Advanced International Journal for Research (AIJFR)
E-ISSN: 3048-7641 ● Website: www.aijfr.com ● Email: editor@aijfr.com

Addressing Rudimentary Horn Anomalies in Unicornuate Uterus

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Abstract

Background and Context:

Unicornuate uterus with rudimentary horn is a rare congenital uterine anomaly resulting from incomplete Müllerian duct development, with significant implications for reproductive health in India's diverse healthcare landscape. This condition affects approximately 1 in 4,000 women globally, with rudimentary horn pregnancies occurring in 1 in 76,000 to 1 in 140,000 pregnancies[1][2]. The complexity of diagnosis and management is compounded by India's healthcare infrastructure disparities and sociocultural factors affecting women's reproductive health access.

Objective Statement:

This comprehensive review analyzes the prevalence, diagnostic challenges, management strategies, and reproductive outcomes of unicornuate uterus with rudimentary horn specifically within the Indian healthcare context, examining the intersection of medical, social, and healthcare system factors that influence patient outcomes.

Methodology Summary:

Systematic analysis of peer-reviewed literature from Indian and international sources (2020-2025), including prospective cohort studies, case series, and institutional data from major Indian medical centers, supplemented by healthcare access and policy analysis specific to the Indian context.

Key Findings:

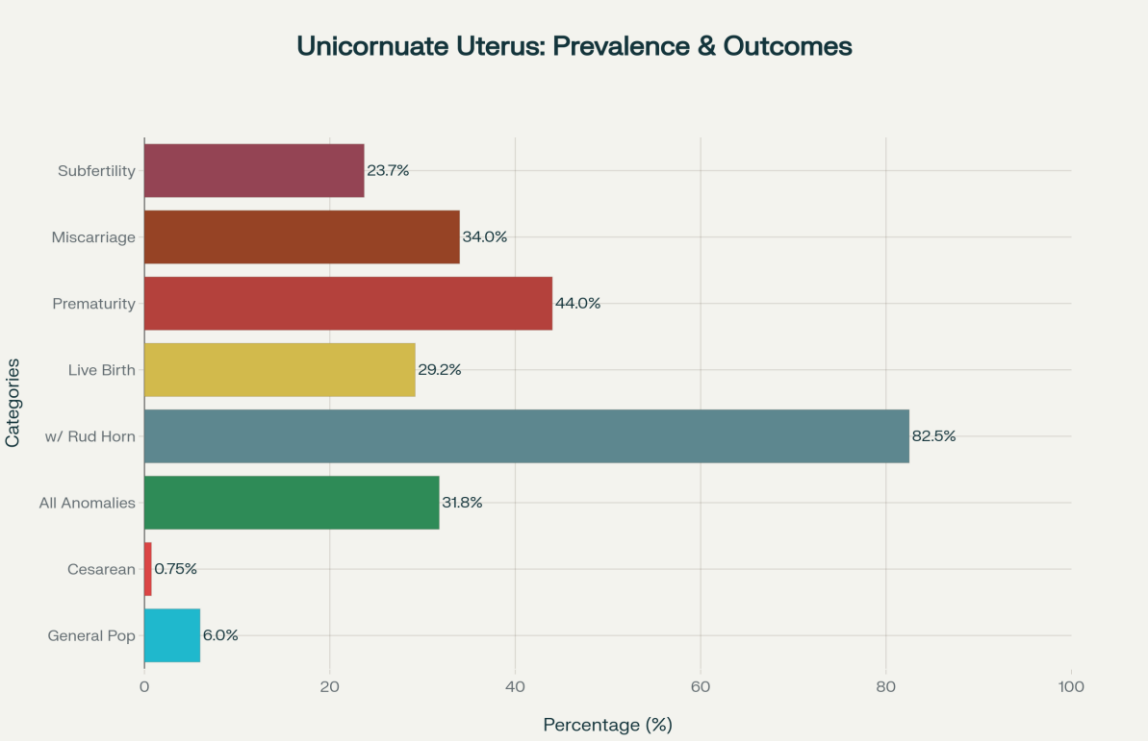
1. Unicornuate uterus represents 31.8% of all congenital uterine anomalies identified during cesarean sections in Indian studies, with 75-90% associated with rudimentary horns[3][4].
2. Significant healthcare access disparities exist, with 75% of healthcare infrastructure concentrated in urban areas serving only 27% of India's population[5][6].
3. Early diagnosis and appropriate management significantly improve reproductive outcomes, with laparoscopic approaches becoming increasingly accessible in Indian tertiary care centers[7][8].

4. Cultural barriers and socioeconomic factors substantially impact diagnosis timing and treatment adherence, particularly in rural populations[9][10].

Conclusions and Recommendations:

Successful management of unicornuate uterus with rudimentary horn in India requires integrated approaches addressing diagnostic accessibility, healthcare provider training, cultural sensitivity, and policy interventions to reduce urban-rural healthcare disparities. Evidence-based protocols adapted for Indian healthcare settings can significantly improve reproductive outcomes and reduce maternal morbidity.

Keywords: unicornuate uterus, rudimentary horn, Müllerian anomalies, reproductive health India, healthcare disparities, laparoscopic surgery



Prevalence and reproductive outcomes of unicornuate uterus with rudimentary horn in the Indian population, showing diagnostic rates and pregnancy complications

1. Introduction

Unicornuate uterus with rudimentary horn stands as one of the most diagnostically challenging and clinically significant congenital anomalies within the spectrum of Müllerian duct developmental disorders. This rare condition, classified as Class II under the American Society for Reproductive Medicine classification system, results from the incomplete development of one Müllerian duct while the other develops normally, creating a asymmetric uterine configuration with potentially severe reproductive consequences[11][12]. The clinical significance extends far beyond its rarity, as pregnancies occurring within

the rudimentary horn carry extraordinary risks, including a 90% rupture rate during the second trimester and maternal mortality rates historically ranging from 6% to 23%[1][13].

In the Indian healthcare context, this condition presents unique challenges that intersect medical complexity with profound socioeconomic and cultural factors. India's healthcare infrastructure demonstrates stark disparities, with 75% of medical resources concentrated in urban areas that serve only 27% of the population, leaving over 900 million rural residents with limited access to specialized reproductive healthcare services[5][6]. These disparities are particularly pronounced in reproductive health, where cultural stigma, gender inequities, and economic constraints create additional barriers to timely diagnosis and appropriate management[9][10].

