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Reshaping Motherhood: A Comprehensive Review of Assisted Reproductive Technologies (ARTs) and Reproductive Realities in India

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ABSTRACT

Assisted Reproductive Technologies (ARTs) have significantly transformed reproductive health worldwide, especially in patriarchal settings like India. These technological advances have improved women's reproductive well-being and reduced the social and psychological burdens of childlessness. In societies where motherhood is closely tied to feminine identity and seen as a key factor in marital success, ARTs have provided women with alternative ways to achieve socially valued motherhood. This article offers a systematic review of existing scholarly literature on ARTs in India, with a focus on in vitro fertilization (IVF) within social and human sciences. The review has two main goals: first, to identify and critically examine the methodological approaches used by researchers to explore women's experiences with ARTs; and second, to analyse the key theoretical frameworks and conceptual tools employed or developed to understand these experiences. By synthesizing these diverse academic contributions, this review offers essential insights into the methodological and theoretical progress in ART-related research in India. It also suggests directions for future studies aiming to deepen our understanding of women's reproductive agency and social roles amid technological interventions.

Keywords: motherhood; in-vitro fertilisation (IVF); reproductive health; infertility treatment; assisted reproduction.

INTRODUCTION

Infertility, a significant global health concern impacting both men and women, carries substantial societal, psychological, and health consequences.[1][2][3] Data from the Global Burden of Disease (GBD) Study 2021, encompassing 204 countries and territories from 1990 to 2021, reveals a concerning global increase in infertility rates over this period. In 2021 alone, approximately 55 million men and 110 million women were affected, corresponding to a prevalence of 1.8% for males and 3.7% for females. While the highest rates were observed in East/South Asia and Eastern Europe, a notable gender disparity exists, with women experiencing infertility at twice the rate of men. Projections using a Bayesian age-period-cohort model indicate that this upward trajectory will continue until at least 2040, with male infertility expected to rise even more sharply than female infertility, signalling intensifying global reproductive challenges. [4] The World Health Organization (WHO) defines infertility as a

disease of the male or female reproductive system characterized by the failure to achieve a pregnancy after 12 months or more of regular unprotected sexual intercourse. [5] This condition is further categorized into primary and secondary infertility. Primary infertility refers to the inability ever to achieve a pregnancy, meaning the individual or couple has never conceived. In contrast, secondary infertility describes the inability to conceive or carry a pregnancy to term after having had at least one successful pregnancy in the past. [5-6] Infertility, subfertility, and sterility are terms that describe different types of reproductive challenges. These terms are not the same. Sterility refers to the complete inability to conceive. This often happens due to a permanent condition, like having no ovaries or a vasectomy. Infertility is when a couple cannot conceive after 12 months of regular, unprotected sex (or 6 months if the woman is over 35). It suggests that pregnancy might still be possible with help or over time, but it's not happening naturally within the usual timeframe. Subfertility means there is a lower chance of becoming pregnant, but it's not impossible. Couples might eventually conceive naturally, but it takes longer than the average time to pregnancy. This condition is less severe than infertility. [6] Infertility affects 8–12 percent of couples of reproductive ages worldwide, impacting over 186 million people, with a hefty burden in developing countries. These trends have significant demographic implications, contributing to varying fertility rates worldwide. High fertility rates are observed in some regions of Sub-Saharan Africa and South Asia, whereas developed nations are experiencing declining rates due to aging populations and delayed childbearing.[7] In India, analysis of four rounds of the National Family Health Survey (NFHS) from 1992 to 2016 reveals shocking trends in infertility prevalence. While primary infertility witnessed a decline from 2.8% in 1992–93 to 2% in 2015–16, secondary infertility alarmingly rose from 19.5% to 28.6% during the same period. This indicates an overall increase in infertility prevalence by nearly 10 percentage points across the nation, highlighting a growing public health challenge, particularly concerning couples who have previously had children. [8-9]

