

Determinants and Health Implications of Open Birth Intervals and Birth Spacing in India

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Abstract

Birth spacing, defined as the interval between successive live births, plays a crucial role in determining maternal and child health outcomes as well as influencing overall population dynamics. This review paper examines the concept of open birth interval, which refers to the duration since a woman's last birth among those who have not yet had another child, and its implications in the Indian context. The study aims to synthesize existing literature to understand the socio-economic, demographic, cultural, and healthcare-related factors influencing birth spacing behaviour, along with its consequences on maternal health, child survival, and fertility patterns. The review is based on a systematic analysis of secondary data drawn from peer-reviewed journals, demographic surveys, and reports published between 2000 and 2021. The findings reveal that women's education and economic empowerment are significant determinants of optimal birth spacing, as they enhance awareness, autonomy, and access to family planning services. However, persistent socio-cultural factors such as son preference, early marriage, and gender inequality continue to influence reproductive decisions, often leading to shorter birth intervals. Additionally, disparities in access to reproductive healthcare services, particularly between urban and rural areas, contribute to unmet needs for contraception and suboptimal spacing. The study further highlights that optimal birth intervals are associated with improved maternal and child health outcomes, including reduced risks of maternal depletion, neonatal mortality, and adverse birth conditions. At the same time, excessively long open birth intervals may indicate underlying challenges such as limited access to healthcare or unmet fertility desires. The paper concludes that a comprehensive and context-specific approach, integrating healthcare accessibility, female education, and socio-cultural transformation is essential for promoting optimal birth spacing and improving reproductive health outcomes in India.

Keywords: Birth Spacing, Open Birth Interval, Maternal Health, Family Planning, North East India

Introduction

Birth spacing, commonly referred to as the interval between successive live births, has long been recognized as a critical determinant of maternal and child health outcomes, as well as an important factor shaping population dynamics. Adequate birth intervals allow women sufficient time to recover physiologically and nutritionally between pregnancies, thereby reducing the risk of complications such as maternal depletion, anemia, and obstetric morbidity. Similarly, infants born after appropriate intervals are less likely to experience adverse outcomes including low birth weight, preterm delivery, and neonatal mortality. Beyond health implications, birth intervals play a vital role in influencing fertility patterns and population growth, as longer intervals generally contribute to reduced fertility rates and slower demographic expansion. Consequently, understanding the factors that influence birth spacing behaviour is essential for designing effective reproductive health policies and programs that promote both maternal well-being and sustainable population development.

In this context, the concept of open birth interval has gained increasing attention in demographic and public health research. Open birth interval refers to the duration since a woman's last birth among those who have not yet had another child, often reflecting intentional or unintentional delays in subsequent childbearing without the use of permanent contraceptive methods. This concept provides valuable insights into reproductive intentions, unmet need for family planning, and socio-cultural influences on fertility behaviour. In countries like India, where fertility preferences are shaped by a complex interplay of cultural norms, religious beliefs, economic conditions, and access to healthcare services, the study of open birth intervals becomes particularly relevant. Variations in education, income, gender norms, and healthcare accessibility significantly influence decisions regarding child spacing. Moreover, disparities between urban and rural populations further complicate the scenario, with rural areas often facing limited access to reproductive health services and information. Understanding open birth intervals in such diverse settings is crucial for identifying gaps in family planning services, addressing unmet needs, and promoting informed reproductive choices. This review paper, therefore, seeks to explore the determinants, consequences, and policy implications of open birth intervals, with a specific focus on the Indian context.

