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Regional Disparities in Maternal Healthcare Utilization between North Eastern and Mainland India: A Comprehensive Review

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Abstract

Maternal health is a key indicator of public health, healthcare equity, and socioeconomic development. Although India has made significant progress in improving maternal healthcare through the National Rural Health Mission (NRHM), National Health Mission (NHM), and flagship initiatives such as Janani Suraksha Yojana (JSY), Janani Shishu Suraksha Karyakram (JSSK), Pradhan Mantri Surakshit Matritva Abhiyan (PMSMA), and the LaQshya programme, substantial regional disparities continue to persist. This review critically examines maternal health inequalities between the North Eastern Region (NER) and mainland India by synthesizing evidence from empirical studies, government reports, and nationally representative datasets, particularly the National Family Health Survey (NFHS). It evaluates regional differences in antenatal care, institutional delivery, skilled birth attendance, postnatal care, and maternal health outcomes while identifying the socioeconomic, geographical, cultural, and health system factors underlying these disparities. The review reveals that women in many North Eastern districts experience comparatively lower utilization of maternal healthcare services due to difficult terrain, inadequate transportation, shortages of skilled health personnel, weak healthcare infrastructure, poverty, lower educational attainment, tribal concentration, and limited women's autonomy. Furthermore, marked inequalities exist not only between the NER and mainland India but also within districts across the North Eastern states, highlighting the need for decentralized planning. The review emphasizes strengthening health infrastructure, referral and transport systems, women's education and empowerment, culturally responsive healthcare delivery, and district-specific interventions to achieve equitable maternal healthcare and accelerate progress towards universal health coverage and the Sustainable Development Goals.

Keywords: Maternal Health, North Eastern Region, Maternal Healthcare Utilization, Regional Disparities, National Family Health Survey (NFHS)

Introduction

Maternal health is widely recognized as a key indicator of the quality, accessibility, and equity of a country's healthcare system and constitutes an essential component of the Sustainable Development Goals (SDGs). Improving maternal health not only reduces maternal mortality and morbidity but also enhances neonatal survival, child health, and overall socioeconomic development. Over the past two decades, India has made substantial progress in strengthening maternal healthcare through the implementation of the National Rural Health Mission (NRHM) in 2005, later subsumed under the National Health Mission (NHM), along with several complementary initiatives such as the Janani Suraksha Yojana (JSY), Janani Shishu Suraksha Karyakram (JSSK), Pradhan Mantri Surakshit Matritva Abhiyan (PMSMA), and the LaQshya programme. These interventions have considerably expanded antenatal care (ANC), institutional deliveries, skilled birth attendance, and postnatal care (PNC), contributing to a significant decline in the Maternal Mortality Ratio (MMR) in India.

Despite these encouraging achievements, several researchers have highlighted that improvements in maternal health have not been equally distributed across the country. Bloom, Lippeveld, and Wypij (1999) observed that maternal healthcare utilization is strongly influenced by women's education, household economic status, and accessibility to healthcare facilities. Similarly, Navaneetham and Dharmalingam (2002) reported substantial interstate disparities in the utilization of maternal health services in India, emphasizing that socioeconomic inequalities and regional development significantly determine the use of antenatal and delivery care. Glei, Goldman, and Rodríguez (2003) further argued that women's autonomy and decision-making power within households play an important role in determining the utilization of maternal healthcare services. Using data from the National Family Health Survey, Pallikadavath, Foss, and Stones (2004) demonstrated that educational attainment, household wealth, and rural-urban residence remain the principal determinants of antenatal care and safe delivery practices in India. Likewise, Singh, Rai, and Singh (2012) found that women belonging to poorer households, Scheduled Tribes, and rural communities were considerably less likely to receive adequate maternal healthcare services than their urban and economically advantaged counterparts. In another comprehensive assessment, Guilmoto and Dumont (2013) highlighted persistent geographical inequalities in maternal and child health indicators across Indian states, indicating that economically developed regions consistently perform better than geographically remote and socioeconomically disadvantaged areas.