Infertility is linked to a range of identifiable physiological, behavioural, and environmental factors impacting both male and female reproductive systems. Women often face ovulatory disorders, which hormonal imbalances can cause. Common causes include Polycystic Ovary Syndrome (PCOS), thyroid issues, and early ovarian failure. Structural abnormalities in the female reproductive tract, including blocked fallopian tubes (frequently a consequence of pelvic inflammatory disease or endometriosis), uterine fibroids, or congenital uterine defects, can impede fertilization or implantation. For men, identified causes primarily involve issues with sperm production or function, such as low sperm count (oligozoospermia), poor sperm motility, abnormal sperm morphology, or even the complete absence of sperm (azoospermia), which can result from hormonal imbalances, genetic conditions, or testicular damage. Obstructions in the male reproductive tract are also significant. Beyond these direct physiological causes, various lifestyle factors contribute substantially to infertility risk. These include harmful habits such as smoking and excessive alcohol consumption, which can negatively impact gamete quality and overall reproductive health in both sexes. Obesity and extreme underweight are also critical, disrupting hormonal balance and affecting ovulation in women and sperm parameters in men. Furthermore, the presence of noncommunicable diseases like diabetes, thyroid disorders, and certain cancers, along with their treatments, can severely compromise fertility. While the influence of contraceptive use on subsequent fertility is mixed, mainly and often not a direct cause, previous sexually transmitted infections (STIs) are a significant preventable factor

for tubal damage in women and male reproductive tract infections. These identified factors highlight the multifaceted nature of infertility, requiring comprehensive assessment and targeted interventions for affected individuals. [5] [10-12]

In a pronatalist society, the emphasis on motherhood often transcends a personal choice, becoming a defining societal role and a fundamental expectation for women. In a pro-natalist cultural context, infertility is usually viewed not just as a medical issue, but as a severe personal failure. This perception can lead to significant social stigma and psychological distress. As a result, a woman's identity and self-worth may become closely tied to her ability to reproduce, making the experience of infertility particularly difficult and emotionally isolating. For individuals and couples in these societies, the desire to "cure" infertility becomes a pressing necessity, requiring extraordinary efforts. The journey toward parenthood becomes a challenging pursuit that requires not only substantial financial investment but also considerable emotional resilience. Couples often face physical demands from various diagnostic procedures and treatments, coupled with a heavy psychological burden. This relentless quest is fuelled by a strong desire to meet deep-seated personal aspirations for family life and to align with prevailing societal norms and expectations. [13-16]

In this context, Assisted Reproductive Technologies (ARTs), such as In Vitro Fertilization (IVF), emerge as a profound blessing for countless individuals and couples grappling with infertility. These advanced medical interventions offer a tangible pathway to achieving pregnancy and parenthood, transforming what once seemed an insoluble obstacle into a hopeful possibility. For many, ARTs represent the fulfilment of long-held dreams, providing a scientific solution to biological challenges and allowing them to experience the joys of raising children, thereby alleviating the intense societal and personal pressures associated with childlessness. [17][18] However, despite their transformative potential, ARTs are often accompanied by significant detrimental consequences, most notably their exorbitant financial cost. The multiple cycles, medications, and procedures involved in ARTs can accumulate into a substantial economic burden, making these treatments inaccessible primarily to a significant portion of the population. This financial strain not only adds immense stress to an already challenging journey but also creates a stark disparity in access to fertility care, where the ability to achieve parenthood through these advanced methods becomes largely contingent on socioeconomic status [19-22]

This article undertook a comprehensive review of existing studies about ARTs within the Indian context. It critically evaluated research conducted across various Indian clinical settings, with a specific focus on patient experiences, treatment outcomes, and the socio-cultural factors that shaped ART practices. Key findings derived from the extant literature were elucidated, highlighting salient trends, reported success rates, and the broader socio-economic implications of ART utilization in India. Furthermore, this review systematically analysed the methodologies employed in the included studies, encompassing both quantitative and qualitative approaches, as well as sampling strategies and data collection techniques. A rigorous assessment of these methodologies served to delineate their respective strengths and weaknesses, thereby contributing to an informed understanding of the robustness and generalizability of the reported findings. Additionally, the review addressed potential limitations inherent in the reviewed body of literature, including constraints related to sample size, geographical biases, and pertinent ethical considerations. Through this process of synthesis and critical evaluation, the article aimed to provide a nuanced and comprehensive overview of the

ART landscape in India, highlighting the current state of research and its implications for future scholarly endeavours and clinical advancements in the field of reproductive health.