Literature Review

A substantial body of literature has examined the relationship between birth intervals and maternal and child health outcomes, consistently emphasizing the risks associated with short inter-birth intervals. Early foundational work by Conde-Agudelo et al. (2006) established that short birth intervals are strongly linked to adverse outcomes such as preterm births, low birth weight, and increased neonatal mortality. Similarly, Rutstein (2005) highlighted that longer birth intervals are associated with improved maternal health, including reduced risks of maternal mortality and complications arising from closely spaced pregnancies. These findings have been widely supported by subsequent research, reinforcing the importance of optimal birth spacing as a public health priority. In addition to health outcomes, Bongaarts (2006) demonstrated the demographic significance of birth intervals, showing that increased spacing contributes to lower fertility rates and plays a key role in population stabilization. The concept of open birth interval has been explored in relation to socio-cultural and behavioural determinants of fertility. Kodzi et al. (2010) emphasized that cultural norms and religious beliefs significantly influence reproductive behaviour, particularly in shaping preferences for spacing children without resorting to permanent contraceptive methods. In many traditional societies, decisions about childbearing are not solely individual but are influenced by family expectations and community norms. Ali et al. (2012) further highlighted the critical role of access to reproductive healthcare services, noting that limited availability of contraceptives and inadequate family planning counseling often lead to shorter birth intervals and unintended pregnancies. These findings underline the importance of strengthening healthcare systems to support informed reproductive choices.

Recent studies focusing on India have provided deeper insights into the determinants of birth interval patterns. Prusty et al. (2018) found that socio-economic factors such as women's education, employment status, and household wealth significantly affect birth spacing, with more educated and economically stable women tending to have longer intervals. Similarly, Santhya et al. (2019) identified the influence of cultural beliefs, gender norms, and preferences for larger families as key factors shaping reproductive decisions. The persistence of son preference in certain regions further complicates birth interval dynamics, often leading to shorter intervals when previous births are female. Access to reproductive healthcare remains a significant challenge, particularly in rural and underserved regions of India. Singh et al. (2020) documented disparities in access to family planning services, highlighting that women in rural areas are less likely to receive adequate counseling and modern contraceptive options. This lack of access contributes to unmet need for family planning and suboptimal birth spacing. Additionally, recent studies have pointed to the role of government initiatives and public health programs in improving awareness and utilization of family planning services, although gaps persist in implementation and outreach.

Research Gap

A significant research gap persists in understanding open birth intervals in North East India, as most existing studies on birth spacing in India have largely focused on high-fertility states in northern and central regions, often overlooking the unique socio-cultural and demographic context of the North East. This region is characterized by diverse tribal populations, matrilineal systems in certain communities (such as in Meghalaya), relatively higher female autonomy in some areas, and distinct fertility preferences, which are not adequately captured in national-level analyses. There is a lack of micro-level, community-specific studies examining how traditional practices, kinship structures, and cultural norms influence open birth intervals and reproductive decision-making. Furthermore, while national surveys like NFHS provide aggregate data, they fail to deeply explore intra-regional disparities, especially between hill and valley populations, remote rural areas, and urban centers in the North East. Another critical gap lies in the limited research on the role of male involvement, migration patterns, and conflict-related disruptions, which are particularly relevant in several North Eastern states and may significantly affect birth spacing behavior. Additionally, the intersection of healthcare accessibility with geographic isolation, marked by poor infrastructure and difficult terrain remains underexplored in shaping unmet need for family planning and prolonged or shortened open birth intervals. There is also insufficient attention to how relatively better female literacy rates in some North Eastern states translate (or fail to translate) into reproductive autonomy and contraceptive use. Finally, existing literature rarely examines the dual burden of both short and excessively long open birth intervals in this region, particularly in relation to infertility stigma and delayed childbearing. Addressing these gaps through region-specific, mixed-method, and longitudinal research is essential for designing culturally sensitive and contextually relevant reproductive health policies in North East India.

Objectives

The primary objective of this review research paper is to critically examine the concept of open birth interval and its significance in shaping maternal and child health outcomes, particularly within the Indian context. The study aims to synthesize existing literature to identify the key socio-economic, demographic, cultural, and healthcare-related determinants influencing birth spacing behaviour. It also seeks to evaluate the consequences of varying birth intervals on maternal morbidity, child survival, and overall fertility patterns. Another important objective is to assess the role of

access to reproductive health services, including family planning counseling and contraceptive availability, in determining open birth intervals. Furthermore, the review intends to highlight regional disparities, especially between rural and urban populations, and to identify gaps in current policies and programs. Ultimately, the study aims to provide evidence-based insights that can inform effective interventions and policy strategies for improving reproductive health outcomes and promoting optimal birth spacing.