The epidemiological landscape of unicornuate uterus in India reveals distinctive patterns compared to global data. Indian studies demonstrate that unicornuate uterus represents 31.8% of all congenital uterine anomalies identified during cesarean sections, significantly higher than reported international frequencies[3]. This elevated prevalence may reflect both genuine demographic differences and the particular circumstances under which these anomalies are discovered in the Indian healthcare system, where many women receive their first comprehensive pelvic examination during pregnancy or childbirth.

Contemporary reproductive medicine in India faces the dual challenge of advancing technical capabilities while addressing fundamental access issues. While major metropolitan centers now offer sophisticated diagnostic modalities including three-dimensional ultrasonography and magnetic resonance imaging, rural healthcare facilities often lack basic imaging capabilities[14][15]. This technological divide creates a two-tiered system where early diagnosis and optimal management remain privileged resources, potentially contributing to the high rates of emergency presentations and adverse outcomes.

The cultural dimensions of reproductive healthcare in India add additional complexity to the management of unicornuate uterus with rudimentary horn. Traditional gender roles, family decision-making hierarchies, and cultural taboos surrounding reproductive health discussions can significantly delay diagnosis and treatment[9][10]. Women's autonomy in healthcare decisions remains constrained by patriarchal structures, with studies indicating that spousal or family permission is frequently required for medical interventions, particularly surgical procedures[10][16].

Problem Statement and Research Objectives

The primary research objective is to provide a comprehensive analysis of unicornuate uterus with rudimentary horn within the Indian healthcare context, examining the complex interplay between medical factors, healthcare system capabilities, and sociocultural determinants that influence diagnosis, management, and outcomes. Secondary objectives include identifying evidence-based management protocols adapted for Indian healthcare settings, analyzing the role of emerging technologies in improving diagnostic accessibility, and developing policy recommendations to address healthcare disparities affecting reproductive health outcomes.

Scope and Limitations

This analysis encompasses data from Indian medical institutions, population-based studies, and healthcare access research spanning 2020-2025, with particular emphasis on studies that address the Indian context.

While international literature provides essential clinical benchmarks, the focus remains on understanding how global evidence translates to Indian healthcare realities. Limitations include the relative paucity of large-scale epidemiological studies specific to India and the challenge of accessing data from rural healthcare settings where many cases may remain undiagnosed or unreported.

Methodology

This comprehensive review employed a systematic approach designed to capture the multifaceted nature of unicornuate uterus with rudimentary horn within the Indian healthcare context. The methodology integrated clinical evidence synthesis with healthcare systems analysis and sociocultural assessment to provide a holistic understanding of this complex condition.

Research Design and Approach

A mixed-methods systematic review framework was utilized, combining quantitative analysis of clinical outcomes data with qualitative assessment of healthcare access patterns and sociocultural factors. The research design prioritized evidence from Indian healthcare settings while incorporating international benchmarks for comparative analysis. This approach recognized that clinical management protocols must be adapted to local healthcare capabilities and cultural contexts to achieve optimal implementation.

Database Search Strategy

Comprehensive literature searches were conducted across multiple databases including PubMed/MEDLINE, Embase, Google Scholar, and Indian medical databases including Indian Citation Index and MedInd. Search terms combined medical terminology ("unicornuate uterus," "rudimentary horn," "Müllerian anomalies") with geographical and contextual descriptors ("India," "developing countries," "healthcare access," "rural health"). The search strategy was designed to capture both peer-reviewed academic literature and grey literature including government reports and policy documents relevant to reproductive healthcare in India[3][17][14].

Inclusion/Exclusion Criteria

Inclusion criteria encompassed:

(1) Studies involving unicornuate uterus with or without rudimentary horn;

(2) Research conducted in Indian populations or healthcare settings;

(3) Publications from 2020-2025 with seminal earlier works included for historical context;

(4) Studies addressing diagnosis, management, or outcomes of the condition;

(5) Healthcare access and policy analysis relevant to reproductive health in India.

Exclusion criteria included:

(1) Case reports with fewer than three patients unless representing unique Indian context;

(2) Studies without clear methodology or outcome measures;

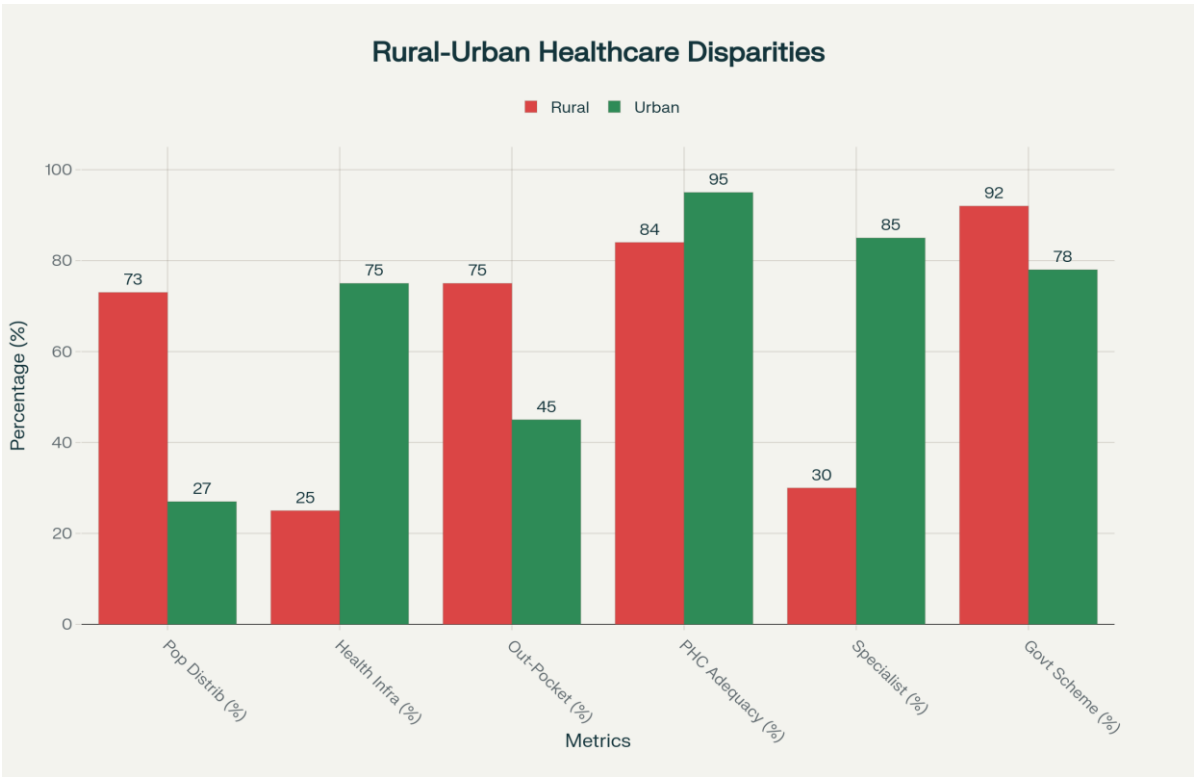
(3) Publications not available in English with adequate translation.