MATERIALS & METHODS

This article reviews studies about ARTs in India. It examines research from various clinical settings, with a focus on patient experiences, treatment outcomes, and the social and cultural factors that impact ART practices. The review highlights key findings, including success rates and the economic impact of using ART in India. The article also examines the methods employed in the studies, including both quantitative and qualitative approaches, as well as the sampling methods and data collection techniques used. By assessing these methods, it discusses their strengths and weaknesses, which helps understand the reliability of the findings. Additionally, the review highlights limitations in the studies, including small sample sizes, geographical biases, and ethical concerns. Overall, this article aims to provide a clear and detailed overview of the ART landscape in India, highlighting the current state of research and its significance for future studies and advancements in reproductive health.

This review was conducted as a systematic synthesis of secondary source data. Empirical studies published between 2015 and 2025 were identified through a comprehensive search of the Google Scholar database. The primary keywords utilized for this search included "Assisted Reproductive Technology," "IVF," "Surrogacy," and "India." Studies were systematically filtered and selected based on the following inclusion criteria: the research presented empirical findings, the studies were conducted within a clinical setting, and the study population was specifically Indian. The rigorous selection process guaranteed that the review concentrated solely on relevant, evidence-based research pertinent to the ARTs in India. Through this systematic approach, 25 studies were identified. These studies were then critically assessed to extract key findings, methodologies, and limitations, which are detailed in the following sections of this article.

FINDINGS AND DISCUSSION

The findings were derived from a comprehensive and systematic review of twenty-five identified empirical studies on Assisted Reproductive Technologies (ARTs) in India, published between 2015 and 2025. For this purpose, the author's approach involved a multi-stage process of reviewing these diverse articles, which encompassed both qualitative and quantitative methodologies. Initially, each article was thoroughly read and coded for key concepts, prevalent narratives, and significant outcomes related to ART experiences, challenges, and societal perceptions in India. Through an iterative process of comparative analysis and constant comparison across all identified studies, two primary and fundamentally interconnected thematic areas consistently emerged as central to the understanding of ARTs. These dominant themes are: Cultural Burden of Motherhood and the Stigma of Infertility and Commercialization, Patient Experience, and Emotional Distress. This thematic framework consolidates recurring patterns and highlights diverse perspectives found in the various research methodologies used in existing literature. It provides a comprehensive understanding of the current research landscape in this vital field.

Cultural Burden of Motherhood and Stigma of Infertility

In India, women often face intense and widespread pressure from their communities to have children. From the moment of marriage, an unspoken yet powerful expectation exists that couples will soon conceive, with waiting often met with suspicion or disapproval.[23][24] This societal pressure extends beyond immediate family to relatives, neighbours, and even casual acquaintances, who may offer

unsolicited advice or ask probing questions. Conversations about family planning and having children become constant, creating a sense of urgency and often invading personal privacy regarding reproductive choices. This collective focus on procreation indicates that childlessness is rarely viewed as a personal choice but rather as a deviation from the norm, often met with concern, pity, or subtle judgment. As a result, women bear significant emotional and social pressure to fulfil this role. [25][26] For many women in India, motherhood is deeply ingrained as the most defining and validating aspect of their identity and worth. It is often seen as the ultimate fulfilment of a woman's purpose, transforming her status within the marital home and the wider community. Becoming a mother brings respect, reinforces her position in the family, and ensures the continuation of the family line. In stark contrast, the inability to conceive can lead to feelings of inadequacy, guilt, and a sense of incompleteness. This cultural glorification of motherhood means that a woman's self-image and social standing are often closely linked to her reproductive ability, making the absence of children a source of personal pain and social exclusion. [27-29]

