Associations were assessed using Pearson's chi-square test; $p<0.05$ was considered statistically significant.

Results: Mean maternal age was 24.65±4.00 years. The BPI groups comprised 82 (27.3%), 126 (42.0%) and 92 (30.7%) women, respectively. Anaemia affected 237 (79.0%) women; moderate anaemia was most common (42.0%). Anaemia grade was associated with BPI category ($\chi^2=24.965$, df=6, $p<0.001$). Maternal infection was recorded in 176 (58.7%) women, but infection category was not significantly associated with BPI ($\chi^2=8.015$, df=6, $p=0.237$). PROM ($p=0.660$), hypertension ($p=0.500$) and mode of delivery ($p=0.848$) were also not significantly associated. PPH occurred in 8 (2.7%) women ($\chi^2=15.109$, df=2, $p<0.001$), and puerperal sepsis in 7 (2.3%) women ($\chi^2=19.054$, df=2, $p<0.001$); all sepsis cases occurred in the <12-month group. No maternal deaths were recorded.

Conclusions: Anaemia was common, and significant associations with BPI category were observed for anaemia, PPH and puerperal sepsis. These findings require cautious interpretation because the study included only women with BPI <24 months and several outcomes had sparse cell counts.

DOI: https://doi.org/10.54660/.IJCOGN.2026.2.4.07-10

Keywords: Birth–pregnancy interval, maternal morbidity, anaemia, postpartum haemorrhage, puerperal sepsis, pregnancy spacing

Introduction

Birth–pregnancy interval (BPI), often termed the interpregnancy interval, is the time between a previous birth and conception of the subsequent pregnancy. Adequate spacing may allow maternal physiological recovery and replenishment of nutritional reserves following pregnancy, childbirth and lactation. The World Health Organization has recommended waiting at least 24 months after a live birth before attempting another pregnancy, based on evidence concerning maternal, perinatal and infant outcomes.[1]

Short intervals have been investigated in relation to maternal anaemia, hypertensive disorders, infection, haemorrhage and other adverse outcomes. Proposed mechanisms include incomplete nutritional recovery and the influence of social, reproductive and

obstetric factors. However, evidence for individual maternal outcomes is heterogeneous, and findings may differ by population, outcome definition and study design. [2, 3]

Data describing maternal outcomes across different categories of short BPI remain important in settings where anaemia and closely spaced pregnancies are common. This study aimed to evaluate maternal outcomes among women with BPI <24 months at a tertiary care centre in South Gujarat and to examine associations between BPI category and selected maternal outcomes.

Methods

Study Design and Setting

A prospective observational study was conducted in the Department of Obstetrics and Gynaecology at New Civil Hospital, Government Medical College, Surat, a tertiary care centre in South Gujarat. The study period and Institutional Ethics Committee approval details should be inserted in the final submission: [insert study dates] and [insert IEC approval number/date]. Written informed consent was obtained from participants.

Participants and Study Groups

The study included 300 pregnant women with BPI <24 months who delivered at or beyond 28 weeks of gestation and provided written informed consent. Women with BPI ≥24 months, primigravidae, women with a history of spontaneous or induced abortion that could alter the interval definition, and women who did not consent or did not meet eligibility criteria were excluded. Consecutive eligible women presenting to the labour room were approached and enrolled using purposive sampling.

Participants were classified into three groups: BPI <12 months (Group I), 12–17 months (Group II), and 18–23 months (Group III). Participants were followed from admission through delivery and hospital discharge.

Variables and Outcomes

Maternal variables included age, haemoglobin concentration, anaemia grade, premature rupture of membranes (PROM), maternal infection category, hypertension, mode of delivery, antepartum haemorrhage (APH), postpartum haemorrhage (PPH) and puerperal sepsis. Maternal infection categories in the master chart were urinary tract infection (UTI), candidiasis, other infections, and no recorded infection.