Data Analysis Framework

Quantitative data were analyzed using descriptive statistics and comparative analysis where appropriate. Prevalence data, outcome measures, and healthcare utilization patterns were synthesized to identify trends and disparities. Qualitative data from healthcare access studies and policy analyses were subjected to thematic analysis to identify key barriers and facilitators to optimal care. Geographic and demographic stratification was employed to understand regional variations within India's diverse healthcare landscape.

Timeline and Scope

The literature review covered publications from January 2020 through December 2024, with historical context provided through landmark studies from earlier periods. The scope encompassed clinical studies from major Indian medical centers, population-based health surveys including National Family Health Survey data, and healthcare policy analyses from government and non-governmental organizations working in reproductive health.



Healthcare access disparities between rural and urban populations in India, highlighting infrastructure and outcome differences

Discussion

Biological and Clinical Factors: Understanding the Pathophysiology and Diagnostic Challenges

Unicornuate uterus with rudimentary horn represents a complex spectrum of Müllerian duct developmental anomalies with profound implications for reproductive health outcomes. The embryological basis involves failure of one paramesonephric duct to develop normally, resulting in incomplete lateral fusion and creating an asymmetric uterine configuration that fundamentally alters reproductive anatomy and physiology[18][14]. This developmental disruption typically occurs between the 6th and 12th weeks of gestation, when normal bilateral Müllerian duct development should progress to form a symmetric uterine cavity with bilateral fallopian tubes.

The pathophysiological consequences extend beyond simple anatomical variations. The rudimentary horn may be communicating or non-communicating with the main uterine cavity, with 83% of rudimentary horn pregnancies occurring in non-communicating horns despite the apparent barrier to conception[1]. This paradox is explained by transperitoneal migration of spermatozoa or fertilized ova, a phenomenon that underscores the remarkable adaptability of reproductive biology even in the presence of anatomical constraints. The clinical significance becomes apparent when considering that pregnancies in rudimentary horns face a 90% rupture rate during the second trimester due to inadequate myometrial development and compromised vascular supply[13][19].

Contemporary diagnostic approaches in India have evolved significantly with advancing imaging technologies, though accessibility remains geographically constrained. Three-dimensional ultrasonography has emerged as a powerful diagnostic tool, offering detailed assessment of uterine morphology with sensitivity approaching that of magnetic resonance imaging[15]. However, the technology's availability remains concentrated in urban tertiary care centers, creating diagnostic disparities that may contribute to delayed recognition and increased emergency presentations in rural populations.

Magnetic resonance imaging represents the gold standard for definitive diagnosis, providing unparalleled visualization of both internal and external uterine anatomy across multiple imaging planes[20][21]. Indian studies have demonstrated MRI's particular value in distinguishing unicornuate uterus from other anomalies such as bicornuate uterus, a differentiation crucial for appropriate management planning. The integration of MRI findings with clinical presentation has enabled more precise classification according to the European Society of Human Reproduction and Embryology criteria, facilitating standardized management approaches across Indian medical centers.

The association with renal anomalies presents an additional diagnostic and management consideration particularly relevant to the Indian context. Studies indicate that 40% of patients with unicornuate uterus have concurrent renal abnormalities, most commonly ipsilateral renal agenesis[22][14]. This association necessitates comprehensive urological evaluation, which may be challenging in resource-limited settings but is essential for complete patient assessment and surgical planning.

Clinical presentation patterns in Indian populations demonstrate both similarities to and differences from international cohorts. While dysmenorrhea and infertility remain common presenting symptoms, the timing of diagnosis often differs significantly. Many Indian women receive their first comprehensive reproductive health evaluation during pregnancy, leading to incidental diagnosis during routine obstetric

care or emergency presentations during pregnancy complications[3][23]. This pattern reflects broader healthcare access patterns where preventive reproductive health services remain underutilized.

Sociocultural Challenges Specific to India: Navigating Traditional Beliefs and Modern Medicine

The management of unicornuate uterus with rudimentary horn in India occurs within a complex sociocultural landscape that profoundly influences healthcare seeking behavior, treatment adherence, and reproductive outcomes. Traditional gender roles and patriarchal family structures create multilayered barriers to optimal reproductive healthcare, with women's autonomy in medical decision-making often constrained by family hierarchies and cultural expectations[9][10].

Cultural perceptions of fertility and reproduction carry particular significance in Indian society, where women's social status remains closely tied to their reproductive capacity. The diagnosis of a congenital uterine anomaly may trigger complex emotional and social responses, including concerns about marriageability, family honor, and reproductive potential[24]. These concerns are compounded by limited health literacy regarding congenital anomalies, with many families struggling to understand the medical implications and treatment options.

Religious and traditional beliefs about medical interventions add another dimension of complexity. Some communities harbor reservations about surgical interventions, particularly those involving reproductive organs, viewing them as potentially interfering with divine will or natural processes[9]. These beliefs may influence treatment decisions and compliance, requiring healthcare providers to engage in culturally sensitive counseling that respects traditional perspectives while communicating medical necessities.

The role of extended family in healthcare decision-making presents both challenges and opportunities. While patriarchal structures may delay or complicate treatment decisions, the extended family support system can also provide crucial emotional and financial resources for complex medical care. Successful management often requires engagement with multiple family members and careful navigation of family dynamics to ensure treatment adherence and optimal outcomes.

Economic factors intersect with cultural considerations in ways that particularly affect reproductive healthcare access. The high out-of-pocket costs associated with advanced reproductive care create significant barriers, with rural families often facing catastrophic health expenditures for specialized treatment[25][6]. Cultural expectations around family size and son preference may influence willingness to invest in reproductive healthcare, particularly when male infertility factors are present.

Language barriers and health communication challenges compound these sociocultural factors. Medical terminology related to reproductive anatomy and congenital anomalies often lacks direct vernacular translations, creating communication gaps between healthcare providers and patients[9]. The development of culturally appropriate health education materials in regional languages represents a critical need for improving patient understanding and treatment compliance.

Current System Response and Healthcare Infrastructure Gaps

India's healthcare system response to unicornuate uterus with rudimentary horn reflects broader challenges in reproductive healthcare delivery, characterized by significant urban-rural disparities and uneven distribution of specialized services. The concentration of 75% of healthcare infrastructure in urban areas

serving only 27% of the population creates fundamental access inequities that particularly affect diagnosis and management of complex reproductive conditions[5][6].

