Placenta and Reproductive Medicine

REVIEW ARTICLE

Infectious pelvic inflammatory disease and *In-Vitro* fertilization: A review of social landscape and community perceptions

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ABSTRACT

Pelvic inflammatory disease (PID), primarily caused by sexually transmitted infections, is a significant health concern that can result in long-term reproductive consequences, including infertility. As one of the leading causes of tubal factor infertility, PID poses challenges for women seeking to conceive, particularly those pursuing fertility treatments like *In-Vitro* fertilization (IVF). This review explores the intersection of infectious PID and IVF, with a particular focus on the social landscape and community perceptions surrounding these conditions. We examine how societal factors, including stigma, knowledge gaps, and cultural attitudes, influence the diagnosis, treatment, and management of PID. Additionally, the review delves into how these factors affect individuals' decisions regarding IVF, addressing potential barriers such as access to healthcare, financial constraints, and psychological impacts. By highlighting the perspectives of women affected by PID, healthcare providers, and the general public, this review seeks to provide a comprehensive understanding of the broader social context of infectious PID and its implications for IVF. Furthermore, it emphasizes the need for improved education, awareness, and support systems to enhance patient outcomes and foster more informed decision-making in fertility treatments. Prior to, during, and after both successful and unsuccessful IVF treatments, the focus will be on psychological reactions. Furthermore, there is evidence to support the theory that training in relaxation techniques or behavioural treatment reduces stress, which in turn enhances the chance of conception.

Key words: pelvic inflammatory disease, *In-vitro* fertilization, global health, infertility, social, health

INTRODUCTON

Pelvic inflammatory disease (PID) is a significant reproductive health concern, primarily caused by infections from sexually transmitted pathogens such as *Chlamydia trachomatis* and *Neisseria gonorrhoeae*.[1,2] Affecting the female reproductive organs—including the uterus, fallopian tubes, and ovaries—PID can lead to long-term complications such as chronic pelvic pain, ectopic pregnancies, and infertility. Notably, PID is a major contributor to tubal factor infertility, one of the leading causes of female infertility worldwide. Despite advances in medical treatment, the residual effects of untreated or inadequately managed PID continue to challenge many women's reproductive health and fertility outcomes.[2–4]

In-vitro fertilization (IVF) has emerged as a crucial assisted reproductive technology (ART) for individuals and couples affected by infertility, including those whose fertility has been compromised by PID-induced tubal damage.[5–7] While IVF offers an alternative path to conception, the intersection between PID and IVF extends beyond the physiological implications, encompassing significant social, cultural, and psycho-

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Received: 18 February 2025; Revised: 6 September 2025; Accepted: 15 November 2025
https://doi.org/10.54844/prm.2025.0885

logical dimensions. Women with a history of PID often encounter additional barriers when considering IVF, including stigma associated with sexually transmitted infections (STIs), misconceptions about infertility treatments, and disparities in access to reproductive healthcare.[8–10]

Although the medical consequences of PID and the efficacy of IVF are well-documented, there remains a critical gap in understanding how social perceptions and community attitudes influence affected individuals' experiences and decision-making processes.[11–13] The stigma surrounding STIs may lead to delayed diagnosis and treatment, exacerbating fertility complications. Moreover, infertility—particularly when linked to PID—carries emotional and societal burdens, as women may face judgment, guilt, or discrimination. These factors can deter individuals from seeking necessary medical interventions, including IVF, and contribute to psychological distress.[12–14]

The relationship between PID and IVF is, therefore, a complex interplay of medical and social factors. While IVF provides hope for those affected by PID-related infertility, societal attitudes, healthcare accessibility, and cultural beliefs significantly impact its acceptance and utilization.[15–17] In communities where reproductive health is influenced by cultural or religious norms, seeking IVF treatment may be met with resistance, further complicating the reproductive choices available to women with a history of PID.[18–20]

This review aims to explore the intersection of PID and IVF within the broader social landscape, analyzing how community perceptions, healthcare access, and societal stigma shape the experiences of affected individuals. It will also examine the role of education, healthcare policies, and support networks in reducing stigma, improving awareness, and facilitating informed decision-making for women with PID-related infertility. A deeper understanding of these social dimensions is crucial for enhancing patient care, promoting equitable access to reproductive health services, and fostering a more inclusive approach to infertility treatment.