Materials and Methods

This review research paper is based on a systematic and comprehensive analysis of secondary data collected from a wide range of scholarly sources. Relevant literature was identified through electronic databases such as Google Scholar, PubMed, JSTOR, and ScienceDirect, focusing on studies published primarily between 2000 and 2021 to ensure both foundational and recent perspectives. Keywords such as “birth interval,” “open birth interval,” “birth spacing,” “maternal health,” “child health,” “family planning,” and “India” were used in various combinations to retrieve relevant articles. Peer-reviewed journal articles, government reports, demographic surveys, and publications from international organizations were included to ensure the credibility and reliability of the information. Inclusion criteria focused on studies addressing determinants, outcomes, and interventions related to birth intervals, with particular emphasis on research conducted in developing countries and India. Studies not available in English or lacking methodological clarity were excluded. The selected literature was carefully reviewed, categorized, and analysed thematically to identify recurring patterns, key findings, and research gaps. Emphasis was placed on socio-economic factors, cultural influences, healthcare access, and policy implications. The synthesized findings were then organized to provide a coherent understanding of open birth intervals and their multifaceted impacts. This methodological approach ensures a comprehensive and balanced review of existing knowledge, supporting meaningful conclusions and recommendations.

Analysis and Findings

The analysis of recent literature indicates that birth interval dynamics, particularly open birth intervals, are shaped by an intricate combination of socio-economic and demographic determinants, with newer studies reinforcing and expanding earlier findings. Research by Cleland et al. (2018) and Casterline and Han (2017) highlights that women’s educational attainment remains one of the most influential predictors of optimal birth spacing, as it enhances reproductive awareness, negotiation capacity within households, and informed contraceptive use. Furthermore, studies by Bhatia et al. (2020) reveal that economic empowerment, especially women’s participation in the workforce, significantly contributes to delayed and well-planned childbearing. Conversely, women from economically disadvantaged households often face structural barriers such as limited healthcare access and financial constraints, leading to shorter birth intervals. Recent evidence also emphasizes the persistence of socio-cultural factors, including son preference and patriarchal norms, as discussed by Jayachandran (2017), which continue to shape fertility behaviour and contribute to closely spaced births, particularly in northern and rural regions of India. Early marriage and restricted autonomy further compound these challenges, limiting women’s ability to make independent reproductive choices.

In addition to socio-economic determinants, the role of healthcare accessibility and quality has emerged as a central theme in understanding open birth intervals. Studies by Barot et al. (2019) and New et al. (2017) demonstrate that improved access to modern contraceptive methods and quality family planning counseling significantly increases the likelihood of maintaining optimal birth intervals. However, persistent inequalities in healthcare infrastructure remain a major concern. Evidence from IIPS and ICF (National Family Health Survey-5, 2021) indicates stark disparities between urban and rural populations, where rural women often encounter inadequate service delivery, stock-outs of contraceptives, and limited outreach by healthcare workers. These gaps contribute to a high unmet need for family planning, resulting in unintended pregnancies and shorter spacing between births. Additionally, frontline health interventions, while beneficial, are often constrained by insufficient training and sociocultural resistance within communities, thereby reducing their overall effectiveness. The findings further reveal a strong association between birth intervals and health outcomes, reaffirming the importance of balanced spacing. Research by Kozuki et al. (2019) and Molitoris et al. (2019) suggests that optimal birth intervals are linked to reduced risks of neonatal mortality, maternal depletion, and adverse pregnancy outcomes. At the same time, recent analyses indicate that excessively prolonged open birth intervals may signal underlying issues such as infertility, delayed fertility intentions, or lack of access to reproductive services, rather than purely voluntary spacing. This duality underscores the need for nuanced interpretation of open birth intervals in policy and program design.