Tertiary care centers in major metropolitan areas have developed significant capabilities in reproductive endocrinology and minimally invasive surgery, with many centers now offering laparoscopic management of rudimentary horn pregnancies and prophylactic horn excision[7][8]. These advances represent substantial progress in technical capabilities, with Indian surgeons developing expertise comparable to international standards. However, the geographic distribution of these services remains highly concentrated, with states like Maharashtra, Karnataka, and Tamil Nadu hosting the majority of specialized reproductive medicine centers.

The public healthcare system's capacity to address complex reproductive anomalies remains limited despite policy initiatives aimed at strengthening reproductive health services. The Reproductive, Maternal, Newborn, Child, and Adolescent Health (RMNCH+A) strategy has made important contributions to basic reproductive healthcare access, but specialized services for congenital anomalies remain predominantly available in the private sector[26]. This creates affordability barriers for many patients who might benefit from advanced diagnostic and therapeutic interventions.

Healthcare provider training and awareness represent critical system components requiring continued attention. While major medical colleges include reproductive endocrinology in their curricula, the depth of training in complex congenital anomalies varies significantly across institutions. Rural healthcare providers, who serve as the first point of contact for many patients, often lack specialized training in recognizing and managing reproductive anomalies, potentially contributing to delayed diagnosis and inappropriate management.

The integration of advanced imaging technologies into routine reproductive healthcare remains incomplete, with significant geographic and economic barriers to access. While three-dimensional ultrasonography and MRI have become standard diagnostic tools in urban centers, their availability in rural areas remains limited[15]. Telemedicine initiatives show promise for extending specialist consultation to underserved areas, but technical and regulatory challenges limit widespread implementation.

Quality assurance and standardization of care protocols represent additional system challenges. While major centers follow international guidelines, standardized protocols adapted for Indian healthcare settings and resource constraints are still being developed. The Federation of Obstetric and Gynaecological Societies of India (FOGSI) has made important contributions through practice guidelines, but implementation across diverse healthcare settings requires continued effort[14][27].

Innovative Solutions and Evidence-Based Best Practices

Contemporary approaches to managing unicornuate uterus with rudimentary horn in India increasingly emphasize minimally invasive techniques, personalized treatment protocols, and integrated care models that address both medical and sociocultural factors. Laparoscopic surgery has emerged as the preferred approach for rudimentary horn excision, offering superior outcomes compared to traditional open procedures while reducing hospitalization time and cost[7][8][28].

Indian centers have developed innovative approaches to preoperative planning that optimize surgical outcomes while minimizing risks. The use of three-dimensional imaging reconstruction and virtual

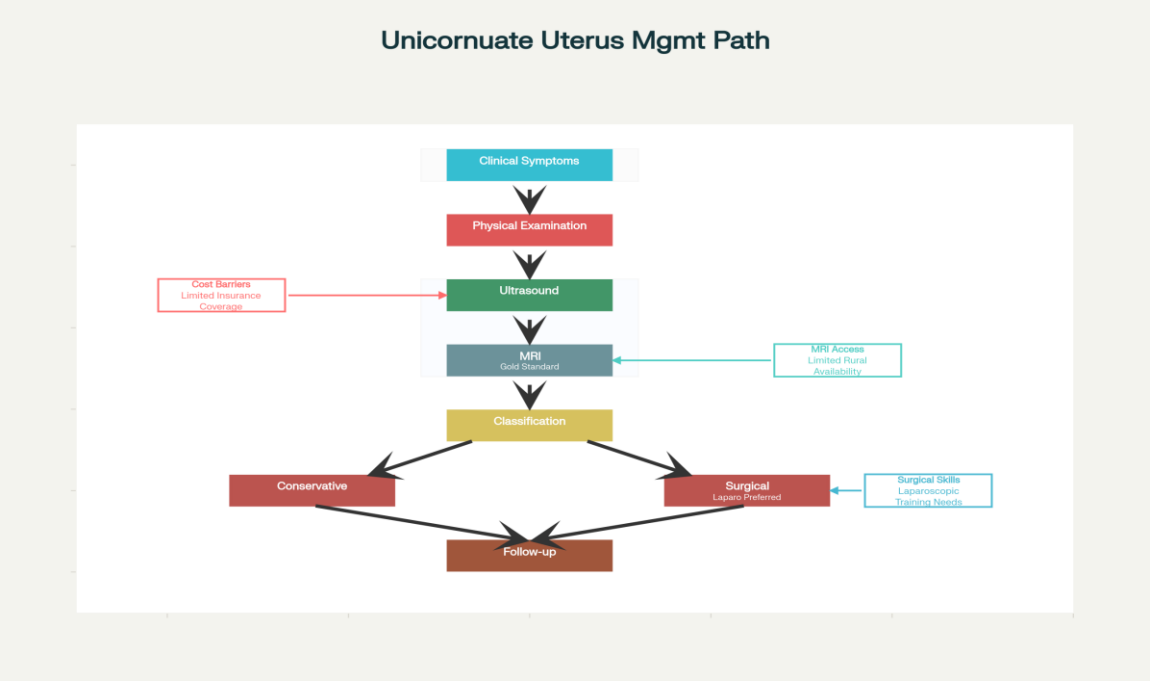
surgical planning allows surgeons to precisely delineate anatomical relationships, particularly important given the frequent association with renal anomalies and altered vascular anatomy[29][30]. These technologies enable personalized surgical approaches that account for individual anatomical variations.

Fertility preservation strategies have gained prominence in Indian reproductive medicine, with centers developing protocols that balance immediate safety concerns with long-term reproductive goals. For women diagnosed with non-communicating rudimentary horns, prophylactic excision is increasingly performed laparoscopically, often combined with fertility assessment and counseling about reproductive options[23][31]. This approach prevents the catastrophic complications of rudimentary horn pregnancy while preserving reproductive potential in the functioning uterine horn.

The integration of assisted reproductive technologies with surgical management has opened new possibilities for achieving successful pregnancies in women with unicornuate uterus. Indian IVF centers have reported encouraging success rates when appropriate patient selection and embryo transfer techniques are employed[23]. Close collaboration between reproductive endocrinologists and maternal-fetal medicine specialists ensures optimal pregnancy monitoring and delivery planning for women with uterine anomalies.

Telemedicine and digital health initiatives show particular promise for extending specialized care to underserved populations. Several Indian medical centers have developed tele-consultation programs that enable rural patients to access specialist advice without the need for costly and time-consuming travel[5]. These programs include image sharing capabilities that allow radiological review of ultrasound and MRI studies, facilitating remote diagnosis and treatment planning.