PID WITH EMPHASIS ON INFECTION

PID is a serious infection of the female reproductive organs, which includes the uterus, fallopian tubes, ovaries, and the surrounding tissues. It is often caused by STIs, particularly *Neisseria gonorrhoeae* (gonorrhea) and *Chlamydia trachomatis* (chlamydia), but it can also result from other bacterial infections. PID can lead to significant reproductive and health complications, including infertility, chronic pelvic pain, and ectopic pregnancy.[21]

CAUSES AND RISK FACTORS

The most common cause of PID is the ascent of bacteria from the vagina or cervix into the upper reproductive tract. These bacteria are frequently associated with STIs. Chlamydia trachomatis is a bacterial pathogen and the most common cause of PID in sexually active women. The causative agent of gonorrhea, another leading cause of PID. Other organisms that may contribute to PID include *Escherichia coli*, *Gardnerella vaginalis*, and *Mycoplasma genitalium*. Multiple sexual partners increases the likelihood of exposure to STIs. Unprotected sex increases the risk of acquiring STIs that may lead to PID. Women who have had PID before are at higher risk of recurrence. Can alter the natural balance of vaginal flora, making it easier for infections to ascend into the upper reproductive tract. Although intrauterine devices (IUDs) are safe for most women, they can increase the risk of PID shortly after insertion, especially if there is an existing cervical infection.[22]

PATHOPHYSIOLOGY: HOW INFECTION LEADS TO PID

PID begins when bacteria from the vagina or cervix spread upward into the reproductive organs. These organisms can ascend through the cervix into the uterus, fallopian tubes, and ovaries. The infection may cause inflammation and damage to the tissues in these areas. The infection often starts in the cervix, where it can cause swelling, redness, and discharge. Bacteria can spread to the endometrium, causing inflammation. The fallopian tubes are commonly affected and can become swollen, blocked, or damaged, increasing the risk of infertility. Although less common, the ovaries can become infected, leading to pain and complications. If the infection spreads beyond the reproductive organs into the peritoneal cavity, it can lead to a life-threatening condition known as peritonitis. As the infection progresses, the body's immune response activates, causing inflammation, tissue damage, and the formation of pus. The result is often scarring and adhesions (bands of fibrous tissue) within the pelvic region, which can cause chronic pain, tubal blockage, and infertility.[23]

The symptoms of PID can range from mild to severe, and in some cases, it may be asymptomatic or present with subtle signs. This is the most common symptom and can range from mild to severe. The pain may worsen with movement or sexual activity. Often foul-smelling, this discharge is a result of the infection. This can include intermenstrual bleeding or heavier menstrual bleeding. Deep pelvic pain may occur during or after sexual activity. A low-grade fever is common, but in

severe cases, a high fever may develop. These can occur, especially if the infection causes more systemic illness or is complicated by peritonitis. In some cases, women may experience painful urination or urgency, especially if the infection involves the bladder or urinary tract.[24]

COMPLICATIONS OF PID

If left untreated or inadequately treated, PID can lead to serious complications. Scarring of the fallopian tubes and ovaries can block the passage of eggs, leading to infertility. It is estimated that PID causes up to 15% of infertility cases. PID increases the risk of an ectopic pregnancy (a pregnancy that occurs outside the uterus, often in the fallopian tubes), which can be life-threatening if not treated promptly. Long-term inflammation and scarring can result in persistent pelvic pain that affects a woman's quality of life. Bacterial infections can lead to the formation of pus-filled sacs in the ovaries or fallopian tubes, requiring surgical drainage. PID is a significant health concern for women, particularly those who are sexually active. The infection primarily results from STIs and can cause severe reproductive health issues, including infertility and chronic pain. Early diagnosis, appropriate antibiotic treatment, and preventive measures are key to reducing the risk of complications. Timely intervention is essential to ensure that PID does not lead to long-term health issues.[25]