Further evidence was provided by Singh et al. (2014), who identified maternal education, accessibility to healthcare facilities, exposure to mass media, and household wealth as significant predictors of institutional delivery and skilled birth attendance. Victora et al. (2016), while examining health inequalities in low- and middle-income countries, emphasized that national averages often conceal substantial regional disparities, and equitable healthcare improvements require targeted interventions for geographically isolated and marginalized populations. These observations are particularly relevant to the North Eastern Region (NER) of India, comprising Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Nagaland, Sikkim, and Tripura. Although the region has experienced noticeable improvements in maternal healthcare under the NHM, it continues to face distinctive challenges arising from difficult terrain, scattered settlements, ethnic diversity, inadequate transport infrastructure, frequent natural disasters, and shortages of skilled healthcare professionals. These geographical and infrastructural constraints often limit timely access to antenatal care, emergency obstetric services, institutional delivery, and postnatal care. Moreover, poverty, low educational attainment, tribal status, cultural practices, and limited women's autonomy further widen maternal health disparities within the region. Therefore, a comprehensive review comparing maternal health disparities between the North Eastern Region and mainland India is essential for understanding the multidimensional determinants of these inequalities and for generating evidence to support context-specific policies aimed at improving maternal health outcomes among vulnerable populations.

Literature Review

Maternal healthcare utilization has been widely investigated in India using successive rounds of the National Family Health Survey (NFHS), District Level Household Survey (DLHS), Sample Registration System (SRS), and other national databases. Early studies by Bloom, Lippeveld, and Wypij (1999) established that women's education, household income, and physical accessibility significantly influence the utilization of maternal healthcare services. Navaneetham and Dharmalingam (2002) demonstrated substantial interstate variations in antenatal care (ANC) and institutional delivery, attributing these differences primarily to socioeconomic inequalities and regional disparities in healthcare infrastructure. Glei, Goldman, and Rodríguez (2003) emphasized that women's autonomy and household decision-making power substantially determine maternal healthcare-seeking behaviour. Pallikadavath, Foss, and Stones (2004) further showed that maternal education, household wealth, and place of residence are the strongest predictors of antenatal care and safe delivery practices in India. Stephenson and Tsui (2002) highlighted that women's empowerment and exposure to mass media significantly improve maternal healthcare utilization, while Sunil, Rajaram, and Zottarelli (2006) observed persistent rural-urban differences in reproductive healthcare services. Gabrysch and Campbell (2009) concluded from a global review that education, accessibility, socioeconomic status, and quality of healthcare remain universal determinants of skilled birth attendance and institutional delivery.

Several researchers have examined the socioeconomic and demographic determinants responsible for regional disparities in maternal healthcare utilization. Singh, Rai, and Singh (2012) reported that women belonging to poorer households, Scheduled Castes, Scheduled Tribes, and rural communities were significantly less likely to receive adequate maternal healthcare than economically advantaged urban women. Guilmoto and Dumont (2013) highlighted pronounced geographical inequalities in maternal and child health indicators across Indian states, noting that southern states consistently outperformed economically weaker and geographically isolated regions. Mohanty and Srivastava (2013) found that maternal education, household wealth, and urban residence significantly increased the likelihood of institutional delivery. Singh et al. (2014) identified female literacy, media exposure, birth preparedness, and accessibility to healthcare facilities as major determinants of safe motherhood practices. Joe, Mishra, and Navaneetham (2015) emphasized that financial inequalities continue to restrict access to maternal healthcare among disadvantaged populations despite government incentive schemes. Bhatia and Cleland (1995), Pathak, Singh, and Subramanian (2010), and Dixit et al. (2014) similarly observed that caste, religion, parity, maternal age, and household economic conditions remain significant predictors of antenatal care, skilled birth attendance, and postnatal care utilization across India.

