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Female Infertility in India: Causes and Reproductive Health Management

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Abstract- Infertility is a prominent reproductive health disease which affects nearly 27.5 million (8-12%) reproductive-age couples in India. Though female-related issues account for about 40–50% of infertility cases, social stigma frequently unfairly attributes the couple's difficulties in conceiving primarily to women. There are multiple causes of female infertility, such as hormonal imbalance, disorders of ovulation, uterine and fallopian tube functions, and reproductive tract infections (RTIs). Clinical evidence indicates a significant prevalence of PCOS and endometriosis. The incidence of high female infertility rates in India is a reproductive health issue crisis influenced by changing socio-demographic and lifestyle elements. This demands specific public health interventions, improving access to reproductive services, reducing social stigma, and establishing a national infertility monitoring system.

Keywords: Female Infertility, India, PCOS, Reproductive Health, Social Stigma.

I. Introduction

Infertility is a prominent reproductive health disease which affects nearly 27.5 million (8-12%) reproductive-age couples in India (Vander Borght & Wyns, 2018). Infertility is defined as the inability of an individual or a couple to attain a clinical pregnancy following 12 months of consistent, unprotected sexual activity. Female-related factors accounting for 40–50% of cases, roughly the same as male-factor contributions. Nevertheless, social stigma continues to unfairly blame women as the sole cause of a couple's inability to conceive (Manimekalai et al., 2020).

There are multiple causes of female infertility such as such as hormonal imbalance, disorders of ovulation, uterine and fallopian tube functions, and reproductive tract infections (RTIs) (Vander Borght & Wyns, 2018). Clinical evidence indicates a significant prevalence of PCOS and endometriosis. Female fertility is also influenced by various lifestyle factors, such as stress, unhealthy eating habits, delays in beginning a family, and exposure to environmental toxicants (Gothwal et al., 2026) (Figure 1).

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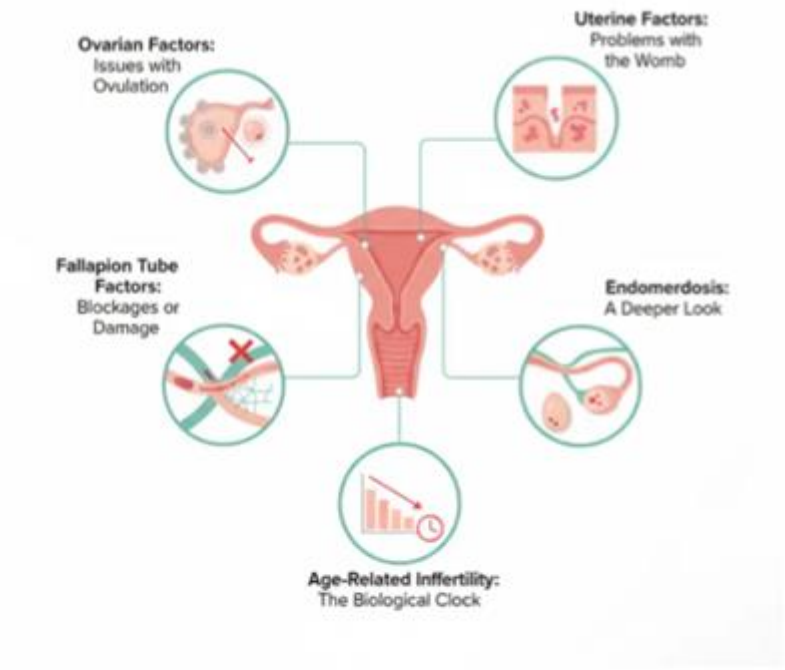

Figure 1: Common Causes of Female Infertility in India

The World Health Organization (WHO) says that most of the couples suffer from primary infertility (Devi et al., 2026). Roughly one in six couples in urban areas of India shows the incidence of primary infertility (Maqbool et al., 2025). Primary infertility is defined as the inability to achieve a first pregnancy after 12 months of unprotected endeavours. The secondary infertility takes place when couples who have previously conceived successfully find themselves incapable of doing so again (Devi et al., 2026). Infertility in India is now recognized as a 'silent epidemic' that demands urgent attention. This crisis stems from a complicated mix of increasing infertility rates, entrenched social stigma, gender discrimination, and insufficient reproductive education, frequently leading to significant mental health problems and unstable marriages. The increasing prevalence of female infertility in India, especially in urban regions, therefore, necessitates immediate reproductive health intervention.