COMPLICATIONS OF PID AS INFERTILITY

PID is a serious infection of the female reproductive organs that can cause long-term health consequences, particularly infertility. PID is most commonly caused by STIs such as *Chlamydia trachomatis* and *Neisseria gonorrhoeae*, but can also result from other bacteria. When left untreated or inadequately treated, PID can lead to scarring and damage to the reproductive organs, disrupting normal reproductive function and increasing the risk of infertility. Infertility is one of the most significant complications of PID, affecting a considerable proportion of women who experience the condition.[26] The relationship between PID and infertility is well-documented, and the severity of infertility is often proportional to the extent of damage caused by the infection to the reproductive system. This section delves into how PID leads to infertility, the mechanisms involved, and the factors influencing reproductive outcomes. The connection between PID and infertility lies primarily in the damage caused to the fallopian tubes, though other reproductive organs such as the ovaries and uterus can also be affected. The fallopian tubes are vital for fertility as they serve as the passage for eggs from the ovaries to the uterus, where fertilization occurs.[27]

PID LEADING INFERTILITY TREATMENT VIA IVF

PID is a significant cause of female infertility, primarily due to its damaging effects on the fallopian tubes. When left untreated or inadequately managed, PID leads to inflammation, scarring, and tubal blockages, resulting in tubal factor infertility (TFI). Since natural conception relies on the proper function of the fallopian tubes to facilitate fertilization and embryo transport, severe tubal damage often necessitates ART, with IVF being the primary option.[28]

PID typically results from ascending infections caused by sexually transmitted pathogens such as *Chlamydia trachomatis* and Neisseria gonorrhoeae, or by polymicrobial infections from the vaginal flora. The inflammation induced by these infections triggers fibrosis and adhesions within the reproductive tract, impairing tubal motility and creating mechanical obstructions. This damage significantly reduces the likelihood of natural conception and increases the risk of ectopic pregnancy.[29]

ROLE OF IVF IN OVERCOMING PID-RELATED INFERTILITY

IVF bypasses the fallopian tubes by directly retrieving mature oocytes, fertilizing them in a controlled laboratory environment, and transferring viable embryos into the uterus. For women with PID-related infertility, IVF offers a viable solution by circumventing tubal dysfunction. Studies indicate that the success rates of IVF in women with a history of PID are comparable to those with other causes of infertility, provided the endometrial lining remains receptive and ovarian function is preserved. However, factors such as hydrosalpinx (fluid-filled, damaged fallopian tubes) can reduce IVF success rates and may require surgical intervention before treatment.[30]

IVF METHODOLOGY

Surrogacy

In essence, a gestational carrier refers to a surrogate who carries and delivers a child (or children) on behalf of another individual or couple. Financial compensation may or may not be involved, depending on legal and personal arrangements. For many individuals—particularly gay men seeking fatherhood and women facing infertility—gestational surrogacy represents a viable alternative for family building. However, surrogacy remains illegal or highly regulated in several countries, including Germany and France, as well as in certain U.S. states. According to the Centers for Disease Control and Prevention (CDC), gestational carriers are utilized in

approximately 2% of ART cycles.[17] Notably, 16% of American couples using ART do not employ gestational carriers, and in 53.4% of cases, gestational carriers give birth to multiple infants.[31]

Egg donation

When a pregnant woman's physician advises that her eggs may not fertilize successfully, egg donation can be considered as an alternative reproductive option. Each year, thousands of families choose to donate or receive donor eggs, reflecting the growing acceptance and accessibility of this approach.[32] In 2019, approximately 19,911 embryo transfers were performed using donor eggs—representing a 14% increase compared to the previous year. The success of egg donation is believed to depend on multiple factors beyond maternal age, including oocyte quality and laboratory conditions. According to one study, 97.1% of donor eggs survived the fertilization process, and 59.1% of resulting embryos successfully developed to the blastocyst stage.[33] Based on biopsy and preimplantation genetic screening (PGS) results, 84.2% of blastocysts were euploid and 15.8% were aneuploid. Consequently, four euploid embryos would be produced from an average of nine donor eggs.[34]