Geographical accessibility and health system capacity have consistently emerged as major determinants of maternal health disparities, particularly in geographically challenging regions. Thaddeus and Maine (1994), through their influential "Three Delays Model," demonstrated that delays in deciding to seek care, reaching healthcare facilities, and receiving appropriate treatment substantially contribute to adverse maternal outcomes. Gabrysch et al. (2011) further confirmed that long travel distances, poor transportation, and inadequate referral systems reduce institutional deliveries and emergency obstetric care utilization. Kumar et al. (2013) reported that difficult terrain and poor road connectivity remain major barriers to maternal healthcare in rural India. Lim et al. (2010) found that the Janani Suraksha Yojana (JSY) significantly increased institutional deliveries nationally; however, programme effectiveness varied considerably across states due to differences in health infrastructure and administrative capacity. Randive et al. (2013) similarly noted that implementation gaps were more pronounced in remote and underserved districts. Scott and Shanker (2010) highlighted persistent shortages of skilled healthcare personnel in rural health facilities, while Paul and Rumsey (2002) emphasized that weak referral systems and inadequate emergency obstetric services continue to hinder maternal health improvements in remote regions. These challenges are particularly evident across several districts of the North Eastern

Region, where mountainous terrain, scattered settlements, seasonal flooding, and limited transport infrastructure frequently delay access to comprehensive maternal healthcare.

Women's education, empowerment, ethnicity, and cultural practices have also received considerable attention in the maternal health literature. Bloom et al. (2001) demonstrated that educated women are more likely to utilize antenatal care, institutional delivery, and postnatal services than less educated women. Fotso, Ezeh, and Essendi (2009) reported that women's autonomy and household decision-making power substantially improve maternal healthcare utilization. Singh and Kogan (2010) found that media exposure and female literacy positively influence maternal health awareness and service utilization. Houweling et al. (2007) documented persistent socioeconomic inequalities in maternal healthcare across developing countries, while Baral, Lyons, Skinner, and Van Teijlingen (2010) emphasized the importance of culturally acceptable maternal health interventions among indigenous populations. Montgomery et al. (2014) observed that tribal communities frequently experience linguistic barriers, traditional delivery practices, and limited trust in formal healthcare institutions, reducing service utilization despite physical availability. Victora et al. (2016) argued that national averages often conceal substantial regional inequalities and recommended targeted interventions for marginalized populations. Finally, Kassebaum et al. (2016) highlighted that sustained reductions in maternal mortality require improvements not only in healthcare coverage but also in equity, accessibility, quality of care, women's education, and socioeconomic development. Collectively, these studies indicate that maternal health disparities between the North Eastern and mainland regions of India are shaped by the complex interaction of socioeconomic inequalities, geographical accessibility, health system capacity, educational attainment, women's empowerment, ethnicity, and governance, thereby underscoring the need for region-specific maternal health policies and interventions.

Objectives

The primary objective of this review paper is to critically examine the existing body of literature on maternal health disparities between the North Eastern Region (NER) and mainland India in order to understand the extent and nature of regional inequalities in maternal healthcare. Specifically, the review seeks to compare maternal healthcare utilization across regions with respect to key indicators such as antenatal care (ANC), institutional delivery, skilled birth attendance, and postnatal care (PNC). It further aims to identify the major socio-economic, geographical, cultural, demographic, and health system factors that contribute to these disparities, including education, household wealth, tribal status, healthcare accessibility, and women's empowerment. The paper also evaluates the effectiveness of major national maternal health initiatives implemented under the National Health Mission in reducing regional inequalities. Finally, the review identifies existing research gaps and highlights future directions for comparative and district-level maternal health research using recent National Family Health Survey (NFHS) data to support evidence-based and region-specific policy interventions.

Materials and Methods

The present study employs a systematic narrative review methodology to synthesize and critically evaluate the existing evidence on maternal health disparities between the North Eastern Region (NER) and mainland India. Relevant literature was identified through an extensive review of peer-reviewed journal articles, government publications, policy reports, and nationally representative survey datasets. Particular emphasis was placed on evidence derived from all five rounds of the National Family Health Survey (NFHS), especially NFHS-5 (2019-21), complemented by information from the Sample Registration System (SRS), the Ministry of Health and Family Welfare (MoHFW), the National Health Mission (NHM), and other official national databases. The literature search primarily covered studies published between 2005 and 2021 that addressed key dimensions of maternal health, including maternal mortality, antenatal care, institutional delivery, skilled birth attendance, postnatal care, maternal nutrition, women's education and empowerment, healthcare accessibility, health infrastructure, tribal populations, and regional inequalities. Preference was given to empirical and comparative studies focusing on the North Eastern Region and mainland India. The selected studies were critically examined and synthesized using a thematic analytical framework encompassing geographical disparities, socioeconomic determinants, health system capacity, accessibility to maternal healthcare services, cultural and ethnic influences, women's autonomy, and the effectiveness of national maternal health programmes. A qualitative comparative approach was subsequently employed to identify recurring patterns, regional variations, policy implications, and existing research gaps, thereby providing a comprehensive understanding of the multidimensional factors influencing maternal healthcare disparities in India.

