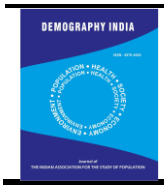

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Breastfeeding Practices in India: A Comparative Analysis Between North-Eastern and Southern Regions

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Abstract

This study examines breastfeeding variables for regional differences in India, comparing the Southern region and North-Eastern region with NFHS-5 (2019-21) data. Region-wise multiple regression analysis was completed on the key indicators. Results indicate the North-Eastern region had the stronger model fit with four statistically significant predictors, while the Southern region presented a lower predictive strength (R2 = 0.7263) with only breastfeeding one day after birth statistically significant from the predictors in the Southern model. These findings indicate that cultural norms and community practices in the North-Eastern region might have more impact on breastfeeding outcomes than institutionalised health infrastructure in the South. The study highlights the need for region-based interventions, both enhancing institutional support in the South and strengthening community-based practices in the North-Eastern region, which could improve equitable breastfeeding outcomes and consequently maternal-child health outcomes across India. Furthermore, these regional perspectives can help inform national programs, such as the POSHAN Abhiyaan and the National Health Mission. Aligning actions with local needs will lead to the intended consequences, as well as support India's commitment to nutrition for all and child health.

Keywords

Breastfeeding Practices, Early Initiation of Breastfeeding, Exclusive Breastfeeding, NFHS-5 (National Family Health Survey), Prelacteal Feeding, Regional Disparities, Regression Analysis

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Introduction

Breastfeeding is recognised worldwide as an important intervention to improve maternal and child health because of its affordability and widespread positive effects. Besides being physiologically relevant, breastfeeding is extremely important in terms of reducing infant mortality, promoting neurological development, and promoting maternal and child health over time. Major global health organizations, namely WHO and UNICEF, advocate for breastfeeding within the first hour after birth, exclusive breastfeeding for 6 months, and continued breastfeeding with complementary feeding for up to 2 years and beyond. However, rates of initiation and prevalence of breastfeeding vary widely not just between countries but also regions of countries.

India has implemented various public health initiatives to promote breastfeeding, including the National Health Mission (NHM), the Mother's Absolute Affection (MAA) initiative, and the complete nutrition front under Poshan Abhiyaan. The implementation of these programs - such as institutional delivery, community-based efforts, and systematic commutation interventions - has been to establish breastfeeding as the normative standard. However, there are large gaps in implementation. According to data from NFHS-5, only about 42% of newborns are breastfed in the first hour of birth and about 63.7% of infants under six months old are exclusively breastfed. However, these averages mask considerable regional differences that continue to drive maternal and child health outcomes across the country.

There is a prominent contrast when comparing the Southern region of India to the North-Eastern (N-E) region, as there are considerable differences in geography, demographics and healthcare systems. The Southern states and Union Territories (Kerala, Karnataka, Andhra Pradesh, Tamil Nadu and Telangana, Puducherry, Lakshadweep, Andaman and Nicobar), are regularly mentioned to have accessible health systems, and better health indicators. The North-Eastern region (Mizoram, Manipur, Sikkim, Assam and Arunachal Pradesh, Meghalaya, Nagaland, Tripura), presents its own issues due to inaccessible land, transport issues, and differing cultural aspects of health care.

Contrary to popular beliefs about maternal and child health, findings from NFHS-5 indicate that breastfeeding indicators in some North-Eastern states are, at times, better than Centre and South India. Exclusive breastfeeding percentages over 70% in Mizoram and Manipur stand in stark contrast to some Centre and South Indian states, such as Tamil Nadu and Karnataka with certain averages less than these percentages. While we have provided ample evidence as to why we should investigate local differences in breastfeeding practices and indicators of maternal and child health, it was important to investigate where differences could be sourced to socio-cultural, behavioural, and systematic forms at local levels.

In this sense, the current study works from a comparative regional perspective, using NFHS-5 data to investigate the complex regional dynamics of breastfeeding practices in India based on these differences. For instance, this study will examine the extent and meanings of key indicators such as early initiation, breastfeeding within the first day

of birth, and use of prelacteal feeds and how these variables overlap with the regional context where the action takes place. It is important to position breastfeeding as not only a maternal behaviour but an outcome that reflects larger structural, geographical, and program levels. Understanding these dimensions is essential for designing policies and programs that are sensitive to local conditions while supporting India's commitment to global nutrition goals and the Sustainable Development Agenda.