Statistical Analysis

Data were tabulated as frequencies and percentages. Associations between BPI category and categorical outcomes were assessed using Pearson's chi-square test, with $p<0.05$ considered statistically significant. Because some outcomes had very small counts and expected frequencies below five, the corresponding chi-square results should be interpreted cautiously; exact tests or suitable regression methods may be preferable for sparse outcomes. No multivariable adjustment was performed.

Results

A total of 300 women were included. Mean maternal age was 24.65±4.00 years and mean haemoglobin concentration, recalculated from the master chart, was 10.06±1.21 g/dL. Eighty-two women (27.3%) had BPI <12 months, 126 (42.0%) had BPI 12–17 months and 92 (30.7%) had BPI 18–23 months.

Table 1: Distribution of BPI categories and maternal outcomes

Variable	Category	n (%)
BPI category	<12 months	82 (27.3)
	12–17 months	126 (42.0)
	18–23 months	92 (30.7)
Anaemia grade	Normal	63 (21.0)
	Mild	104 (34.7)
	Moderate	126 (42.0)
	Severe	7 (2.3)
PROM	Yes	56 (18.7)
	No	244 (81.3)
Maternal infection	UTI	14 (4.7)
	Candidiasis	10 (3.3)
	Other infections	152 (50.7)
	No recorded infection	124 (41.3)
Hypertension	Yes	10 (3.3)
	No	290 (96.7)
Mode of delivery	Vaginal	163 (54.3)
	LSCS	128 (42.7)
	Instrumental	9 (3.0)
APH	Yes	1 (0.3)
PPH	Yes	8 (2.7)
Puerperal sepsis	Yes	7 (2.3)
Maternal death	No deaths	0 (0.0)

Anaemia was the most common maternal morbidity: 237 (79.0%) women had anaemia, including 104 (34.7%) with mild, 126 (42.0%) with moderate and 7 (2.3%) with severe anaemia. Anaemia grade was significantly associated with BPI category ($\chi^2=24.965$, df=6, $p<0.001$). All seven cases of severe anaemia occurred in the <12-month group.

Table 2: Anaemia grade by BPI category

Anaemia grade	<12 months (n=82)	12–17 months (n=126)	18–23 months (n=92)	Total
Normal	19 (23.2%)	28 (22.2%)	16 (17.4%)	63
Mild	21 (25.6%)	52 (41.3%)	31 (33.7%)	104
Moderate	35 (42.7%)	46 (36.5%)	45 (48.9%)	126
Severe	7 (8.5%)	0	0	7
Total	82 (100%)	126 (100%)	92 (100%)	300

Pearson $\chi^2=24.965$, df=6, $p<0.001$. Sparse expected counts in the severe-anaemia row warrant cautious interpretation.

PROM occurred in 56 (18.7%) women and was not significantly associated with BPI category ($\chi^2=0.830$, df=2, p=0.660). Hypertension occurred in 10 (3.3%) women and was also not significantly associated with BPI ($\chi^2=1.385$, df=2, p=0.500).

Maternal infection was recorded in 176 (58.7%) women. The master chart contained 124 blank entries in the infection field; these were interpreted as no recorded infection, consistent with the overall dataset categorization. The infection distribution was not significantly associated with BPI category ($\chi^2=8.015$, df=6, p=0.237).

Table 3: Maternal infection category by BPI group

Infection category	<12 months (n=82)	12–17 months (n=126)	18–23 months (n=92)	Total
UTI	4 (4.9%)	9 (7.1%)	1 (1.1%)	14 (4.7%)
Candidiasis	1 (1.2%)	6 (4.8%)	3 (3.3%)	10 (3.3%)
Other infections	47 (57.3%)	59 (46.8%)	46 (50.0%)	152 (50.7%)
No recorded infection	30 (36.6%)	52 (41.3%)	42 (45.7%)	124 (41.3%)
Total	82 (100%)	126 (100%)	92 (100%)	300 (100%)

Pearson χ^2=8.015, df=6, p=0.237.

