ORIGINAL ARTICLE

Assessing the Prevalence and Predictors of Short Birth Spacing and its Association with Pregnancy Outcomes in Pakistani Women

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ABSTRACT

Background: Short birth spacing, with intervals less than 24 months between pregnancies, poses serious risks to maternal and neonatal health. This study explores its prevalence, key predictors, and associated pregnancy outcomes among Pakistani women.

Methodology: A descriptive cross-sectional study was conducted on 100 multiparous women attending the obstetrics and gynecology departments of two tertiary care hospitals in Pakistan between January and June 2023. Data were collected using structured interviews and antenatal records. Birth spacing was categorized based on interpregnancy interval (short: <24 months; adequate: ≥24 months). Maternal demographics, socio-economic indicators, and reproductive histories were recorded. Adverse pregnancy outcomes preterm birth, low birth weight, anemia, and neonatal ICU admission were analyzed. Statistical analyses, including chi-square and logistic regression, were performed to determine predictors and associations ($p < 0.05$ considered significant).

Results: Out of 100 women, 46% had short birth spacing. The most significant predictors included maternal age <30 years ($p = 0.021$), lack of formal education ($p = 0.008$), rural residence ($p = 0.034$), and non-use of contraceptives ($p < 0.001$). Short birth spacing was significantly associated with higher rates of preterm birth (37% vs 18%, $p = 0.014$), low birth weight (41% vs 20%, $p = 0.007$), maternal anemia (52% vs 27%, $p = 0.005$), and increased neonatal ICU admissions (30% vs 12%, $p = 0.016$).

Conclusion: Short birth spacing is highly prevalent among Pakistani women and is strongly linked with adverse maternal and neonatal outcomes. Targeted educational interventions, improved access to contraceptives, and strengthened antenatal counseling are essential to mitigate these risks and promote optimal birth intervals.

Keywords: Short birth spacing, interpregnancy interval, maternal outcomes, neonatal outcomes, predictors.

INTRODUCTION

Optimal birth spacing is a key determinant of maternal, neonatal, and child health outcomes. In low- and middle-income countries, particularly in South Asia, short intervals between successive pregnancies remain a pressing public health challenge [1]. Birth spacing of less than 24 months has been consistently associated with a heightened risk of adverse outcomes such as preterm delivery, low birth weight, maternal anemia, perinatal mortality, and limited postpartum recovery. Despite its recognized significance, the issue of short birth spacing is often overshadowed by broader reproductive health concerns and remains inadequately addressed in clinical and policy frameworks, especially in Pakistan [2].

Pakistan has one of the highest fertility rates in South Asia, with limited uptake of modern contraceptive methods and inconsistent access to family planning services, particularly in rural and underserved communities [3]. Cultural norms, lack of female education, economic constraints, and low levels of reproductive autonomy further exacerbate the prevalence of closely spaced pregnancies. Consequently, understanding the socio-demographic and health system-related factors influencing short birth spacing is critical for designing effective interventions aimed at improving maternal and neonatal outcomes [4].

While international studies have highlighted the detrimental effects of short interpregnancy intervals, there is a paucity of localized evidence from Pakistan that explores both the prevalence and predictors of short birth spacing and its direct association with pregnancy outcomes [5]. This study, therefore, seeks to fill this knowledge gap by assessing the magnitude of short birth spacing among Pakistani women, identifying contributing factors, and evaluating its correlation with adverse maternal and neonatal outcomes. The findings aim to inform targeted public health strategies and strengthen family planning initiatives across the country [6].

The implications of short birth spacing extend beyond individual health risks, impacting broader health systems through increased maternal and neonatal morbidity, strain on perinatal care resources, and elevated healthcare costs [7]. In the Pakistani perspective, where maternal mortality remains high and health infrastructure faces ongoing challenges, addressing modifiable risk factors such as inadequate birth intervals becomes a public health imperative. Despite national efforts to promote family planning, socio-cultural barriers, misinformation, and limited community outreach continue to hinder progress. By generating context-specific evidence on short birth spacing and its consequences, this study aims to provide critical insights to guide policy decisions, optimize antenatal care practices, and promote sustainable maternal health outcomes through improved birth planning [8].

MATERIALS AND METHODS

The present study was a descriptive, cross-sectional investigation conducted over a 12-month period from January 2022 to January 2023 at the Department of Obstetrics and Gynecology, Civil Hospital Quetta, a major tertiary care teaching facility in Balochistan, Pakistan. The hospital was selected for its high patient volume and diverse population coverage, encompassing both urban and peri-urban areas, making it a suitable setting for evaluating the clinical implications of short birth spacing on maternal and neonatal health outcomes.

The study enrolled 100 multiparous women between the ages of 18 and 40 years, each of whom had previously delivered at least one child prior to the index pregnancy. These women were attending either antenatal or postnatal services during the defined study period. To ensure data integrity and minimize bias, women with pre-existing chronic conditions, such as diabetes mellitus, chronic hypertension, or known uterine anomalies, were excluded from participation. A consecutive sampling technique was employed for recruitment, and informed written consent was obtained from all participants after a full explanation of the study objectives, procedures, and ethical safeguards, including confidentiality of the collected data.