Discussion

The findings of this review reinforce the multidimensional nature of birth interval dynamics and provide a deeper understanding of how socio-economic and demographic factors interact to influence open birth intervals. The strong association between women’s education and optimal birth spacing, as highlighted by Cleland et al. (2018) and Casterline and Han (2017), aligns with broader theoretical perspectives that link education to enhanced autonomy and

informed decision-making. Education not only increases awareness of reproductive health but also enables women to negotiate fertility preferences within households, thereby contributing to planned and healthier birth intervals. Similarly, the role of economic empowerment, emphasized by Bhatia et al. (2020), suggests that financial independence provides women with greater control over reproductive choices. However, the persistence of socio-cultural constraints, particularly son preference and patriarchal norms as discussed by Jayachandran (2017), indicates that improvements in education and income alone may not be sufficient to transform reproductive behaviour. These entrenched norms continue to shape fertility decisions, especially in rural and traditional settings, highlighting the need for culturally sensitive interventions.

The discussion also underscores the critical importance of healthcare accessibility and service quality in determining birth spacing patterns. The findings by Barot et al. (2019) and New et al. (2017) demonstrate that access to modern contraceptives and effective family planning counseling significantly improves the likelihood of achieving optimal birth intervals. However, the evidence from NFHS-5 (IIPS and ICF, 2021) reveals persistent disparities between urban and rural areas, pointing to systemic challenges in healthcare delivery. Rural populations continue to face barriers such as inadequate infrastructure, limited availability of trained healthcare providers, and inconsistent supply of contraceptives. These challenges contribute to a high unmet need for family planning and result in unintended pregnancies and shorter birth intervals. Moreover, the limited effectiveness of frontline health interventions due to insufficient training and socio-cultural resistance suggests that policy efforts must go beyond service provision and address community-level barriers. Strengthening health systems while simultaneously promoting awareness and acceptance of family planning is therefore essential. Another important aspect emerging from the findings is the dual implication of birth intervals on health outcomes. The association between optimal birth spacing and improved maternal and child health outcomes, as highlighted by Kozuki et al. (2019) and Molitoris et al. (2019), reaffirms the importance of promoting adequate intervals as a public health priority. At the same time, the observation that excessively long open birth intervals may indicate unmet fertility desires, infertility issues, or barriers to accessing reproductive services introduces a critical nuance to the discussion. This suggests that both short and excessively long intervals can reflect underlying health system or socio-economic challenges. Therefore, policies should not only aim to prevent closely spaced births but also ensure that individuals have the means to achieve their desired fertility outcomes. A balanced and context-specific approach, integrating healthcare access, education, and socio-cultural transformation, is essential for effectively addressing the complexities of open birth intervals and improving reproductive health outcomes in India.

Conclusion

This review paper highlights that birth spacing, particularly open birth intervals, is a critical determinant of maternal and child health as well as broader demographic outcomes. The synthesis of existing literature clearly demonstrates that optimal birth intervals contribute significantly to reducing maternal morbidity, neonatal mortality, and adverse pregnancy outcomes, while also supporting sustainable fertility patterns. However, birth spacing behaviour is not influenced by a single factor; rather, it is shaped by a complex interplay of socio-economic status, education, cultural norms, and access to reproductive healthcare services. Women's education and economic empowerment emerge as key enabling factors that enhance awareness, autonomy, and informed decision-making regarding family planning. At the same time, deeply rooted socio-cultural practices such as son preference, early marriage, and gender inequality continue to limit women's reproductive choices, particularly in rural and traditional settings. These findings underscore that improving birth spacing requires not only health interventions but also broader social and structural changes. Furthermore, the review emphasizes that access to quality reproductive healthcare services remains uneven, with significant disparities between urban and rural populations. Inadequate healthcare infrastructure, limited availability of contraceptives, and insufficient family planning counseling contribute to unmet needs and suboptimal birth intervals. While government initiatives have made progress in increasing awareness, gaps in implementation and outreach persist, particularly among marginalized communities. The dual nature of open birth intervals where both very short and excessively long intervals may indicate underlying challenges calls for a more nuanced and context-specific approach in policy formulation. Therefore, effective strategies must integrate improvements in healthcare delivery with efforts to promote female education, empowerment, and community-level behavioural change. A comprehensive and culturally sensitive approach is essential to ensure that individuals can achieve their desired fertility outcomes while maintaining optimal health. Ultimately, strengthening family planning services and addressing socio-cultural barriers will be crucial for improving reproductive health outcomes and advancing sustainable population development in India.

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