Sperm donation

Eggs represent only one form of genetic material that may be donated by friends, partners, or anonymous individuals. Donated sperm, typically obtained through licensed sperm banks, is commonly used in in vitro fertilization (IVF) or intrauterine insemination (IUI) procedures.[35] Studies indicate that approximately 21% of sperm donors contribute to multiple sperm banks. Notably, 48% of donors cite altruism as their primary motivation for donation, while 85.7% report that they would feel comfortable having future contact with offspring conceived from their donations.[36]

Embryo donation

In some cases, two individuals must collaborate to achieve a successful pregnancy through medical assistance, a process known as embryo donation.[37] This option typically involves embryos donated by couples who have completed their own fertility treatment and chosen to contribute their remaining frozen embryos to others. Each year, this practice results in the birth of hundreds of babies worldwide.[38] It is estimated that more than 2,000 donor embryos are preserved annually for potential use in IVF procedures. In the United States, the likelihood of a live birth following IVF using a donated embryo is approximately 40.6% per cycle (Figure 1).[39]

EMBRYO TRANSFER

During IVF procedures, clinicians must carefully consider medical, ethical, and personal factors when determining the appropriate number of embryos to transfer. The optimal number is primarily influenced by medical criteria such as the patient's age, reproductive history, and overall health status, aiming to maximize success rates while minimizing risks. Although transferring multiple embryos may increase the probability of pregnancy, it also elevates the risk of multiple gestations, which can lead to adverse health outcomes for both the mother and the offspring. Ethical considerations include the potential need for selective embryo reduction and respect for patient autonomy in decision-making. This section discusses these aspects in detail, highlighting evidence-based guidelines and best practices for achieving a balance between safety and efficacy in embryo transfer decisions.[40,41]

IVF COSTS

The cost of a single IVF cycle in the United States typically ranges between $10,000 and $15,000. However, some health insurance policies partially or fully cover IVF and other fertility treatments, allowing eligible individuals to significantly reduce their out-of-pocket expenses.[42] The extent of coverage varies depending on the insurance provider and the state of residence. Currently, 17 U.S. states have enacted legislation requiring insurance companies to either provide or offer coverage for infertility treatments, including IVF.[43] In addition, various online tools—such as the IVF due date calculator—can help estimate an expected delivery date based on the timing of embryo transfer. Calculations differ according to the specific treatment protocol used, including Day 3 or Day 5 embryo transfer, IVF with own eggs, IVF with fresh donor eggs, or fresh donor embryo cycles.[44]

SCREENINGS

Preimplantation genetic testing (PGT) is used by doctors to determine the sex of the embryo prior to implantation during IVF. If an embryo is to be male or female, the chromosomes that comprise it can be analysed by medical professionals. Preimplantation testing is available at approximately 72% of contacted ART facilities, according to a 2018 study. The main purpose of PGT was to identify genetic abnormalities in the embryo's DNA. A birth defect or developmental problem could arise from these.[45]

IVF vs. IUI

Artificial insemination, sometimes referred to as IUI, is the practice of directly injecting sperm into the uterus using a catheter. This technique reduces the distance and time the sperm must travel to reach the egg in order to fertilise it. This process is not the same as IVF, which

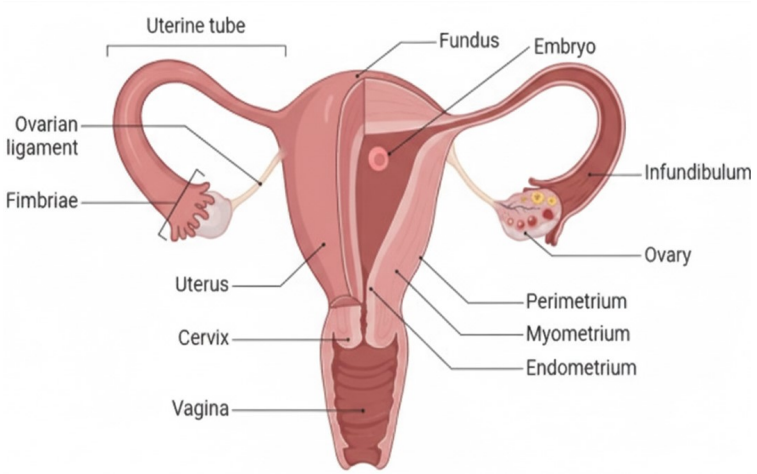

Figure 1. Anatomy of the female reproductive system, illustrates the key componants of reproductive system.