Analysis and Results

The analysis of the reviewed literature indicates that India has made remarkable progress in improving maternal health over the past two decades through the implementation of the National Rural Health Mission (NRHM), the National Health Mission (NHM), and several flagship initiatives, including the Janani Suraksha Yojana (JSY), Janani Shishu Suraksha Karyakram (JSSK), Pradhan Mantri Surakshit Matritva Abhiyan (PMSMA), and the LaQshya programme. These interventions have significantly increased the utilization of antenatal care (ANC), institutional deliveries, skilled

birth attendance, and postnatal care (PNC), leading to a substantial reduction in the Maternal Mortality Ratio (MMR) at the national level. However, the synthesis of existing evidence clearly demonstrates that these achievements have been unevenly distributed across the country. Marked regional disparities continue to exist between the North Eastern Region (NER) and mainland India, with the southern and western states consistently recording better maternal health indicators owing to stronger health infrastructure, higher female literacy, improved socioeconomic conditions, and more effective implementation of public health programmes. In contrast, many districts of Assam, Arunachal Pradesh, Meghalaya, and Nagaland continue to exhibit comparatively lower utilization of comprehensive maternal healthcare services. Furthermore, recent evidence suggests that maternal health disparities are not confined to interstate differences alone but also exist within the North Eastern Region, where considerable district-level variations reflect localized inequalities that are often concealed by state-level averages.

The review further identifies geographical accessibility and socioeconomic inequality as the most influential determinants of maternal healthcare utilization in the North Eastern Region. The mountainous terrain, dispersed settlements, poor road connectivity, seasonal flooding, difficult transportation, and long travel distances substantially restrict timely access to antenatal care, emergency obstetric services, institutional deliveries, and postnatal care. These physical barriers frequently delay referral services, increase dependence on home deliveries, and contribute to poorer maternal health outcomes in geographically isolated communities. The findings strongly support the "Three Delays Model," which explains that delays in deciding to seek care, reaching healthcare facilities, and receiving appropriate treatment collectively increase maternal health risks. Simultaneously, socioeconomic disadvantages further intensify regional disparities. Women belonging to poorer households, Scheduled Tribes, rural communities, and educationally disadvantaged groups consistently demonstrate lower utilization of maternal healthcare services than wealthier, urban, and better-educated women. Higher educational attainment enhances awareness regarding pregnancy-related complications, promotes early antenatal registration, increases compliance with recommended ANC visits and nutritional supplementation, and encourages institutional delivery. Likewise, household wealth reduces financial barriers associated with transportation and healthcare expenses, while women's autonomy and media exposure improve healthcare-seeking behaviour and informed decision-making. These findings indicate that geographical isolation and socioeconomic deprivation interact synergistically to reinforce maternal health inequalities across the North Eastern Region.

The review also highlights that variations in health system capacity, cultural diversity, and ethnic composition substantially influence maternal healthcare utilization across India. Compared with economically advanced mainland states, many districts in the North Eastern Region continue to experience shortages of obstetricians, anaesthetists, emergency obstetric care facilities, blood banks, referral transport systems, and other essential healthcare infrastructure, thereby limiting the effectiveness of maternal health programmes despite similar policy frameworks. In addition, tribal and indigenous communities frequently encounter linguistic barriers, traditional childbirth practices, limited awareness of available maternal health services, and lower levels of trust in formal healthcare institutions, which often discourage the utilization of antenatal care and institutional delivery even when services are physically accessible. States such as Mizoram, Sikkim, and Tripura have achieved relatively better maternal health outcomes, whereas several districts of Assam, Arunachal Pradesh, Meghalaya, and Nagaland continue to lag behind, highlighting considerable intraregional heterogeneity. Overall, the reviewed evidence demonstrates that maternal health disparities between the North Eastern Region and mainland India arise from the complex interaction of geographical accessibility, socioeconomic conditions, educational attainment, women's empowerment, cultural practices, ethnicity, and health system capacity. The findings underscore the necessity for decentralized, district-specific, and culturally responsive policy interventions aimed at strengthening healthcare infrastructure, improving transportation and referral mechanisms, enhancing women's education and empowerment, and addressing the unique geographical and social challenges of the North Eastern Region to ensure equitable maternal health outcomes across India.