II. Common Causes Of Women's Infertility In India

Hormonal Imbalance

Compared to men, women are more susceptible to imbalances of reproductive hormones especially GnRH, LH, FSH, estrogen, progesterone, prolactin etc. The levels of these hormones change significantly during menstruation, pregnancy, and menopause. At times, drugs used to address a specific illness can disrupt and interfere with hormone production and secretion. Elevated free estrogen levels (hyperestrogenism) in women have resulted in early menarche, eating disorders,

premenstrual syndrome, endometriosis, uterine fibroids, menstrual issues like cramps, pain and heavy bleeding, infertility, and breast cancer (Al-fahham, 2017). An increase in FSH levels in women may indicate reduced production of high-quality eggs and embryos for fertilization, potentially lowering the chances of pregnancy (Al-fahham, 2017). The ovaries are sensitive to insulin, and when insulin levels are imbalanced, the ovaries produce more ovarian hormones, which disrupt various metabolic processes in the body, leading to subfertility or infertility.

Ovarian Factors (Disorders of Ovulation)

For pregnancy to occur, a single egg must be released from the ovaries. Reproductive issues associated with the process of ovulation represent a significant percentage of infertility cases. Polycystic Ovary Syndrome (PCOS) results from a hormonal disorder that inhibits the regular maturation and release of eggs by the ovaries. It is a leading contributor to female infertility in India, impacting more than one in ten women of childbearing age (Parua et al., 2025).

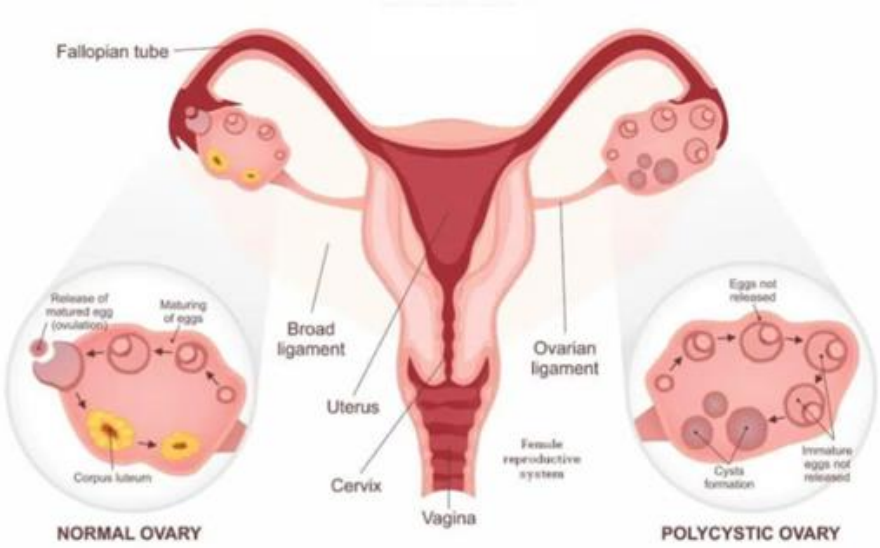

Figure 2: Polycystic ovarian syndrome. The ovaries in PCOS fail to release mature eggs regularly, which leads to the formation of multiple immature follicles and the formation of cyst-like structures.

The condition fundamentally disrupts reproductive health through several key mechanisms, such as ovulatory dysfunction, which leads to irregular ovulation (oligo-ovulation) or a total lack of ovulation (anovulation), making natural conception difficult (Yang & Chen, 2024). In PCOS women, a complex imbalance of hormones, including insulin, growth hormone (GH), ghrelin, LEAP-2, GnRH, androgens, and estrogens, drives the clinical presentation of the disorder (Yang & Chen, 2024). Specifically, an elevated LH/FSH ratio and hormonal fluctuations are closely linked to the development of insulin resistance and Type 2 diabetes, increased risk of being overweight or obese, and irregular menstrual cycles with subsequent infertility (Figure 2).

Premature Ovarian Insufficiency (POI), also called premature ovarian failure (POF), is another condition in which the ovaries fail to function properly before the age of 40, leading to irregularities or absence of ovulation. It impacts around 1% of women younger than 40 and 0.1% of those under 30. It is marked by insufficient ovarian sex hormones and reduced ovarian follicles that hasten the arrival of menopause (Chon et al., 2021). This condition frequently leads to subfertility or infertility, as it is linked to hypoestrogenism, resulting in menstrual irregularities and unsuccessful pregnancies.

Uterine Issues: Complications with the Uterus

An embryo is expected to implant and grow in the uterus in a favourable, healthy environment. Certain conditions impact the uterus anatomically. These include the formation of Fibroids and Polyps. Fibroids are benign growths that can alter the form of the uterus, causing disturbance in implantation and subsequent embryonic growth (Alkhrait et al., 2023). Uterine fibroids are the most common tumour in women, and their prevalence is high in patients with infertility. Fibroids may be the sole cause of infertility in 2–3% of women (Freytag et al., 2021).