combines sperm and eggs outside of the body in a controlled environment. IUI is usually used for mild male factor infertility and couples whose infertility cannot be explained. An IUI patient may potentially be given medication to induce ovulation. A doctor will inject the sperm into the uterus during the ovulation phase. IUI is a rapid procedure that usually takes five to ten minutes, in contrast to IVF. IUI is also less expensive than IVF. When insurance is not present, IUI usually costs $300–1,000. However, in terms of success, IVF outperforms IUI.[46] When sperm is injected into the uterus by medical experts, the body's natural processes take over. IVF allows medical professionals to select the best embryo or embryos and monitor the fertilisation status of an egg.[47] When utilising IUI, about one-third of IVF instances are successful. Moreover, IUI may not be the ideal course of treatment for infertility for a person who has severe endometriosis, obstructed fallopian tubes, is in their late 30 s or older, or all three of these conditions. Has lower quality eggs and fewer eggs overall.[48] Infertility treatment for severe male factor infertility is also not appropriate for this reason. Infertility is a multifactorial condition influenced by both physiological and social determinants. While social and psychological pressures often shape the experience and management of infertility, understanding its biological basis is essential for selecting appropriate interventions such as IVF. Table 1 summarizes the key physiological factors that contribute to infertility in both males and females.

During pregnancy or IVF therapy, a woman's body undergoes numerous physiological changes that interact with both her physical health and psychosocial well-being. These include an enhanced inflammatory response, alterations in gut microbiota, hormonal fluctuations, and changes in glucose and lipid metabolism.[49] Compared with natural conception, IVF pregnancies are associated with a slightly higher incidence of ovarian disorders, ectopic pregnancies, and in rare cases, certain cancers.[50] Moreover, intrauterine growth restriction (IUGR) and autoimmune disease relapses have also been identified as potential risk factors linked to IVF treatments.[51] By acknowledging these physiological dimensions within the social context of infertility, this section emphasizes the importance of a holistic approach—one that integrates medical understanding with the emotional, ethical, and social experiences of individuals undergoing fertility treatment.

EDUCATIONAL FACTORS AFFECTING INFERTILITY

Artificial reproductive technology use is positively correlated with education level. A 2021 study found that 76% of women seeking fertility care had a bachelor's or master's degree, and 19.1% had a professional degree.[52] 18 Women who experienced infertility and had less than a high school diploma were only 33.1% likely to seek infertility care, compared to 80.8% of women who had a college degree.[53] The use of artificial reproductive technology has also been linked to increased challenges in accessing infertility care, especially for Latino patients seeking care.[54] Those dealing with infertility problems frequently experience anxiety and/or despair, which may prevent them from getting fertility care if they don't have a support system from the community.[55] Reduced access to fertility care is linked to lower educational attainment, language, and cultural barriers.[56]

PSYCHOLOGICAL ASPECTS

Anxiety and emotional distress are greater in IVF patients than in control persons.[57] Even while the infertile women did not display any odd behavioural

Table 1: Physiological factors affecting infertility

No.	Factors impacting females	Factors impacting males
1	Disorders of ovulation (irregular or absent ovulation cycles)	Unusual function or production of sperm (low count or quality)
2	Abnormalities of the uterus and cervix (structural or functional issues)	Sperm delivery issues (blockage, anatomical defects)
3	Damage or blockage of fallopian tubes: This can result from infections (*e.g.*, pelvic inflammatory disease), previous surgeries, or ectopic pregnancies that impair the transport of the egg to the uterus.	Excessive exposure to environmental factors: Prolonged exposure to heat, radiation, toxins (pesticides, chemicals), or heavy metals can damage sperm quality or quantity.
4	Primary ovarian insufficiency (premature failure of the ovaries before age 40)	Cancer (chemotherapy, radiation, or surgery impacting fertility)
5	Endometriosis (tissue similar to uterine lining grows outside the uterus) / Early menopause	NA
6	Pelvic adhesions (scar tissue in the pelvic area due to infection or surgery)	NA
7	Cancer (reproductive organ involvement or treatments affecting fertility)	NA