Background

Breastfeeding rates vary nationally and there is a high prevalence of exclusive breastfeeding across the world. Nonetheless, breastfeeding does not seem to be homogeneous across regions in India. Despite national interventions such as the MAA programme and the widespread approach of Poshan Abhiyaan, multiple breastfeeding indicators show variation, which could reflect different systemic and socio-cultural trajectories behind maternal and infant health practices in the two settings.

A number of the most useful medical literature examining determinants of breastfeeding have primarily focused on what explains variation in breastfeeding. These studies have assessed individual or regionalised determinants such as maternal education, institutional delivery, and working women and first-time mothers' exposure to breastfeeding counselling. In addition, they have aggregated determinants to seek to explain national averages, or the catchment statistics of a specific health facility or programme within a single state, but few have compared breastfeeding trends regionally. For instance, the N-E and South of India provide very different health care climates as well as culturally different influences on maternal and infant health. Importantly, many N-E states score better on assessments relating to key breastfeeding indicators than southern states, despite having more pronounced issues of health care and accessibility.

Another limitation in the literature is the tendency to analyze breastfeeding indicators in isolation, without assessing how different elements, such as early initiation or avoidance of prelacteal feeds, and breastfeeding or received any breast milk is performed within an entire day of birth, interact to predict overall outcome. Many studies intervene using statistical modeling techniques in a few surveys but rely almost entirely on descriptive statistics and primarily this has been applied inferential statistics for regression analysis to establish causal effects or adjust for potential confounding variables.

This study hopes to address these weaknesses in the literature using NFHS-5 to compare the North-Eastern and Southern states of India. The study will use empirical modelling to assess which predictors of breastfeeding outcomes are region-relevant to India and whether these are still in accordance with other national or global health aspirations. The findings are intended to support more context-sensitive policy interventions and contribute to a deeper understanding of breastfeeding dynamics in diverse settings.

Literature Review

Breastfeeding has historically been seen as the most cost-effective and powerful intervention aimed at improving child survival and maternal health. The World Health Organization (WHO) and UNICEF still recommend that all newborns receive breastfeeding within the first hour of birth,

only breastfed for the first six months, and continue breastfeeding for two years (or beyond) (WHO, 2021). There is strong evidence supporting the benefits of these practices, including reduced infant mortality rates, better growth and development in children, and decreased health risks for mothers. Despite the scientific support for these practices, variations in breastfeeding continue to be a significant issue, especially in low- and middle-income countries where healthcare systems and cultural beliefs vary substantially.

As India contributes to a significant portion of the global infant population, a number of policies and programs have been designed to help and support optimal breastfeeding outcomes. The National Health Mission (NHM), Poshan Abhiyaan and Mother's Absolute Affection (MAA) are national platforms involving the government, stakeholders as well as local communities that all want the best for maternal and child health specifically in the context of breastfeeding promotion and behaviour change communication (Ministry of Health and Family Welfare, 2018). Gradually, these initiatives may bring about improved health. As reported in the National Family Health Survey (NFHS), levels of exclusive breastfeeding have increased from 54.9 % in NFHS-4 (2015-16) to 63.7 % in NFHS-5 (2019-21) (IIPS & ICF, 2021). However, the national averages mask extensive variations in breastfeeding behaviour and associated health outcomes across the country.

There are many studies which have examined the determinants of breastfeeding at the household or mother level. In these studies, maternal education level, type of antenatal care received, type of hospital delivery (institutional delivery) and socioeconomic status have all been shown to positively influence early initiation and exclusive breastfeeding. Patel et al. (2015) discussed the effects of maternal educational level and maternity services in her study of breastfeeding behavior. Ogbo et al. (2015) used NFHS data to highlight that urban residence and educational level also play a positive role in the adherence to recommended breastfeeding behaviour. However, more generally, determinants will vary in their influence depending on the state and community in India. Given this, determinants are part of a complex intersection of structural and cultural undertakings.

A number of researchers have pointed out that India's southern states, particularly, Kerala and Tamil Nadu, are invariably among the best in public health indicators. However, it is very surprising that selected North-Eastern states (i.e., Mizoram, Manipur, and Nagaland) exhibit more exclusive breastfeeding than southern states. Thus, it challenges the assumption that health system infrastructure, on its own, guarantees better breastfeeding patterns. Gupta et al. (2020) recognised this contradiction, but did not investigate the structural, or cultural explanations for these trends; and therefore, it is difficult to know what regional driving factors exist for breastfeeding.