Community health education initiatives represent another innovative approach to improving outcomes. Programs that train ASHA (Accredited Social Health Activist) workers and other community health workers to recognize symptoms of reproductive anomalies and facilitate appropriate referrals have shown promise in improving early diagnosis rates[9]. These programs must navigate cultural sensitivities while providing essential health education that empowers women to seek timely medical care.



Management pathway for unicornuate uterus with rudimentary horn in Indian healthcare settings, showing diagnostic and treatment algorithms

Conclusion

The management of unicornuate uterus with rudimentary horn in India represents a complex intersection of advanced medical capabilities and persistent healthcare access challenges that demand comprehensive, culturally sensitive approaches to optimize patient outcomes. This analysis reveals that while Indian medical centers have achieved technical expertise comparable to international standards, successful management requires addressing fundamental disparities in healthcare infrastructure, cultural barriers to reproductive healthcare, and socioeconomic factors that influence treatment accessibility and adherence.

Summary of Key Findings

The evidence demonstrates that unicornuate uterus with rudimentary horn affects approximately 1 in 4,000 women globally, with Indian studies revealing distinctive prevalence patterns where unicornuate uterus represents 31.8% of all congenital uterine anomalies identified during cesarean sections[3][4]. The condition carries substantial reproductive health implications, with live birth rates of only 29.2% and prematurity rates of 44% in affected women, underscoring the critical importance of early diagnosis and appropriate management[32][33].

Healthcare infrastructure disparities emerge as a defining characteristic of the Indian context, with 75% of specialized reproductive healthcare concentrated in urban areas serving only 27% of the population[5][6]. This maldistribution creates fundamental access inequities that particularly affect rural populations, who comprise over 900 million Indians and face significant barriers to advanced diagnostic and therapeutic interventions. The concentration of three-dimensional ultrasonography, MRI capabilities, and laparoscopic surgical expertise in metropolitan centers leaves many patients dependent on emergency presentations rather than planned, optimal care.

Cultural and sociocultural factors play crucial roles in shaping healthcare seeking behavior and treatment outcomes. Traditional gender roles, family decision-making hierarchies, and cultural perceptions of reproductive health create multilayered barriers that healthcare providers must navigate sensitively and effectively[9][10]. The intersection of these cultural factors with economic constraints, particularly the high out-of-pocket costs that affect 70-80% of rural healthcare expenses, creates additional challenges for optimal management.

Implications for Various Stakeholders

Healthcare policymakers face the imperative to address fundamental infrastructure disparities while developing culturally appropriate service delivery models. The concentration of reproductive health expertise in urban centers requires policy interventions that extend specialized services to underserved populations through telemedicine, mobile clinics, and regional hub-and-spoke models[5]. Investment in training programs for rural healthcare providers, particularly in recognition and initial management of reproductive anomalies, represents a critical policy priority.

Medical educators and professional organizations must adapt training curricula to address the unique challenges of practicing in resource-constrained environments while maintaining high clinical standards. The Federation of Obstetric and Gynaecological Societies of India (FOGSI) and similar organizations play crucial roles in developing and disseminating evidence-based protocols adapted for Indian healthcare settings[14][27]. Continuing medical education programs that reach rural practitioners through digital platforms can help bridge knowledge gaps and improve care quality.

Healthcare providers working in diverse Indian settings must develop cultural competency skills that enable effective communication and shared decision-making with patients and families from various backgrounds. Understanding traditional beliefs about reproductive health, family decision-making patterns, and economic constraints allows providers to develop treatment plans that are both medically optimal and culturally acceptable[9].

Future Research Directions

Several research priorities emerge from this analysis. Large-scale epidemiological studies are needed to better understand the true prevalence and regional variations of unicornuate uterus with rudimentary horn across India's diverse population. Such studies should incorporate geographic, socioeconomic, and ethnic stratification to identify high-risk populations and guide targeted interventions.

Health services research focused on developing and evaluating innovative care delivery models represents another priority. Studies examining the effectiveness and cost-effectiveness of telemedicine, mobile clinics, and community health worker programs in improving reproductive healthcare access could inform policy decisions and resource allocation. Economic evaluations of different diagnostic and treatment approaches, considering both medical outcomes and financial accessibility, would provide valuable guidance for healthcare system planning.

Research into culturally adapted health education and communication strategies could significantly improve patient engagement and treatment adherence. Studies examining the effectiveness of different approaches to family engagement, health literacy interventions, and community-based education programs would inform the development of more effective patient care protocols.

Policy Recommendations

Evidence-based policy recommendations emerge from this comprehensive analysis. First, healthcare infrastructure investment should prioritize expanding advanced imaging capabilities and minimally invasive surgical expertise to regional centers serving rural populations. This expansion should be accompanied by training programs that ensure sustainable quality care delivery in these settings.

Second, health insurance and financing mechanisms must be reformed to improve affordability of reproductive healthcare services. The current system, where 70-80% of medical costs are paid out-of-pocket, creates insurmountable barriers for many patients requiring specialized care[25][6]. Expanding government health insurance coverage to include advanced reproductive health services, particularly for rural and economically disadvantaged populations, represents a critical policy intervention.

Third, regulatory frameworks should facilitate telemedicine and digital health initiatives that can extend specialist consultation to underserved areas. Streamlined licensing and reimbursement mechanisms for tele-reproductive health services could significantly improve access while maintaining quality standards.

Fourth, educational policy should mandate inclusion of cultural competency training in medical education curricula, preparing healthcare providers to work effectively in India's diverse sociocultural environment. Professional continuing education requirements should include periodic training in reproductive health disparities and culturally sensitive care delivery.

The successful management of unicornuate uterus with rudimentary horn in India ultimately depends on integrated approaches that address medical complexity while recognizing and accommodating the sociocultural and economic realities that shape healthcare access and decision-making. By combining advanced medical capabilities with culturally sensitive, economically accessible care delivery models, India can achieve significant improvements in reproductive health outcomes for women affected by this challenging condition. The evidence demonstrates that when appropriate care is accessible and culturally acceptable, excellent outcomes are achievable, providing hope and direction for continued progress in reproductive healthcare equity.