NA, not available.

patterns, the IVF group had a distinctive pattern of marital connections and a distinct psychological profile compared to the control group. There are notable differences in psychopathology, psychological characteristics, and relationship dynamics between IVF veterans and inductees.[58] There is no correlation found between specific psychiatric, psychopathological, or marital characteristics and women's success with IVF.[58]

INDICATIONS

According to estimates, between 25% and 35% of infertile women suffer from tuboperitoneal disease, with PID being the most common cause of tubal damage.[59] PID is usually caused by infections with *Chlamydia trachomatis*. Peritubular adhesions and tubal obstruction, which are caused by bacterial infections, reduce the chance of IVF.[60] During IVF, embryos are put straight into the uterus to prevent tubal damage. Those with endometriosis, a chronic inflammatory illness marked by the presence of endometrial tissue outside of the uterine cavity, have a substantially higher frequency of the condition than those without infertility.[61] Studies have shown that endometriosis causes pelvic adhesions, persistent intraperitoneal inflammation, modified folliculogenesis, and poor embryo implantation in women. We still don't*t* know exactly how endometriosis leads to infertility. Laparoscopic surgery has been found to increase the pregnancy rate from 4.7% to 30.7%,[62] which emphasises the necessity of restoring normal pelvic architecture in order to facilitate spontaneous conception. Unfortunately, endometriosis women have a substantially lower success rate with IVF compared to other causes of infertility, and worse outcomes are linked to more advanced disease.[62,63]

Poor quality semen is the only reason for infertility in 20% of couples and a contributing cause in another 20%. Reduced sperm count, motility, or morphology (sperm shape) can be successfully corrected in around half of males with medication or surgery.[64,65] Intrauterine insemination may increase the chance of conception when the male partner has fewer motile sperm.[66] If the above therapies don't*t* work, there is always the option of intracytoplasmic sperm injection (ICSI) or IVF with or without such treatments. Since sperm retrieved from the testicle or epididymis in cases of obstructive azoospermia or testicular hypofunction have not completed the final *in vivo* maturation phase that allows sperm to fertilise an oocyte, they can only be used in an IVF cycle with ICSI.[65,67]

Women with decreased ovarian reserve or polycystic ovarian syndrome (POS) who are unable to conceive naturally may benefit from donor oocytes or embryos.[58] Because ageing affects oocyte function and fertilizability and IVF cannot reverse these effects, many women in their late 30 s and beyond will require donor oocytes.[68,69] These eggs are extracted from a younger woman and are either stored for potential future use or used in a fresh IVF cycle.[70] IVF is also an option for women who desire to maintain their fertility. Patients with cancer or other diseases may be diagnosed in women who need gonadotoxic treatments that compromise ovarian function.[71,72] Before receiving radiation or chemotherapy, these women can choose to cryopreserve embryos or oocytes for future transfer.[73] Women who would prefer to postpone having children may also think about oocyte cryopreservation. The fourth decade of life is associated with a significant decline in a woman's fertility,[71,74] which is caused by a decline in oocyte quantity and quality. Cryopreserve oocytes for future use if a woman is not interested in getting pregnant any time soon.[75]

CURRENT RESEARCH STATUS OF IPD INDUCED INFERTILITY TREATMENT VIA IVF

A serious problem for reproductive health, PID is frequently brought on by sexually transmitted infections

such *Neisseria gonorrhoeae* and *Chlamydia trachomatis*. One of the main causes of female infertility globally, tubal factor infertility, can result from the inflammation and scarring brought on by PID. One of the most important ART for infertile individuals and couples, including those with tubal damage from PID, is IVF. IVF gives women with tubal factor infertility an alternate route to conception by fertilizing eggs outside the body and transferring embryos straight into the uterus, avoiding the damaged fallopian tubes.[76,77]

But the relationship between PID and IVF involves important social, cultural, and psychological factors in addition to physiological ones. When thinking about IVF, women with a history of PID may encounter obstacles like the stigma attached to STIs, misunderstandings about infertility treatments, and unequal access to reproductive healthcare. These elements may cause mental anguish and discourage people from obtaining the required medical care. Furthermore, the acceptance and use of ARTs like IVF can be strongly influenced by cultural and religious beliefs. The reproductive options available to women with a history of PID may be further complicated by the reluctance that some communities may have to IVF treatment because of prevalent standards.[78–80]