Cultural factors and traditional practices also shape breastfeeding behaviour in complex ways. Bhandari et al (2003) documented that prelacteal feeding, which has deep significance in many religious and cultural norms, continues to disrupt optimal breastfeeding practice in many northern and central Indian states. In some communities in the North-East, the community norms are stronger and reject prelacteal feeding and encourage immediate breastfeeding. Tiwari

et al. (2016) found that institutional births and skilled birth attendance were associated with early breastfeeding initiation; however, institutions that provided skilled birth attendance did not consistently reach individuals and tended to be unevenly distributed, particularly in geographically remote locations or underdeveloped areas.

While some national studies have used regression-based approaches to estimate the associations between socio- demographic factors and breastfeeding outcomes; most of these studies combined data from across the nation and did not provide a sub-regional analysis. For instance, Agho et al. (2011) showed the effect of maternal age, education, and place of delivery in a cross-national model that included data specific to India. While some of these studies are robust methodology, they do not account for localized differences based on behavioural, cultural, and infrastructure reasons. This is an important gap in the literature because many studies have yet to investigate a region's impact on other factors that affect breastfeeding in two or more diverse Indian regions through a region-specific empirical modelling framework.

The global issue of regional variations in breastfeeding is not limited to India. In their series on breastfeeding in The Lancet, Rollins et al. (2016) focused on whole countries with well-defined, cohesive national policies. They noted that even within those countries there is a vast variation in breastfeeding determinations based on region, ethnicity, and social class. They argue for data-based, culturally relevant interventions that are much better alternatives to linking statements that attempt to provide universal messaging. The Indian scenario is no different, and a blanket approach of one size fits all may not be able to address the specific, localized determinants of breastfeeding attitudes and behaviours.

In India, community health workers, such as Accredited Social Health Activists (ASHAs), have played a key in fostering breastfeeding behaviours, especially in rural areas, although Kumar et al. (2020) have pointed out explanations for inter-state variation in breastfeeding are many and not limited to the training, deployment, and motivation of ASHAs. The availability and performance of those health workers can considerably influence how health messaging is received and how the recipients act on it.

Although there is a growing literature base, few empirical studies examining breastfeeding practice have used a sound regression model to compare the North-Eastern and Southern regions. Most studies look at individual states or treat India as a whole unit ignoring important regional differences using multiple data sources. This study fills that gap by examining whether early initiation, feeding within one day, and not giving prelacteal feeding act as predictors of exclusive breastfeeding for two regions with different healthcare contexts and cultural contexts. In addition, it not only provides a quantitative comparison but also contributes to the understanding of the socio-cultural and systemic constraints on maternal behaviour.

Research Objective

To comparatively examine the regional determinants of breastfeeding practices in the Southern and North-Eastern states of India using data from the National Family Health Survey (NFHS-5), with a specific focus on identifying the most statistically significant predictors that influence early and optimal breastfeeding outcomes across both regions.

Research Methodology

This research utilizes a quantitative research design to identify regional disparities in breastfeeding behaviour between the Southern states / UTs and the North-Eastern states of India. The data for this analysis comes from secondary source material using the National Family Health Survey (NFHS-5, 2019-21), which provides detailed demographic and health indicator information for all states in India.

For the comparison, the Southern region includes the following states and the UTs: Kerala, Tamil Nadu, Karnataka, Andhra Pradesh and Telangana, Lakshadweep, Puducherry, Andaman & Nicobar; the North-Eastern region includes the following eight states: Mizoram, Manipur, Nagaland, Tripura, Sikkim, Arunachal Pradesh, Assam, and Meghalaya.

Analysis and Interpretation

This section presents a comparative regression analysis of breastfeeding practices in Southern and North-Eastern states using NFHS-5 data. The aim is to identify statistically significant predictors of exclusive breastfeeding and understand the regional variation in influencing factors.

Table 1 Description of Variables Used

Indicator	Description
Breastfeeding within 1 hour of birth	Child was breastfed within the first hour after birth
Breastfeeding within 1 day of birth	Child was breastfed within the first 24 hours
Predominant Breastfeeding Duration	Infant received breast milk predominantly, without solids
Any Breastfeeding Duration	Infant received any amount of breast milk
Prelacteal Feeding	Infant was given food or liquid before breastfeeding
Bottle Feeding in the past 24 hours	Infant was fed using a bottle in the last 24 hours
Exclusive Breastfeeding	Infant was only breastfed (no other foods/liquids)

Table 1 contains the key indicators for the study, and the description for these indicators. These indicators highlight different aspects of breastfeeding practices and are essential in estimating the breastfeeding behaviours and other outcomes.