Discussion

The present review demonstrates that although India has achieved remarkable progress in maternal health through the implementation of the National Rural Health Mission (NRHM), the National Health Mission (NHM), and complementary programmes such as the Janani Suraksha Yojana (JSY), significant regional inequalities continue to characterize maternal healthcare utilization. The findings corroborate the observations of Bloom, Lippeveld, and Wypij (1999), who identified education, household economic status, and physical accessibility as fundamental determinants of maternal healthcare utilization. Similarly, the interstate disparities reported by Navaneetham and Dharmalingam (2002) remain evident, as the southern and western states continue to perform considerably better than many North Eastern states in terms of antenatal care, institutional delivery, skilled birth attendance, and postnatal care. The review further supports the findings of Pallikadavath, Foss, and Stones (2004) and Singh et al. (2014), who demonstrated that maternal education, household wealth, and accessibility to healthcare facilities are among the strongest predictors of safe motherhood practices. Consistent with the arguments of Victora et al. (2016), the present review confirms that national maternal health achievements often conceal substantial regional and district-level disparities. Consequently, state-level

averages may not adequately reflect the maternal health conditions prevailing in geographically isolated and socioeconomically disadvantaged districts of the North Eastern Region, emphasizing the need for disaggregated regional analyses to guide equitable policy formulation.

Another important observation emerging from the review is the multidimensional influence of geographical accessibility, socioeconomic disadvantage, and health system capacity on maternal healthcare utilization in the North Eastern Region. The findings strongly support the "Three Delays Model" proposed by Thaddeus and Maine (1994), which explains how delays in deciding to seek care, reaching health facilities, and receiving appropriate treatment collectively increase maternal health risks. The difficult topography, scattered settlements, inadequate transportation, seasonal flooding, and poor road connectivity prevailing across many North Eastern districts substantially restrict timely access to emergency obstetric care and institutional delivery. These observations are in close agreement with Gabrysch et al. (2011) and Kumar et al. (2013), who identified geographical isolation and inadequate transport infrastructure as major barriers to maternal healthcare utilization. Likewise, the review confirms the findings of Scott and Shanker (2010) and Randive et al. (2013), who highlighted persistent shortages of skilled healthcare personnel and implementation challenges in remote regions despite the expansion of national maternal health programmes. Furthermore, the review reinforces the conclusions of Joe, Mishra, and Navaneetham (2015), Singh, Rai, and Singh (2012), and Mohanty and Srivastava (2013), who emphasized that poverty, educational disadvantage, tribal status, and limited financial resources continue to restrict maternal healthcare utilization even when public health programmes provide financial incentives. Thus, geographical barriers and socioeconomic inequalities do not operate independently but interact to reinforce maternal health disparities across the North Eastern Region.

The review also underscores the critical importance of women's empowerment, cultural diversity, and health system strengthening in achieving equitable maternal healthcare outcomes. Consistent with the findings of Glei, Goldman, and Rodríguez (2003), Stephenson and Tsui (2002), and Fotso, Ezeh, and Essendi (2009), women's decision-making autonomy, educational attainment, and exposure to health information significantly enhance healthcare-seeking behaviour and the utilization of maternal health services. At the same time, the observations of Baral et al. (2010) and Montgomery et al. (2014) regarding the influence of tribal culture, language barriers, and traditional childbirth practices are particularly relevant to the North Eastern Region, where ethnic diversity frequently shapes maternal healthcare utilization. The review further supports the conclusions of Houweling et al. (2007) and Kassebaum et al. (2016) that improvements in maternal health depend not only on expanding healthcare coverage but also on ensuring equity, quality of care, accessibility, and broader socioeconomic development. Overall, the evidence suggests that reducing maternal health disparities between the North Eastern Region and mainland India requires a comprehensive and context-specific approach that integrates improvements in healthcare infrastructure, referral transport systems, specialist workforce availability, women's education and empowerment, culturally sensitive healthcare delivery, and district-specific planning. Such an integrated strategy would strengthen the effectiveness of national maternal health programmes and contribute substantially to achieving equitable maternal health outcomes and the Sustainable Development Goals across all regions of India.