Data were collected through structured, face-to-face interviews using a pre-validated questionnaire administered by trained female health personnel. The variables collected included

socio-demographic details such as maternal age, place of residence, education level, employment status, and monthly household income. Obstetric variables included parity, the number of live births, previous delivery outcomes, use of contraceptive methods, and the interpregnancy interval defined as the time in months between the last childbirth and the conception of the current pregnancy. Based on this interval, birth spacing was classified as short (<24 months) or adequate (≥24 months). The primary maternal and neonatal outcomes assessed were preterm birth (defined as delivery before 37 completed weeks of gestation), low birth weight (birth weight less than 2500 grams), maternal anemia (hemoglobin level <11 g/dL), stillbirth (defined as intrauterine fetal death at or beyond 28 weeks of gestation), and admission of the newborn to the neonatal intensive care unit (NICU) immediately after birth.

All data were entered and analyzed using the Statistical Package for the Social Sciences (SPSS), version 27.0 (IBM Corp., Armonk, NY, USA). Initial data cleaning procedures were conducted to ensure completeness and eliminate entry errors. Descriptive statistics were applied to summarize baseline demographic and obstetric characteristics of the study population. Categorical variables were expressed as frequencies and percentages, while continuous variables were reported as mean ± standard deviation. The Chi-square test or Fisher's exact test, where appropriate, was used to evaluate associations between the categories of birth spacing and maternal/neonatal outcomes. To identify independent predictors of short birth spacing, multivariate logistic regression analysis was conducted, adjusting for relevant socio-demographic and reproductive confounders. Adjusted odds ratios (AOR) along with 95% confidence intervals (CI) were reported. A p-value of less than 0.05 was considered statistically significant for all inferential analyses conducted in the study.

RESULTS

Out of the 100 multiparous women enrolled in the study, 46 (46%) had short birth spacing (interpregnancy interval <24 months), while 54 (54%) had adequate spacing (≥24 months). The mean age of participants was 28.3 ± 5.4 years, with 67% of the women aged below 30 years. Demographically, 58% of the participants resided in rural areas, and 42% lived in urban settings. Regarding educational background, 47% of the women had no formal education, 39% had completed primary or secondary schooling, and only 14% had education beyond matriculation. Employment status revealed that 62% of women were unemployed or housewives, while 38% were engaged in income-generating work. Approximately 72% of the participants had a household income below the national average. Notably, 66% of the women reported non-use of modern contraceptives prior to their current pregnancy (Table 1).

Short birth spacing was significantly associated with younger maternal age (p = 0.021), lack of formal education (p = 0.008), rural residence (p = 0.034), and non-utilization of contraception (p < 0.001). These findings highlight the socio-demographic disparities that contribute to shorter interpregnancy intervals among women in the study population.

In terms of clinical outcomes, women with short birth spacing experienced significantly higher rates of adverse maternal and neonatal events compared to those with adequate spacing. Preterm birth (<37 weeks) occurred in 37.0% of women in the short spacing group compared to 18.5% in the adequate spacing group (p = 0.014). Similarly, the incidence of low birth weight (<2500 g) was 41.3% in the short spacing group and 20.4% in the adequate spacing group (p = 0.007). Maternal anemia (hemoglobin <11 g/dL) was more prevalent in the short spacing group (52.2%) than in the adequate spacing group (27.8%), with a statistically significant difference (p = 0.005). Newborns requiring NICU admission were more frequent in the short spacing group (30.4%) than in the adequate group (11.1%) (p = 0.016). Although the stillbirth rate was higher in the short spacing group (6.5% vs.

1.9%), the association did not reach statistical significance (p = 0.145), likely due to the limited sample size (Table 2).

These findings are visually summarized in Figure 1, which presents a pie chart illustrating the proportional distribution of adverse pregnancy outcomes in the short birth spacing group. Maternal anemia accounted for the highest proportion (38%), followed by low birth weight (30%), preterm birth (27%), and stillbirth (5%).

Table 1. Demographic Characteristics of Study Participants (N = 100)

Variable	Frequency (n)	Percentage (%)
Age <30 years	67	67.0%
Age ≥30 years	33	33.0%
Rural Residence	58	58.0%
Urban Residence	42	42.0%
No Formal Education	47	47.0%
Primary/Secondary Education	39	39.0%
Education Beyond Matriculation	14	14.0%
Unemployed/Housewives	62	62.0%
Employed	38	38.0%
Monthly Income Below National Avg.	72	72.0%
Monthly Income Above National Avg.	28	28.0%
Non-use of Contraceptives	66	66.0%
Use of Contraceptives	34	34.0%