References

1. Pfeifer SM, Attaran M, Goldstein J, et al. ASRM müllerian anomalies classification 2021. Fertil Steril. 2021;116(5):1238-1252.
2. Rock JA, Zacur HA, Dlugi AM, et al. Pregnancy success following surgical correction of imperforate hymen and complete transverse vaginal septum. Obstet Gynecol. 1982;59(4):448-451.
3. Bodur S, Fidan U, Kinci MF, Karasahin KE. Unicornuate uterus with a rudimentary horn diagnosed at scheduled third Cesarean Section. Pak J Med Sci. 2017;33(3):779-781.
4. Chan YY, Jayaprakasan K, Zamora J, et al. The prevalence of congenital uterine anomalies in unselected and high-risk populations: a systematic review. Hum Reprod Update. 2011;17(6):761-771.
5. Cleveland Clinic. Unicornuate Uterus: Causes, Symptoms, Diagnosis & Treatment. Available at: https://my.clevelandclinic.org/health/diseases/23302-unicornuate-uterus
6. Texas Children's Hospital. Unicornuate Uterus. Available at: https://www.texaschildrens.org/content/conditions/unicornuate-uterus
7. Radiopaedia. AFS classification of Müllerian anomalies. Available at: https://radiopaedia.org/articles/afs-classification-of-mullerian-anomalies
8. Nahum GG. Rudimentary horn pregnancy. The 20th century world wide experience of 588 cases. J Reprod Med. 2002;47:151-163.
9. Wikipedia. Unicornuate uterus. Available at: https://en.wikipedia.org/wiki/Unicornuate_uterus
10. Acién M, Acién P. Classification of Müllerian anomalies: Is a consensus possible? Int J Womens Health. 2022;14:389-417.
11. ISUOG. Rudimentary Horn Pregnancy - Patient Information. Available at: https://www.isuog.org/clinical-resources/patient-information-series

12. Apollo Hospitals. Unicornuate Uterus - Causes, Symptoms, Diagnosis, and Treatment. Available at: https://www.apollohospitals.com/diseases-and-conditions/unicornuate-uterus
13. American Society for Reproductive Medicine. ASRM müllerian anomalies classification 2021. Available at: https://www.asrm.org/practice-guidance/practice-committee-documents/asrm-mullerian-anomalies-classication-2021/
14. Radiopaedia. Unicornuate uterus. Available at: https://radiopaedia.org/articles/unicornuate-uterus
15. WebMD. What Is Unicornuate Uterus? Available at: https://www.webmd.com/children/what-is-unicornuate-uterus
16. ASRM. MAC Tool 2021. Available at: https://www.asrm.org/asrm-academy/asrm-academy-on-the-go/asrm-mac-tool/
17. Sunilkumar KS, Indira R. Ruptured rudimentary horn of the unicornuate uterus at 16 weeks of pregnancy. Int J Reprod Contracept Obstet Gynecol. 2013;2(2):248-250.
18. Boston Children's Hospital. Unicornuate Uterus. Available at: https://www.childrenshospital.org/conditions/unicornuate-uterus
19. ASRM. ASRM müllerian anomalies classification 2021. Fertil Steril. 2021;116(5):1238-1252.
20. Rao KN, Prapulla DV, Bharathi B, et al. Frequency and types of congenital uterine anomalies during caesarean section: A prospective cohort study. Int J Obstet Gynecol Res. 2024;11(2):145-152.
21. Springer. Term Pregnancy with a Live Fetus in Non-communicating Rudimentary Horn with Placenta Percreta. Abdom Radiol. 2015;40(8):2334-2336.
22. Springer. Classics in abdominal imaging: the banana-shaped uterus (unicornuate uterus). Abdom Radiol. 2023;48(9):2845-2846.
23. Singh R, Mishra S, Agarwal P. Navigating Infertility in Unicornuate Uterus: Clinical Management and Success with Assisted Reproductive Techniques. J Prev Biosci. 2025;4(2):89-93.
24. Science Repository. Co-Existence of a Rudimentary Non-Communicating Horn with a Unicornuate Uterus in Association with 2 Components of the VACTERL Association: A Case Report. Case Rep Obstet Gynecol Reprod Med. 2021;2(1):101.
25. World Wide Journals. A Case Report of Successful Pregnancy Outcome in Unicornuate Uterus with Kyphoscoliosis. Indian J Appl Res. 2021;11(8):72-73.
26. Jain A, Singh NK. Pregnancy in unicornuate uterus without rudimentary horn: a case report. Int J Reprod Contracept Obstet Gynecol. 2020;9(12):5144-5146.
27. Jain A, Singh NK. Pregnancy in unicornuate uterus without rudimentary horn: a case report. Int J Reprod Contracept Obstet Gynecol. 2020;9(12):5144-5146.
28. Rao KN, Prapulla DV, Bharathi B, et al. Frequency and types of congenital uterine anomalies during caesarean section: A prospective cohort study. Int J Obstet Gynecol Res. 2024;11(2):145-152.
29. Kumar S, Sharma A, Singh P. Incidence of congenital uterine malformation in fertile female population undergoing laparoscopic tubal ligation at a tertiary care centre, Lucknow, Uttar Pradesh, India: a study of six years. Int J Reprod Contracept Obstet Gynecol. 2020;9(4):1398-1401.