A comprehensive strategy that incorporates education, healthcare regulations, and support systems is needed to address these complex issues. This strategy aims to lower stigma, raise awareness, and help women with PID-related infertility make educated decisions. Improving patient care, encouraging fair access to reproductive health services, and developing a more inclusive approach to infertility treatment all depend on a deeper comprehension of these social factors.[81–83]

SOCIAL AND PSYCHOLOGICAL ISSUES RELATED TO INFECTIOUS PID

PID is a serious disease that affects the reproductive system. It is mostly caused by STIs like *Chlamydia trachomatis* and *Neisseria gonorrhoeae*. The medical effects of PID, like infertility, prolonged pelvic pain, and ectopic pregnancies, are well known. However, the social and psychological effects of PID are still not well understood. Women who have been identified with PID often have to deal with a lot of emotional pain, social stigma, and problems getting medical care, all of which affect their health and their decision to get treatment.[84,85]

SOCIAL STIGMA AND MISCONCEPTIONS

The shame that comes with having a STI is one of the biggest social problems that PID causes. Because PID is often connected to STDs, women who are diagnosed may feel shame, judgment, or discrimination from their groups and healthcare providers. In some cultures, talking about sexual health is frowned upon, which spreads false information and fear about PID. This shame can keep people from getting medical help when they need it, which can make the disease's long-term problems, like infertility, worse. In cultures where having children is a core expectation for women, women who can'*t* have children because of PID may have to deal with extra social pressures. Women are often unfairly blamed for problems with reproduction, which can lead to social rejection, unstable marriages, or even divorce. Being judged for both having PID and not being able to have children can have a big effect on your mental health and self-esteem.[86–88]

PSYCHOLOGICAL DISTRESS AND MENTAL HEALTH CHALLENGES

The psychic effects of PID are very bad, especially for people who can't have children because of the disease. Studies have shown that women who can't have children because of PID are more likely to be anxious, depressed, and emotionally upset than women who can't have children because of other reasons. They feel alone and hopeless because they don't know if they will be able to have children in the future and because STI-related illnesses and infertility are looked down upon by society. Women who have been identified with PID often feel guilty and blame themselves for their problems. Many people take on board negative views from society and see their situation as a personal failure or punishment for actions they have done in the past. People who have these kinds of negative thoughts about themselves may not want to tell their partners about their health or ask for mental support from friends and family.[89,90]

Many people with PID put off getting medical help because they are afraid of being judged or having mental health problems. This can lead to serious problems, such as not being able to have children again. Women may not go to regular reproductive health screenings or talk about their symptoms freely because they are afraid of being judged by healthcare providers or called promiscuous. Lack of money and unequal access to health care make the problem even worse because women from lower-income families may have trouble getting timely and suitable treatment for PID and infertility. Due to the high prices of fertility treatments like IVF and ART, many women who are having trouble getting pregnant because of PID can'*t* get them.[91,92]

ADDRESSING SOCIAL AND PSYCHOLOGICAL CHALLENGES

To reduce the social and psychological impacts of PID,

targeted interventions are required, such as public health initiatives that combat stigma and raise awareness of the illness. Comprehensive sex education and community outreach programs can help bust myths about PID and get people diagnosed and treated as soon as possible. When dealing with PID cases, healthcare professionals should be understanding and not harsh. This will make sure that people who are affected feel safe talking about their symptoms and getting the right care. Including mental health support, like counseling and peer support groups, in treatment plans for PID and infertility can help women deal with the social problems that come with the conditions and make their lives better overall.[93]

FUTURE OF IVF

The Assisted Reproductive Technology (Regulation) Bill, recently enacted by the Indian Parliament, seeks to ensure high-quality, transparent, and ethically regulated reproductive treatments across the country. This legislation is expected to improve both clinical outcomes and social equity in ART access by minimizing unregulated practices and protecting patients from exploitation. The Indian IVF market, valued at $478.2 million in 2018, is projected to grow at a CAGR of 14.7%, reaching $1,453 million by 2026, reflecting both technological progress and expanding societal acceptance of assisted reproduction.