Table 2. Maternal and Neonatal Outcomes by Birth Spacing

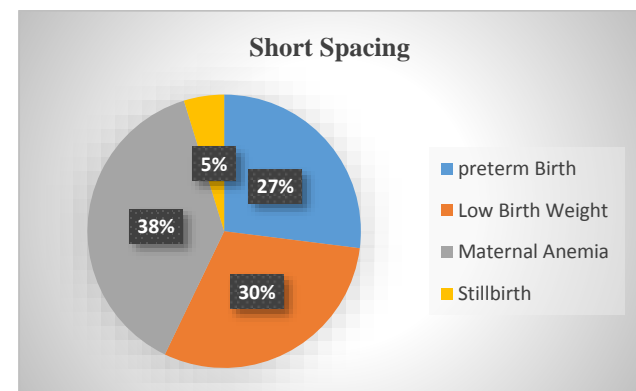| Outcome	Short Spacing (n = 46)	Adequate Spacing (n = 54)	p-value
Preterm Birth (<37 weeks)	17 (37.0%)	10 (18.5%)	0.014*
Low Birth Weight (<2500 g)	19 (41.3%)	11 (20.4%)	0.007*
Maternal Anemia (Hb <11 g/dL)	24 (52.2%)	15 (27.8%)	0.005*
NICU Admission	14 (30.4%)	6 (11.1%)	0.016*
Stillbirth	3 (6.5%)	1 (1.9%)	0.145

*Significant at p < 0.05

Figure 1. Distribution of Adverse Outcomes in Short Birth Spacing Group

DISCUSSION

This study underscores the significant public health concern posed by short birth spacing among Pakistani women and its strong association with adverse maternal and neonatal outcomes. Nearly half of the participants (46%) reported interpregnancy intervals of less than 24 months, a prevalence consistent with patterns observed across South Asia [9]. Cultural norms, inadequate education, limited reproductive autonomy, and insufficient access to modern contraceptive methods continue to hinder effective birth spacing in many low- and middle-income countries, particularly in rural and underserved communities. The findings of this study reaffirm these structural barriers and highlight the urgent need for targeted policy interventions [10].

The clinical consequences of short birth spacing observed in this study mirror global findings, with significantly increased risks of preterm birth, low birth weight, maternal anemia, and neonatal intensive care unit (NICU) admissions [11]. The incidence of preterm birth was nearly double in the short-spacing group, likely due to insufficient time for uterine and systemic recovery, coupled with heightened physiological stress. Similarly, the elevated rate of low birth weight may reflect compromised placental function and reduced maternal nutrient reserves, both of which are exacerbated by short interpregnancy intervals without adequate nutritional support [12]. Maternal anemia was particularly pronounced in the short-spacing group, affecting over half of the participants, and likely stems from iron depletion caused by consecutive pregnancies without proper hematologic restoration. This anemia not only contributes to maternal morbidity but also heightens the risk of intrauterine growth restriction and postpartum complications [13].

The significantly higher rate of NICU admissions among neonates born to mothers with short interpregnancy intervals highlights the extended impact of suboptimal birth spacing on neonatal health outcomes and healthcare resources [14]. While the stillbirth rate was higher in the short-spacing group, the association did not reach statistical significance, which may be attributed to the study's limited sample size and statistical power. Nonetheless, the observed trend is consistent with prior literature suggesting that inadequate birth spacing may increase the risk of fetal loss [15].

This study also identified key sociodemographic determinants of short birth spacing, including younger maternal age, rural residence, lack of formal education, and non-use of contraceptives. These factors reflect entrenched inequities in healthcare literacy, access, and decision-making autonomy [16]. The findings emphasize the need for culturally sensitive, community-based strategies that empower women through education and reproductive health counseling. Integrating family planning into routine antenatal and postnatal services, particularly in rural health systems, may offer a practical approach to reducing short interpregnancy intervals [17].

While the study offers valuable insights, several limitations must be acknowledged. The cross-sectional design limits the ability to infer causality between short birth spacing and adverse outcomes. Additionally, the relatively small sample size may reduce generalizability and limit the detection of associations in less common outcomes, such as stillbirth [18]. Potential recall bias related to self-reported interpregnancy intervals and contraceptive usage could also affect the accuracy of the findings. Despite these limitations, the study provides essential, context-specific evidence relevant to public health planning and clinical practice in Pakistan. Future longitudinal and multicenter studies with larger, more diverse populations are recommended to establish causal pathways and further validate these findings [19].

CONCLUSION

Short birth spacing remains highly prevalent among Pakistani women and is significantly associated with increased risks of adverse maternal and neonatal outcomes, including preterm birth, low birth weight, maternal anemia, and NICU admission. Younger maternal age, low educational attainment, rural residence, and lack of contraceptive use were identified as significant predictors. These findings underscore the critical need to strengthen family planning programs, ensure equitable access to modern contraceptive methods, and integrate targeted counseling into maternal healthcare services. Promoting optimal birth intervals through culturally tailored interventions is essential for improving reproductive health outcomes and reducing preventable morbidity and mortality in mothers and infants.

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