As a result, the burden of "curing" infertility often rests unfairly on women. Regardless of the actual medical reasons behind a couple's difficulty in conceiving, women are typically viewed as the primary, if not the sole, partly responsible for this issue. [30] This societal blame can manifest in relentless emotional suffering, painful social exclusion, and significant strain on marital relationships. Women often endure numerous, physically demanding, and emotionally draining medical procedures and treatments, sometimes repeatedly, even when the infertility is medically diagnosed as male factor. This relentless, often lonely, pursuit of conception underscores the profound societal expectation that women must overcome all obstacles to fulfil their perceived reproductive duty, regardless of the personal cost.[16][31] An extreme emphasis on biological ties within family structures further compounds this intense societal pressure. There is a deep-seated cultural preference for children who share the family's genetic lineage, as they are considered essential for carrying on the family name, traditions, and inheriting property. This powerful value means that alternative paths to parenthood, such as adoption, are often viewed less favourably and are frequently considered only as a very last resort, if at all, even after years of failed medical treatments.[27][32] The perceived necessity to "cure" infertility, therefore, extends beyond merely having a child; it specifically revolves around having a biological child. This strong genetic imperative significantly amplifies the emotional, physical, and financial strain on couples as they navigate complex and arduous medical interventions, driven by the profound need to meet these deeply ingrained societal and familial expectations for a bloodline heir. [33-35]

Commercialization, Patient Experience, and Emotional Distress

ARTs, especially IVF, are often associated with intense emotional distress for patients, related to the procedures themselves, uncertain outcomes, and high financial costs. [36-37] Patients frequently go through a rollercoaster of emotions, from hope at the start of a cycle to despair if treatment fails. The procedures are physically demanding, involving multiple injections, frequent clinic visits, and invasive steps like egg retrieval, which cause significant discomfort and anxiety. [31] [38] This emotional and physical burden is exacerbated by the significant financial strain of ARTs, which are primarily available through the private sector in India and can be prohibitively expensive. The high costs add to the stress, as couples use their savings or take loans for a process with no guaranteed success, leading to feelings of desperation and helplessness.[20]

Despite a growing demand for assisted reproductive technology (ART), nearly half of the infertile couples do not seek clinical

help, often due to limited awareness, cultural stigma, and financial barriers. [30] Although ART services have expanded, access remains uneven, and social attitudes continue to prioritize childbearing as central to women's health and status. The ART Act of 2022 signals progress by introducing stricter regulations and promoting altruistic surrogacy; however, persistent gaps in affordability, insurance coverage, and community education pose significant hurdles.

Patients undergoing ART often find themselves navigating a complex emotional landscape, a blend of profound hope and significant vulnerability. It's common for individuals to engage in "doctor shopping," moving between clinics in pursuit of better success rates or more compassionate care. However, a consistent concern emerging from patient experiences is the inadequacy of counseling and a notable lack of clear, comprehensive information regarding procedures, realistic success rates, and potential risks, including the crucial aspect of spare embryo management. This significant information gap leaves many patients feeling uninformed and disempowered, as they struggle to navigate a complicated medical journey without sufficient guidance. [35-36] Furthermore, the deeply personal and often secretive nature of their infertility journey, primarily driven by pervasive societal stigma in India, can severely isolate patients, making it incredibly difficult for them to seek much-needed emotional support from their wider social networks. This confluence of factors creates a challenging and often lonely path for those seeking to build their families through ART. [39-41]

Parallel to the patient's emotional journey is the rapid and often unregulated growth of the ART industry in India, which has transformed fertility treatment into a highly commercialized enterprise. [42-44] This industry grows due to the strong societal pressure for biological children. It aggressively promotes ARTs as the main solution for infertility. [45][46] While this commercialization has made treatments more accessible, it raises ethical concerns. Studies show examples of aggressive marketing, exaggerated success rates, and a focus on profit rather than patient care. The lack of strong regulations has allowed practices like transferring multiple embryos, which increases risks, and even unethical sex selection. This commercial environment, where bodies and reproductive materials can be treated as products, adds complexity and potential exploitation for patients, leading to their distress and vulnerability. [47-49]

Key Methodologies/ Theoretical Perspective in the Past Studies

The reviewed studies employed a variety of methodologies, mainly relying on qualitative research designs to explore the complex, lived experiences of individuals navigating ARTs in India. In-depth interviews were a key component of many studies, enabling researchers to collect rich, detailed narratives directly from patients, couples, surrogates, and medical professionals. This method was beneficial for understanding the deep emotional, social, and psychological aspects of infertility and ARTs. [12] [20] [28] [29][51] Ethnographic research, involving participant observation and extensive fieldwork within clinics and communities, was also a prominent qualitative approach. It provided a deeper, immersive understanding of ART practices, power dynamics, and socio-cultural interactions in real-world contexts. [34][38][42][49][50] Several studies adopted gender-sensitive social research or feminist critique as their theoretical frameworks, guiding their qualitative investigations to specifically analyse how gender roles and patriarchal norms shape infertility experiences and access to ARTs. [3][35]