Polyps, on the other hand, are small tissue outgrowths that obstruct the embryo's development.

Congenital uterine abnormalities are alterations in the uterus's form or function that hinder the ability to conceive.

Fallopian Tube Issues: Obstructions or Injury

The egg and sperm can only meet in the fallopian tubes if they are in good condition. The causes of obstructions include Pelvic Inflammatory Disease (PID), which results from infections that haven't been adequately treated. Endometriosis is a major barrier to conception, affecting approximately 10% of reproductive-age women worldwide (Labinjo, 2025).

Fibroids are noncancerous, muscular growths located inside or on the uterus. Endometriosis, on the other hand, is the abnormal growth of the uterine lining tissue outside the uterus, usually on the ovaries, fallopian tubes, or the lining of the pelvic area. Chronic inflammation from these growths often leads to the formation of pelvic adhesions (scar tissue). This can physically displace the ovaries or "glue" the fallopian tubes shut, preventing the essential pick-up and transport of the egg. The inflammatory environment in the pelvis can also be toxic to both eggs and sperm (Madjunkov et al., 2026). When the endometriosis affects the ovaries, it stimulates the formation of ovarian cysts, which take up space within the ovary, potentially damaging healthy follicles and disrupting regular ovulation.

Reproductive Tract Infections

The presence of abnormal microflora in the vagina and lower genital tract significantly impacts female fertility. The healthy microflora is primarily composed of Lactobacillus, along with various other beneficial bacteria that make up the flora of the lower genital tract. These bacteria and their metabolic byproducts support the microenvironment that fosters a healthy conception. Nonetheless, this microenvironment faces constant risks from both external and internal factors, with urogenital infections playing a significant

role. Recent reports have highlighted the significance of various bacteria, including Escherichia coli, Staphylococcus, Gardenella, Mycobacteria, and Niesseria, as key contributors to sperm immobilization and agglutination (Pai et al., 2020). In India, RTIs impact approximately one in four women of reproductive age who suffer from at least one type of infection. Furthermore, the prevalence rate across various Indian states shows great variation, ranging from 19% to 71% depending on the region and the specific population survey (Durai et al., 2019).

Lifestyle Factors and Environmental Toxicants

The modern "lifestyle crisis" marked by delayed marriage, substance use, poor nutrition, obesity, and chronic stress directly disrupts the physiological systems necessary for conception. In women, growing older frequently increases the risk of chromosomal irregularities and hormonal shifts. Women's fertility generally starts to decrease slowly after 30, with a more significant decline happening after 35 (Group, 2005). This biological timeline reduces the probabilities of conception while increasing the risk of miscarriages and pregnancy complications (Figure 3).

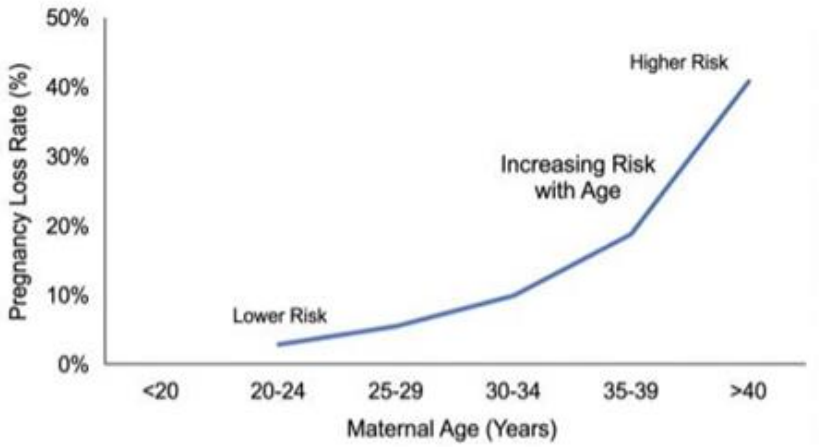

Figure 3: Pregnancy loss by age in pregnant women

The intake of tobacco, alcohol, and recreational drugs introduces systemic toxins that degrade sensitive reproductive tissues. The smoking habit is linked to hormonal imbalances, which accelerate the depletion of the ovarian reserve and can cause rapid ageing of the ovaries and earlier menopause in working women (Maqbool et al., 2025).