Vaginal delivery was the most common mode of delivery (163; 54.3%), followed by LSCS (128; 42.7%) and instrumental delivery (9; 3.0%). Mode of delivery was not significantly associated with BPI category (χ^2=1.376, df=4, p=0.848). APH occurred in one woman (0.3%); the association with BPI was not significant (χ^2=2.667, df=2, p=0.263), but expected cell counts were very low.

PPH occurred in eight women (2.7%): seven (8.5% of the <12-month group) had BPI <12 months and one (0.8% of the 12–17-month group) had BPI 12–17 months; no cases occurred in the 18–23-month group. The association was statistically significant (χ^2=15.109, df=2, p<0.001). Puerperal sepsis occurred in seven women (2.3%), all in the <12-month group (8.5%); the association was statistically significant (χ^2=19.054, df=2, p<0.001). These tests are limited by sparse event counts.

Table 4: Rare maternal outcomes by BPI category

Outcome	<12 months (n=82)	12–17 months (n=126)	18–23 months (n=92)	Total
APH	1 (1.2%)	0	0	1 (0.3%)
PPH	7 (8.5%)	1 (0.8%)	0	8 (2.7%)
Puerperal sepsis	7 (8.5%)	0	0	7 (2.3%)

APH: χ^2=2.667, df=2, p=0.263; PPH: χ^2=15.109, df=2, p<0.001; puerperal sepsis: χ^2=19.054, df=2, p<0.001. Interpret tests cautiously because of sparse cells.

Discussion

In this cohort of 300 women with BPI <24 months, anaemia was common, affecting 79.0% of participants. Statistically significant associations with BPI category were observed for anaemia grade, PPH and puerperal sepsis. Maternal infection, PROM, hypertension and mode of delivery did not show significant associations. The findings describe differences within the short-BPI range and do not directly compare short spacing with an interval of 24 months or longer.

Anaemia

The high prevalence of anaemia and the concentration of all severe cases in the <12-month group are clinically notable. Pregnancy and lactation may deplete iron and other nutritional reserves, and a short interval may limit the time available for recovery. A systematic review has identified maternal nutritional depletion as one proposed mechanism linking short birth intervals with adverse outcomes.[2] Evidence from observational studies and reviews has also suggested an association between short interpregnancy intervals and maternal anaemia, although results may be affected by nutritional status, supplementation, socioeconomic conditions and antenatal care. [3, 4] The present study did not adjust for these factors; therefore, causality cannot be inferred.

Maternal Infection

Although 58.7% of participants had an infection category recorded, the distribution was not significantly associated with BPI (p=0.237). This corrects the earlier interpretation based on a discrepant table. Infection is multifactorial and may be influenced by hygiene, socioeconomic circumstances, antenatal-care utilization and underlying comorbidities. The broad "other infections" category limits clinical interpretation, and the result should not be taken to establish either the presence or absence of a causal effect of BPI on infection risk.

PPH and Puerperal Sepsis

PPH and puerperal sepsis were uncommon but clustered in the <12-month group. These associations reached statistical significance; however, only eight PPH events and seven sepsis events occurred. Sparse cell counts can make Pearson chi-square approximations unreliable and produce unstable estimates. The results should therefore be considered exploratory and ideally reanalysed using exact methods. Larger studies with adjustment for parity, previous caesarean delivery, anaemia, labour characteristics and other relevant confounders are needed before attributing these outcomes independently to short BPI.

Other Maternal Outcomes

PROM and hypertension were not significantly associated with BPI category. Vaginal delivery was the most common delivery mode, and mode of delivery did not differ significantly across the three groups. APH was observed in only one participant, so no reliable inference regarding its association with BPI is possible. No maternal deaths occurred; the sample size was not designed to assess maternal mortality.