While qualitative methods were dominant, some studies also used quantitative approaches. These often involve surveys with psychological questionnaires designed to measure specific outcomes such as

depression, anxiety, or quality of life. [36] [43-44] Some of these quantitative studies employed experimental designs, which used a waitlist control group to assess interventions and produce statistical evidence of their effectiveness. The combination of qualitative and quantitative methods in mixed-methods studies provided a more comprehensive understanding by offering both detailed personal experiences and broad measurable results. Studies on ARTs in India utilize different approaches to examine their complex issues. Gender-sensitive research and feminist perspectives focus on how societal norms link being a woman with being a mother and increase pressure on women due to infertility stigma. Medical sociology and anthropology analyse how society defines infertility and how ARTs integrate into families and healthcare systems. The political economy of health and critical cultural theory explores the rapid growth of the ART industry, raising concerns about access, ethics, and viewing reproductive work as a commodity. Kinship theory sheds light on how third-party reproduction affects traditional family relationships, while psychosocial stress frameworks illustrate the emotional and psychological impacts of infertility and treatment on individuals. Collectively, these perspectives help deepen our understanding of ARTs as medical solutions closely intertwined with India's unique social, cultural, and economic landscape.

Potential Limitations of the Studies

The studies reviewed have made significant contributions, but they also have several limitations that should be considered when interpreting their findings. A common issue in many qualitative studies is the small sample size. While these small samples are suitable for in-depth exploration, they often limit the extent to which the findings can be generalized to the larger population, especially in a diverse country like India. Additionally, there is a noticeable urban bias, as most studies have been conducted in major metropolitan areas, such as New Delhi, Mumbai, Pune, and Kolkata. This creates a substantial gap in understanding ART experiences in rural or less-developed regions.

Another significant limitation is temporal relevance, especially for studies published in the mid-2000s or early 2010s. Since then, practices, technologies, regulatory frameworks, and societal perceptions related to ART have undergone considerable evolution. As a result, older findings may no longer accurately reflect the current context. Additionally, many studies relied heavily on self-reported narratives and retrospective accounts. While these provide valuable insights into personal experiences, they are also susceptible to recall bias and can be influenced by individual and situational factors at the time of the interview. Furthermore, many studies had a narrow focus, mainly on women undergoing IVF, while ignoring the experiences of men, couples using alternative ART methods, and childless individuals who did not seek medical treatment. There was also a notable lack of longitudinal research tracking the long-term psychosocial, economic, and health outcomes for parents using ART, as well as for children conceived through ART and surrogates, beyond the immediate post-treatment or post-delivery period. These methodological and contextual limitations highlight key areas for future research that could yield a more comprehensive and generalizable understanding of ART in India.

CONCLUSION

Infertility carries a heavy social and cultural burden, especially for women who often face stigma and challenges to their identity. At the same time, the ART sector has grown, offering more treatment options but raising ethical concerns about its regulation and practice. In India, new laws such as the Assisted Reproductive Technology (Regulation) Act and the Surrogacy (Regulation) Act, both passed in 2021, aim to regulate clinics, promote ethical

practices, and protect the rights of all parties involved. These laws aim to establish a more organized and responsible system for fertility care. However, challenges persist, highlighting areas that require further attention. There is an urgent need for broader research, particularly studies that focus on rural areas, incorporate men's perspectives, and examine long-term outcomes. Proper implementation and strict enforcement of the new ART and Surrogacy laws are essential to prevent unethical practices and ensure that patients give informed consent. Additionally, it is crucial to provide strong psychological support in clinical settings and to encourage societal changes that reduce the stigma around infertility. This promotes open conversations and an inclusive perspective on parenthood that transcends traditional biological definitions.

Declaration by Authors

Ethical Approval: No ethical approval was required for this study, as it is a review article synthesizing existing published literature and does not involve the collection of primary data from human subjects.

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