Table 2 Comparison of Regression Model Performance between Southern and North-Eastern States

Region	R^2	Adjusted R^2	F-Statistic (p-value)	No. of Significant Predictors
Southern States	0.7491	0.5818	4.48 (p = 0.022)	1 + 1 marginal
North-Eastern States	0.854	0.7263	6.69 (p = 0.008)	4

The regression results indicate that the North-Eastern States perform better than the Southern. The North-Eastern region has an R^2 of 0.854, i.e., 85.4% variance, having four significant predictors. Whereas, the Southern regions have a lower R^2 of 0.7491, i.e., a variance of 74%, and only one significant predictor

Region-Wise Regression Analysis and Interpretation:

To analyze the impact of breastfeeding-related indicators on the outcome variable, multiple regression analyses were carried out for both regions. The following table outlines the coefficients, p-values, and levels of significance of the predictors for the Southern States.

- **Southern States**

Table 3 shows the regression coefficients and significance levels for selected breastfeeding indicators in the Southern states and UTs, including statistical significance on the dependent variable.

Table 3 Regression Coefficients and Significance of Breastfeeding Indicators in Southern States/UTs

Predictor	Coefficient	p-value	Significance
Breastfeeding within 1 hour of birth	-0.02439	0.554	Not Significant
Breastfeeding within 1 day of birth	0.42736	0.008	Significant
Predominant Breastfeeding Duration	1.16957	0.076	Marginally Significant
Any Breastfeeding Duration	-0.1723	0.056	Marginally Significant

In the Southern region, the only significant predictor is Breastfeeding within one day of birth, having (β = 0.427, p = 0.008) indicating strong positive correlation. Other indicators i.e., Predominant Breastfeeding Duration (β = 1.17, p = 0.076) and Any Breastfeeding Duration (β = -0.17, p = 0.056) are marginally significant whereas breastfeeding within one hour in not statistically significant (β = -0.024, p = 0.554).

- **North – Eastern States**

Table 4 shows the regression coefficients and significance levels for selected breastfeeding indicators in the North-Eastern states, including statistical significance on the dependent variable.

Table 4 Regression Coefficients and Significance of Breastfeeding Indicators in North-Eastern States

Predictor	Coefficient	p-value	Significance
Breastfeeding within 1 hour of birth	-0.23257	0.008	Significant
Breastfeeding within 1 day of birth	0.68052	0	Highly Significant
Predominant Breastfeeding Duration	2.31759	0.012	Significant
Any Breastfeeding Duration	0.11735	0.207	Not Significant

In the North-Eastern region, the only significant predictor is Breastfeeding within one day of birth, having (β = highest, p = 0.000) indicating strong positive correlation. Other indicators i.e., Breastfeeding within 1 hour (p = 0.008) and Predominant Breastfeeding Duration (p = 0.012) also show positive association and Any Breastfeeding Duration not statistically significant (p = 0.207).

Comparative Analysis of Predictors of Breastfeeding Outcomes in Southern and North-Eastern States (NFHS-5)

To illustrate regional differences in the impacts of breastfeeding behaviour, separate multiple regression analyses were performed for the Southern and North-Eastern States. A comparative summary of the models is provided in this section to demonstrate variations in predictor significance as well as differences in the overall model performance.

Table 5 Comparative Analysis of Predictors of Breastfeeding Outcomes in Southern and North-Eastern States (NFHS-5)

Indicator	Southern Region	North-Eastern Region	Interpretation
Breastfeeding within 1 hour of birth	Not significant	Significant (p = 0.008)	Plays a stronger role in the North-East; possibly due to traditional birth practices
Breastfeeding within 1 day of birth	Significant (p = 0.008)	Highly significant (p = 0.000)	A consistent and strong predictor in both regions; more powerful in NE
Predominant Breastfeeding Duration	Not significant	Significant (p = 0.012)	Suggests sustained breastfeeding behavior is more common/impactful in NE
Any Breastfeeding Duration	Marginally significant (p = 0.056)	Not significant	Influences outcomes slightly in South; less relevant in NE
Prelacteal Feeding	Not significant / not included	Significant (p = 0.004) – negative effect	Avoidance of prelacteal feeding is crucial in NE region
Model R^2 (Explained Variation)	0.7491 (74.91%)	0.8540 (85.40%)	NE model explains more of the variance in outcomes
Adjusted R^2	0.5818	0.7263	More robust fit in the NE region
F-statistic (Model Significance)	F = 4.48 (p = 0.022)	F = 6.69 (p = 0.008)	Both models are statistically significant; a stronger fit in NE
Number of Significant Predictors	1 significant + 1 marginal	4 significant predictors	Indicates a more complex, multi-factor influence in the North-East