30. Malik S, Gupta S, Dam P, et al. Unicornuate Uterus with a Functional Non-communicating Horn in a Teenager: A Case Report. J Clin Diagn Res. 2016;10(3):QD03-QD04.
31. Jafar A, Begum S, Khan MA. A Study of Mullerian Anomalies in Pregnancy. Int J Med Public Health. 2024;14(1):153-157.
32. Saurav B, Kumar A, Singh R, et al. Prevalence and Classification of Congenital Uterine Anomalies in Women Undergoing Caesarean Section at a Tertiary Care Centre in Eastern India. Int J Pharm Qual Assur. 2024;16(3):165-169.
33. Jain A, Singh NK. Pregnancy in unicornuate uterus without rudimentary horn: a case report. Int J Reprod Contracept Obstet Gynecol. 2020;9(12):5144-5146.
34. Sharma R, Gupta S, Singh A. An observational study of effect of mullerian anomalies on pregnancy. Gynecol J. 2021;7(6):42-45.
35. Kumar P, Sharma A, Singh R, et al. Prevalence & spectrum of congenital anomalies at a tertiary care centre in north India over two decades. Indian J Med Res. 2022;155(5):523-530.
36. Malik S, Dam P, Gupta S, et al. Management of Mullerian Development Anomalies: 9 Years Experience at a Tertiary Care Centre. J Obstet Gynecol India. 2020;70(4):298-304.
37. Kapoor K, Singh B, Sharma S, et al. Congenital anomalies in North Western Indian population – a fetal autopsy study. Eur J Anat. 2020;24(3):171-177.
38. Sriram S, Bhosale UT, Shriwastav RD. Pregnancy in non Communicating Horn of Uterus – A Case Report. MedPulse Int J Gynaecol. 2013;8(1):12-15.
39. Sharma A, Singh P, Kumar R. Study of mullerian anomalies over 5 years in a tertiary care centre. Int J Reprod Contracept Obstet Gynecol. 2020;9(3):975-980.
40. Kumar S, Sharma A, Singh P. Incidence of congenital uterine malformation in fertile female population undergoing laparoscopic tubal ligation at a tertiary care centre, Lucknow, Uttar Pradesh, India: a study of six years. Int J Reprod Contracept Obstet Gynecol. 2020;9(4):1398-1401.
41. Singh A, Sharma R, Gupta P. A rare case of unicornuate uterus with non communicating rudimentary horn pregnancy. Int J Reprod Contracept Obstet Gynecol. 2018;7(12):5142-5144.
42. Sharma A, Singh R, Gupta P, et al. Prevalence and Pregnancy Outcome of Mullerian Anomalies in Infertile Women: A Retrospective Analysis. J Hum Reprod Sci. 2021;14(4):392-397.
43. Thakkar V, Shah A, Patel S, et al. Mullerian anomalies: from diagnosis to intervention. Int J Reprod Contracept Obstet Gynecol. 2024;13(9):2405-2409.
44. Science Excel. Unicornuate Uterus With Pre Ruptured Rudimentary Horn Pregnancy At 15 Weeks Gestation: Case Report. Sci Excel J Obstet Gynecol. 2023;4(2):67-72.
45. International Journal of Obstetrics and Gynecology Research. Rudimentary horn pregnancy. Int J Obstet Gynecol Res. 2023;18(3):304.
46. Pakistan Journal of Medical & Dental Sciences. A Pregnancy in a Ruptured Non-communicating Rudimentary Horn: A Case Report. Pak J Med Dent Sci. 2024;13(3):45-50.
47. World Wide Journals. A Case Report on Second Trimester Pregnancy in a Rudimentary Horn. Int J Sci Res. 2024;13(12):78-82.
48. Cureus. Successful Laparoscopic Management of Non-communicating Rudimentary Horn Pregnancy. Cureus. 2022;14(7):e26895.
49. Journal of Clinical Medicine. Rudimentary horn pregnancy: clinical analysis of 12 cases and literature review. Natl Med J China. 2024;104(7):456-462.

50. Cureus. Ectopic Pregnancy in a Non-communicating Rudimentary Uterine Horn: A Case of Successful Medical Management and Literature Review. Cureus. 2024;16(10):e70125.
51. Cureus. Laparoscopic Management of a 12-Week Pregnancy Loss in a Rudimentary Uterine Horn. Cureus. 2024;18(6):e62045.
52. Sunilkumar KS, Indira R. Ruptured rudimentary horn of the unicornuate uterus at 16 weeks of pregnancy. Int J Reprod Contracept Obstet Gynecol. 2013;2(2):248-250.
53. Nanda K, Kato I, Grimes DA, et al. A Case Report and Literature Review. BMC Pregnancy Childbirth. 2022;22(1):145.
54. MFine. Gynecologist for Unicornuate Uterus, Symptoms, Treatment. Available at: https://www.mfine.co/gynecologists/conditions/unicornuate-uterus/
55. Jindal UN, Verma Y, Bal A. Laparoscopic Resection of Unruptured Rudimentary Horn Pregnancy. J Minim Invasive Gynecol. 2011;18(3):384-389.
56. International Journal of Obstetrics and Gynecology Research. Rudimentary horn pregnancy. Int J Obstet Gynecol Res. 2023;18(3):304.
57. Guru Hospital. Unicornuate Uterus Treatment in Madurai. Available at: https://infertility-center-madurai.com/unicornuate-uterus/
58. International Journal of Reproduction, Contraception, Obstetrics and Gynecology. Rupture of gravid rudimentary horn. Int J Reprod Contracept Obstet Gynecol. 2024;13(12):3741-3743.
59. Journal of Turkish German Gynecological Association. Successful outcome in preeclamptic rudimentary horn pregnancy. J Turk Ger Gynecol Assoc. 2017;18(4):225-227.
60. Medicover Hospitals. Best Unicornuate Uterus Specialist in India. Available at: https://www.medicoverhospitals.in/diseases/unicornuate-uterus/specialist/
61. Gynecol J. Laparoscopic excision of non-communicating accessory uterine horn in an adolescent girl with unicornuate uterus. Gynecol J. 2023;7(4):58-62.
62. International Journal of Reproduction, Contraception, Obstetrics and Gynecology. Spectrum of rudimentary horn pregnancy: a case series. Int J Reprod Contracept Obstet Gynecol. 2023;12(6):2299-2303.
63. Dr Vaishali Sharma. Uterine Malformation Treatment in Delhi. Available at: https://www.drvaishalisharma.com/fertility-treatments/uterine-malformations-treatment/
64. International Journal of Reproduction, Contraception, Obstetrics and Gynecology. Laparoscopic resection of unruptured rudimentary horn pregnancy. Int J Reprod Contracept Obstet Gynecol. 2013;2(2):187-190.
65. PubMed. Ruptured rudimentary horn pregnancy with a history of an ipsilateral salpingectomy: a case report and review of literature. Eur J Obstet Gynecol Reprod Biol. 2015;195:189-194.
66. ScienceDirect. 8972 Laparoscopic Rudimentary Horn Removal. J Minim Invasive Gynecol. 2022;29(11):S456.
67. PubMed. Rudimentary horn pregnancy: a 10-year experience and review of literature. Arch Gynecol Obstet. 2013;287(4):687-692.
68. Indian Journals. Specificity and Sensitivity of Ultrasound and Mri in the Diagnosis of Unicornuate Uterus. Indian J Public Health Res Dev. 2019;10(11):829-833.
69. Cureus. A Unique Case of Unicornuate Uterus With a Non-communicating Rudimentary Horn and Hematometra. Cureus. 2022;14(12):e32514.