Chronic alcohol and caffeine intake disrupts the hypothalamic-pituitary-gonadal axis, leading to irregular ovulation in females (Molina & Simon, 2026). Reproductive health is largely affected by metabolic factors. Insulin resistance is a primary driver of ovulatory failure in obese women (Roberts et al., 2026). Excess adipose tissue acts as an active endocrine organ, converting androgens into estrogen, which can impact ovulation in women. Additionally, a sedentary lifestyle slows metabolic rates and contributes to hormonal imbalances, causing infertility. By managing insulin levels,

exercise helps stabilize the endocrine system, creating a more favorable physiological environment for conception (Orio et al., 2013). Studies show that high levels of chronic stress elevate cortisol, which can suppress the GnRH (Gonadotropin-Releasing Hormone) necessary for triggering ovulation in rodents (Simonneaux & Simonneaux, 2026). Circadian disruption due to sleep deprivation interferes with the nocturnal release of luteinizing hormone (LH), therefore, fragmented sleep cycles directly correlate with lower fertility markers (Lin et al., 2026).

The external environmental toxicants play a decisive role in human fertility. The dense urban living has exposed populations to heightened levels of particulate matter (PM2.5 and PM10) and nitrogen dioxide. Inhaled toxicants enter the bloodstream, triggering systemic oxidative stress causing decreased egg quality in women (Sairat et al., 2026). Urban environments are saturated with EDCs (Endocrine Disrupting Chemicals) found in plastics, detergents, and industrial runoff (such as BPA and Phthalates) (Kozieł-Leszczyńska & Piastowska-Ciesielska, 2026). These chemicals "mimic" natural hormones, binding to receptors and blocking the signals required for healthy ovulation in women. Continuous exposure to Electromagnetic Fields (EMF) and non-ionizing radiations affect female reproductive physiology (Fatkhutdinova et al., 2026). Research indicates that such exposure leads to changes in oocyte structure, ovarian follicles, and endometrial tissue. Additionally, these radiations hinder embryonic development and affect gestational progress in many animal models (Jangid et al., 2022).

III. Female Reproductive Health Management

The ability to get pregnant and have a child, as well as the right to have access to information regarding reproductive health, is a fundamental human right (Carneiro & França Ferreira, 2021). A critical lack of awareness regarding infertility remains a significant barrier in developing nations like India, contributing significantly to a modern fertility crisis. A significant majority of couples cannot accurately identify the most fertile period of the menstrual cycle, which often leads to unnecessary delays in natural conception (Mahey et al., 2018). Infertility is often viewed as a social failure rather than a medical condition, with women frequently bearing the brunt of domestic blame and ostracization. Further, the intersection of social pressure and repeated failure to conceive creates a cycle of anxiety and depression, which can further disrupt hormonal balance and physiological fertility (Dutta & Sengupta, 2025). High treatment costs and a lack of insurance coverage make advanced interventions like ART inaccessible for the majority of the population. Additionally, the quality of fertility care is heavily concentrated in urban hubs, leaving rural populations with limited guidance and a higher prevalence of untreated infections that cause secondary infertility (Dalal, 2016).

Infertility remains a neglected priority within global public health frameworks, characterized by a systemic underinvestment in clinical research and a lack of universal access to preventative and diagnostic services. Consequently, this policy gap exacerbates gender-based health disparities, as the absence of equitable treatment options often leads to adverse psychosocial outcomes and the social marginalization of women (Carneiro & França Ferreira, 2021). The Indian government tackles fertility and maternal health via the extensive Reproductive, Maternal, Newborn, Child, Adolescent

Health plus Nutrition (RMNCAH+N) framework, which implements a "continuum of care" strategy throughout a woman's life. At the heart of this approach are key programs such as Janani Suraksha Yojana (JSY) and Janani Shishu Suraksha Karyakram (JSSK), which encourage hospital deliveries by offering conditional cash transfers and removing out-of-pocket costs for medications, diagnostics, and transportation. The Pradhan Mantri Surakshit Matritva Abhiyan (PMSMA) enhances the quality of care by providing complimentary, specialist-guided antenatal check-ups on the 9th of each month, alongside the LaQshya initiative that standardizes protocols for labour rooms and maternity operating theatres. To guarantee dignity and a strict stance against service denial, the Surakshit Matritva Aashwasan (SUMAN) initiative consolidates these programs into one framework, playing a key role in reducing India's Maternal Mortality Ratio (MMR) from 130 in 2014–16 to 93 in 2019–21. Furthermore, the Assisted Reproductive Technology (Regulation) Act, 2021, has established a national registry to oversee fertility clinics, whereas the Pradhan Mantri Matru Vandana Yojana (PMMVY) offers nutritional and financial assistance to expecting mothers, promoting comprehensive health security.

IV. Conclusion

In India, the crisis of female infertility is both a socioeconomic concern and a medical challenge. The causes are influenced by clinical disorders, lifestyle-related metabolic changes, and environmental aspects, necessitating targeted, preventive, and healthcare measures. Through integrating early detection with expanded insurance options and proactive public education, India can change its reproductive healthcare framework from a system of "privilege" to one of "universal access."

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