During the COVID-19 pandemic, the IVF industry faced severe operational disruptions similar to other medical sectors.[83–85] Global health organizations, including the CDC, ESHRE, and the British Fertility Society, issued guidelines emphasizing infection control through mask usage, sanitization, and social distancing. These bodies also recommended the temporary suspension of treatment for COVID-positive patients and the "freeze-all" approach in cases where infection was detected between oocyte retrieval and embryo transfer.[93,94] While these measures ensured patient safety, they also underscored disparities in access—patients from rural or low-income settings faced greater delays and reduced continuity of care.

Artificial intelligence (AI) the future of IVF

The integration of AI into reproductive medicine—often termed Repro-AI—represents a transformative step in optimizing infertility diagnosis and treatment. AI tools such as time-lapse embryo imaging, digital data integration, and automated culture systems enhance precision, efficiency, and safety in embryology laboratories.[95,96] However, while these innovations can improve IVF success rates and lower costs over time, they may also exacerbate social disparities if access remains limited to technologically advanced or private urban centers.

AI-driven embryo selection and success prediction algorithms have the potential to reduce subjectivity, allowing more consistent decision-making and potentially lowering treatment failures. Yet, the ethical and social challenges—including unequal access, data privacy, and the risk of depersonalized patient care—must be addressed to ensure equitable benefits. In regions with limited resources or insufficiently trained embryologists, AI could serve as a bridge for capacity building, helping standardize care and extend services to underserved populations.[97,98]

The future of IVF in India and globally will likely be shaped by a dual trajectory: technological innovation improving efficiency and outcomes, and social policy ensuring that these advancements are distributed equitably. Aligning emerging technologies like AI with patient-centered and socially inclusive frameworks will be key to reducing disparities and promoting reproductive justice for all individuals affected by infertility.

CONCLUSION

Infectious PID remains a significant reproductive health challenge globally, with a direct impact on women's fertility and long-term health outcomes. The social and community perceptions surrounding PID often reflect limited awareness, stigma, and misconceptions, which can delay diagnosis and treatment. These factors, combined with the complications associated with untreated PID, such as infertility and chronic pelvic pain, highlight the importance of early intervention, education, and accessible healthcare resources. In the context of assisted reproductive technologies like IVF, PID presents both clinical and social challenges. While advancements in IVF offer hope for many individuals affected by infertility, the underlying complications of PID, such as tubal factor infertility, remain significant barriers to successful reproductive outcomes. The evolving landscape of reproductive health, including the intersection between PID and IVF, requires a multidisciplinary approach that not only focuses on medical interventions but also addresses the societal perceptions and stigma that may influence patients' decisions to seek treatment. Effective public health strategies, enhanced patient education, and comprehensive reproductive health policies can help bridge the gap between clinical advancements and social attitudes, improving access to care and outcomes for women affected by PID. Future research and community-based efforts should prioritize reducing the stigma surrounding PID, promoting early detection, and improving access to both preventive and therapeutic reproductive health services. By fostering a supportive and informed environment, it is possible to improve the quality of care

and ensure better fertility outcomes for women affected by PID.

DECLARATION

Acknowledgement
We, thank you to the Mumbai Education Trust (MET)'s, Institute of Pharmacy, BKC, affiliated under Savitribai Phule Pune University, Nashik, for their constant support and providing all facilities to complete this work.

Author contributions
SRW and GBM conceptualized the content of the manuscript and contributed in drafting the manuscript. EDA reviewed and edited the final manuscript.

Source of funding
None

Ethical approval
Not applicable.

Informed consent
Not applicable.

Conflict of interest
The authors declare that they have no conflicts of interest.

Use of large language models, AI and machine learning tools
During the preparation of this study, the authors used Grammarly (Version 14.1263.0), ChatGPT (OpenAI GPT-5.1), and QuillBot Premium version, in order to verify the grammar and improve the readability. After using these tools/services, the authors reviewed and edited the content as needed and take full responsibility for the content of the article.

Data availability statement
No additional data.

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