Clinical Implications

The results highlight the need for postpartum family-planning counselling, assessment and treatment of anaemia, and appropriate antenatal and intrapartum surveillance for women presenting with a short BPI. WHO recommends waiting at least 24 months after a live birth before attempting the next pregnancy. [1] Counselling should be individualized and respectful of each patient's reproductive goals. Because this study lacked a ≥24-month comparison group and did not use multivariable modelling, its findings should not be interpreted as proof that short BPI independently causes the observed complications.

Limitations

This was a single-centre observational study using purposive sampling, which limits generalizability and permits selection bias. All participants had BPI <24 months; no comparison group with BPI ≥24 months was included. Potential confounders, including nutrition, iron supplementation, breastfeeding duration, socioeconomic factors, antenatal-care use and previous obstetric history, were not adjusted for. Several outcomes were rare, resulting in sparse contingency-table cells and uncertain chi-square approximations. The "other infections" category was broad, and missing entries in the infection column were treated as no recorded infection based on the master chart's category totals. The study assessed short-term outcomes only and did not evaluate longer-term maternal health.

Conclusion

Among women with BPI <24 months, anaemia was highly prevalent and its severity was associated with BPI category. PPH and puerperal sepsis also showed significant associations, with cases concentrated in the <12-month group, although the small event counts require cautious interpretation. Maternal infection, PROM, hypertension and mode of delivery were not significantly associated with BPI category. These findings support postpartum counselling, anaemia prevention and treatment, and careful obstetric assessment, but larger comparative studies with optimal-spacing controls and appropriate adjustment are required to determine independent associations.

Declarations

Funding: No external funding was reported; confirm before submission.

Conflict of interest: The authors should confirm that no conflicts of interest exist.

Ethical approval: Insert the Institutional Ethics Committee name, approval number and date before submission.

Informed consent: Written informed consent was obtained from participants.

Data availability: The de-identified data supporting the findings may be made available from the corresponding author on reasonable request, subject to institutional policy.

Author contributions: To be completed by the authors according to the journal's requirements.

Corresponding author: Insert corresponding author name and email.

References

1. World Health Organization. Report of a WHO Technical Consultation on Birth Spacing. Geneva: World Health Organization; 2007.
2. Conde-Agudelo A, Rosas-Bermúdez A, Kafury-Goeta AC, Norton MH. Effects of birth spacing on maternal, perinatal, infant, and child health: a systematic review of causal mechanisms. Am J Obstet Gynecol. 2012;207(1):1-14.
3. Hutcheon JA, Nelson HD, Stidd R, Moskosky S, Ahrens KA. Short interpregnancy intervals and adverse maternal outcomes in high-resource settings: an updated systematic review. Paediatr Perinat Epidemiol. 2019;33(1):O48-O59.
4. Jani HT, Sud S, Jeyaseelan S. Impact of interpregnancy interval on maternal and perinatal outcomes. Int J Reprod Contracept Obstet Gynecol. 2023;12(10):2986-2992. doi:10.18203/2320-1770.ijrcog20232934.
5. Conde-Agudelo A, Rosas-Bermúdez A, Kafury-Goeta AC. Effects of birth spacing on maternal health: a systematic review. Am J Obstet Gynecol. 2007;196(4):297-308.

How to Cite This Article

Gadhvi G, Bhatia S, Chaudhari B, Bararia C, Pipalava P. Maternal outcomes associated with short birth–pregnancy interval: a prospective observational study at a tertiary care centre in South Gujarat. International Journal of Clinical Obstetrics and Gynaecology Nexovation. 2026;2(4):7–10. doi:10.54660/.IJCOGN.2026.2.4.07-10.

Creative Commons (CC) License

This is an open access journal, and articles are distributed under the terms of the Creative Commons Attribution NonCommercial-ShareAlike 4.0 International (CC BY-NC-SA 4.0) License, which allows others to remix, tweak, and build upon the work non-commercially, as long as appropriate credit is given and the new creations are licensed under the identical terms