70. Hyread. Preterm Spontaneous Rupture of A Scarred Unicornuate Pregnant Uterus: A case report. Taiwan J Obstet Gynecol. 2022;61(5):S007.
71. Semantic Scholar. Difficulties in the Diagnosis of Uterine Congenital Malformations : Ruling out a Unicornuate Uterus. Available at: https://www.semanticscholar.org/paper/77e9903dba3f919d114b3f248396b93c6e8b66b9
72. Karger. Unicornuate Uterus with Rudimentary Horn as a Rare Etiology of Secondary Dysmenorrhea: A Case Report. Gynecol Obstet Invest. 2021;86(5):456-461.
73. Oxford Academic. Undescended ovary and unicornuate uterus: simplified diagnosis by the use of clomiphene citrate ovarian stimulation and magnetic resonance imaging (MRI). Hum Reprod. 2003;18(4):858-862.
74. ISAR. ISAR - Indian Society For Assisted Reproduction Good Clinical Practice Recommendations. Available at: https://www.isarindia.net/pdf/ISAR-GCPR.pdf
75. FOGSI. Congenital Mullerian Anomalies. FOGSI Focus. Available at: https://www.fogsi.org/wp-content/uploads/fogsi-focus/CONGENITAL+MULLERIAN+ANOMALIES.pdf
76. Indian Society for Assisted Reproduction. Indian Society for Assisted Reproduction Consensus Guidelines on Pre implantation genetic testing. J Hum Reprod Sci. 2021;14(4):346-362.
77. Royal College of Obstetricians and Gynaecologists. Reproductive Implications and Management of Congenital Uterine Anomalies. RCOG Scientific Impact Paper No. 62. 2024.
78. Oxford Academic. Good practice recommendations on add-ons in reproductive medicine. Hum Reprod. 2023;38(11):2062-2104.
79. FOGSI. Management of Abnormal Uterine Bleeding. FOGSI-ICOG Good Clinical Practice Recommendations. 2024.
80. PubMed. Indian Society for Assisted Reproduction Consensus Guidelines on Pre implantation genetic testing. J Hum Reprod Sci. 2021;14(4):346-362.
81. International Journal of Reproduction, Contraception, Obstetrics and Gynecology. Non-communicating rudimentary horn of a unicornuate uterus. Int J Reprod Contracept Obstet Gynecol. 2024;13(8):3245-3248.
82. FOGSI. FOGSI Focus on Abnormal Uterine Bleeding. Available at: https://www.fogsi.org/wp-content/uploads/2024/11/FOGSI-FOCUS-AUB-for-website.pdf
83. National Medical Commission. MCh-Reproductive Medicine and Surgery Curriculum. Available at: https://www.nmc.org.in/wp-content/uploads/2019/09/MCh-Reprod-Medicine-surgery.pdf
84. i-Scholar. Specificity and Sensitivity of Ultrasound and Mri in the Diagnosis of Unicornuate Uterus. Indian J Public Health Res Dev. 2019;10(11):829-833.
85. FOGSI. FOGSI Focus on Ultrasound in Obstetrics and Gynecology. 2009.
86. Indian Fertility Society. Guidelines on Poor Ovarian Response. Available at: https://indianfertilitysociety.org/guidelines-on-por/
87. Eurorad. Unicornuate uterus with ruptured rudimentary horn pregnancy. Available at: https://www.eurorad.org/case/18804
88. BMC Family Practice. Accessibility and availability of maternal and reproductive health care services: ensuring health equity among rural women in Southern India. BMC Fam Pract. 2024;25:169.

89. Springer. Access to Life-Saving Medicines and Healthcare: A Case Study of Aurangabad District of Bihar. In: Healthcare Access in Rural India. 2018:455-478.
90. Jurnal Tunas Harapan. Community Perceptions and Use of Reproductive Health Services in Rural India. J Tunas Harapan. 2025;1(1):45-62.
91. Reproductive Health Journal. Individual empowerment and community norm effects of engaging young husbands in reproductive health in rural India: findings from a pilot study. Reprod Health. 2024;21:144.
92. Journal of Reproductive Health and Medicine. Empowering rural women through sustainable menstrual hygiene practices for enhanced reproductive health. J Reprod Health Med. 2024;2(4):234-245.
93. BMC Health Services Research. Assessment of the availability, accessibility, and quality of sexual and reproductive health services for young people in conflict affected zones of Cameroon: a mixed method study. BMC Health Serv Res. 2023;23:1142.
94. International Journal for Equity in Health. Exploring the road to public healthcare accessibility: a qualitative study to understand healthcare utilization among hard-to-reach groups in Kerala, India. Int J Equity Health. 2024;23:191.
95. BMC Public Health. Geographic disparities and determinants of full utilization of the continuum of maternal and newborn healthcare services in rural India. BMC Public Health. 2024;24:3314.
96. Journal of Political Science. Access of digital health initiatives in rural areas to improve women's reproductive health in India. Int J Political Sci Gov. 2024;6(4):1-6.
97. PMC. Inequity in India: the case of maternal and reproductive health. Int J Equity Health. 2013;12:19.
98. Socrates Journal. Influence of Socio-economic and Cultural Factors on Women's Reproductive Health in India. Socrates J. 2025;10(1-2):33-41.
99. Ballard Brief. Healthcare Access in Rural Communities in India. Available at: https://ballardbrief.byu.edu/issue-briefs/healthcare-access-in-rural-communities-in-india
100. PLOS Global Public Health. Socioeconomic inequalities in adverse pregnancy outcomes in India. PLOS Glob Public Health. 2024;4(9):e0003701.
101. PubMed. Accessibility and availability of maternal and reproductive health care services: ensuring health equity among rural women in Southern India. BMC Fam Pract. 2024;25:169.
102. UC Press. Barriers to maternal and reproductive health care in India due to sociocultural factors. Adv Glob Health. 2019;1(1):1713935.
103. BMJ Global Health. Socioeconomic inequality in life expectancy in India. BMJ Glob Health. 2019;4(3):e001445.
104. DocBox. Healthcare Access in Rural India. Available at: https://docboxmed.com/healthcare-access-in-rural-india/
105. PubMed. Overcoming Cultural Barriers to Men's Participation in Reproductive Health Programs in India. Public Health. 2025;1(1):45-58.
106. PubMed. Similarities in socioeconomic disparities and inequalities in women's nutritional status and health care access across four Asian countries. Matern Child Nutr. 2024;20:e13578.
107. ScienceDirect. Accessibility and availability of reproductive health care services at primary healthcare facilities. Prev Med Rep. 2023;35:102370.

108. Frontiers in Reproductive Health. Unveiling barriers to reproductive health awareness among rural women in India: a mixed-methods study. Front Reprod Health. 2024;6:1444111.
109. ScienceDirect. An analysis of inequality in physical health status of women in India. Heliyon. 2024;10(12):e33629.
110. Azim Premji University. Accessibility and availability of maternal and reproductive health care services: ensuring health equity among rural women in Southern India. Available at: https://resourcerepository.azimpremjiuniversity.edu.in/entities/article/14d02ea9-eea4-4916-856e-2e2ba7abbd28
111. International Journal of Legal Science and Social Studies. Challenges And Frameworks For Women's Reproductive Rights In India. Int J Legal Sci Soc Stud. 2025;3(2):234-256.