The North-Eastern states indicate a wider and stronger set of predictors of breastfeeding outcomes, suggesting a multi-faceted determination possibly related to cultural norms, traditional feeding practices, and other community-level health practices.

By contrast, Southern states appear to rely more on the timing of initiation (within 1 day), and the preclinical behavioural and postnatal factors are insignificant.

Findings and Results

Based on the regression analysis conducted on NFHS 5 data to examine and compare the breastfeeding practices among the North-Eastern and Southern regions. The study revealed that, although both models are statistically significant, the North-Eastern model with an R^2 of 0.854 shows a superior model performance than the Southern region, which has an R^2 of 0.749.

In Southern states, breastfeeding within a day of delivery has a statistically significant positive effect on overall breastfeeding (coefficient = 0.43, p = 0.008). This estimate for preschool breastfeeding duration indicates a marginally positive effect. Any breastfeeding duration has a negative association at borderline statistical significance. No statistically significant effect was found for breastfeeding within an hour of birth, bottle feeding in the past 24 hours, or prelacteal feeding.

In the North-Eastern states, the regression model identified a stronger set of significant predictors. Breastfeeding within one day, predominant duration of breastfeeding, and avoiding prelacteal feeding were positively related to overall breastfeeding. Early initiation of breastfeeding within one hour was significant and negatively associated with overall breastfeeding, suggesting that delayed breastfeeding initiation was negatively related to breastfeeding outcomes. Additionally, bottle feeding showed a very slight positive association, which could represent a mixed feeding approach.

These results suggest that specific actions should be taken in each region. In both regions, promoting breastfeeding on the first day is critical. In the North-East, promotion of predominant breastfeeding, restriction of prelacteal feeds, and lessening bottle feeding should be prioritized. In the South, while the focus should still be on supportive breastfeeding in the first day, and on sustaining predominant breastfeeding, these approaches may improve opportunities in the South region. Developing responsive health education, behaviour change, and intervention programs that are specific to state actions is critical to develop good infant feeding practices.

Discussion

This study is done to analyse the breastfeeding practices in North-Eastern and Southern states and UTs. Regression analysis on NFHS 5 data reveals that the North-Eastern model is comparatively stronger than South. Breastfeeding within one day is found to be the most statistically significant in both the regions. In North-East, Predominant Breastfeeding is also significant and avoids prelacteal feed. The findings of the study also suggest that, region specific and localised interventions are required as universal interventions lack adaptability. This indicates towards enhancing institutional practices in South and integrating cultural behaviours in the North-East. The study contributes to the existing literature and highlights regional differences within the country. Though there are limitations of a cross-sectional design, it provides useful information while recognizing the need for research incorporating socio-cultural considerations in order to improve maternal and child health.

Conclusion

This study compares breastfeeding practices in India using NFHS-5 data from a regional

perspective. The North-Eastern states depict a better statistical model with four significant predictors while the Southern region shows less predictive strength, with only one key predictor i.e. breastfeeding of within one day. These results suggest that beyond health care infrastructure, socio-cultural norms and community behaviours plays a vital role in shaping breastfeeding practices. The policy recommendations include facility-based initiation of breastfeeding in South and promote community-based interventions in the North-East. An approach that is regionally customized and implemented in an equitable manner is needed. Future research should consider a mixed methodology approach, to more accurately represent context-specific drivers.

Recommendations

1. **Prioritize Context-Specific Interventions:** Develop breastfeeding programs that implement context specific breastfeeding practices, especially within culturally diverse and underperforming areas.
2. **Strengthen Early Initiation in the South:** Continue to strengthen breastfeeding during the first hour of life through systematic approaches for facility standards and delivery care.
3. **Leverage Positive Practices in the North-East:** Support culturally rooted practices that can be expanded upon and contribute to successful engagement with breastfeeding.
4. **Integrate Region-Wise Data for Policy Feedback:** Use disaggregated data and implications for local approaches to guide future efforts for breastfeeding promotion.

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