Summary and Conclusion

The present review provides a comprehensive synthesis of the existing literature on maternal health disparities between the North Eastern Region (NER) and mainland India, highlighting the multidimensional nature of regional inequalities in maternal healthcare utilization. The review demonstrates that although India has made significant progress in reducing maternal mortality and improving antenatal care (ANC), institutional delivery, skilled birth attendance, and postnatal care (PNC) through the implementation of the National Rural Health Mission (NRHM), the National Health Mission (NHM), and other flagship maternal health programmes, these achievements have not been uniformly distributed across regions. The evidence consistently indicates that women residing in many districts of the North Eastern states continue to experience comparatively lower utilization of maternal healthcare services than those in the more developed mainland states. The review identifies geographical isolation, inadequate transportation, difficult terrain, shortages of skilled healthcare personnel, weak referral systems, poverty, low educational attainment, tribal status, cultural diversity, limited women's autonomy, and insufficient health infrastructure as the principal determinants of these disparities. Furthermore, the findings reveal that maternal health inequalities exist not only between the North Eastern Region and mainland India but also among districts within the North Eastern states themselves, indicating that state-level averages often conceal substantial localized disparities requiring focused policy attention.

Thus, maternal health disparities in India are the outcome of the complex interaction of geographical, socioeconomic, cultural, and health system factors, which cannot be adequately addressed through uniform national strategies alone. Although government initiatives have substantially expanded maternal healthcare coverage, their effectiveness continues to vary according to regional context, infrastructural capacity, and local implementation mechanisms. Therefore, achieving equitable maternal health outcomes requires decentralized and evidence-based policy interventions that are responsive to the unique needs of geographically remote and socially vulnerable populations, particularly those residing in the North Eastern Region. Strengthening healthcare infrastructure, improving transportation and emergency

referral systems, ensuring the availability of skilled healthcare professionals, promoting women's education and decision-making autonomy, expanding culturally appropriate maternal healthcare services, and enhancing community awareness are essential for reducing persistent regional inequalities. Future research should utilize recent NFHS datasets and advanced spatial and multilevel analytical techniques to investigate district-level variations and the interaction of social, economic, and geographical determinants of maternal health. Such evidence will support the formulation of targeted interventions and strengthen India's progress toward achieving universal maternal healthcare, reducing preventable maternal mortality, and fulfilling the maternal health targets of the Sustainable Development Goals.

Implications

The findings of this review have important policy, programmatic, research, and public health implications for improving maternal healthcare in India, particularly in the North Eastern Region (NER). The evidence suggests that reducing maternal health disparities requires a shift from uniform national approaches to region-specific and district-focused strategies that address the unique geographical, socioeconomic, cultural, and health system challenges of the North East. Policymakers should prioritize strengthening healthcare infrastructure, ensuring the availability of skilled obstetric personnel, expanding emergency obstetric care facilities, improving transportation and referral networks, and enhancing digital health services in remote and inaccessible areas. Simultaneously, greater emphasis should be placed on promoting female education, women's decision-making autonomy, community awareness, and culturally sensitive maternal healthcare interventions tailored to tribal and indigenous populations. Strengthening the implementation and monitoring of existing programmes under the National Health Mission through decentralized planning and district-specific resource allocation can substantially improve service delivery and equity. From a research perspective, the review highlights the need for comparative regional studies using recent NFHS and other nationally representative datasets, together with spatial, multilevel, and geospatial analytical techniques, to identify localized determinants of maternal healthcare utilization and vulnerable population clusters. Such evidence-based investigations will facilitate the formulation of targeted interventions, optimize resource allocation, and support the development of inclusive maternal health policies that reduce regional inequalities and accelerate India's progress toward achieving universal maternal healthcare and the Sustainable Development Goals.

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