

Review Article

Delayed Parenthood: The Role of Polycystic Ovary Syndrome and Endometriosis in Fertility and Reproductive Outcomes – A Review

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Abstract

Delayed parenthood has become an increasingly common phenomenon worldwide. Although postponement of childbearing may be influenced by education, career development, financial stability, relationship circumstances, and personal readiness, reproductive health conditions may also contribute substantially to difficulties in achieving parenthood. Among these conditions, Polycystic Ovary Syndrome (PCOS) and endometriosis are important causes of impaired fertility among women of reproductive age. The present review examines the relationship between delayed parenthood and these two reproductive health conditions, with particular emphasis on infertility, reproductive dysfunction, delayed diagnosis, and fertility outcomes. Evidence reviewed in the seminar literature indicates that women with PCOS experience higher rates of infertility, ovulatory dysfunction, menstrual irregularities, and fertility-treatment use. Delayed diagnosis of PCOS was also associated with delayed childbearing. Similarly, women with endometriosis demonstrated higher rates of infertility, pelvic pain, and reduced likelihood of achieving a first live birth. Increasing severity of endometriosis was associated with poorer pregnancy and live-birth outcomes. Evidence regarding interventions in PCOS suggests that lifestyle modification can improve ovulation, menstrual regularity, metabolic health, and conception outcomes. The combination of lifestyle modification with pharmacological treatments such as metformin or letrozole may further improve reproductive outcomes in appropriate patients. Current evidence supports the importance of early recognition, fertility counselling, timely diagnosis, individualized management, and reproductive-health education for women at risk of fertility difficulties. Addressing PCOS and endometriosis early may help reduce avoidable delays in conception and support individuals in achieving their reproductive goals.

Keywords: Delayed parenthood, delayed childbearing, PCOS, endometriosis, infertility, fertility, reproductive health, ovulatory dysfunction, fertility outcomes, early intervention.

Introduction

Delayed parenthood has become increasingly common over recent decades. Individuals may postpone childbearing because of higher education, career development, financial considerations, relationship circumstances, and the desire to achieve personal and professional stability before starting a family. Your seminar literature identifies delayed parenthood as an important demographic and public-health issue because postponement of childbearing may coincide with declining fertility and increasing reproductive-health challenges [1]. Fertility awareness is an important component of reproductive decision-making. However, individuals may have limited knowledge regarding age-related fertility decline, pregnancy risks, and the effectiveness and limitations of assisted reproductive technologies. The awareness studies included in the seminar demonstrated moderate fertility awareness, while knowledge gaps remained regarding reproductive aging and pregnancy-related risks [2].

Delayed parenthood should not, however, be considered only in relation to social or personal decisions. Underlying reproductive health conditions may also affect the ability to conceive and may contribute to prolonged attempts to achieve pregnancy. The seminar identifies several health conditions that can affect fertility, including PCOS, endometriosis, thyroid disorders, obesity, diabetes, hormonal disorders, and pelvic inflammatory disease. PCOS and endometriosis were selected as the major focus because of their direct effects on female reproductive function.

PCOS is an endocrine and metabolic reproductive disorder associated with menstrual irregularities, hyperandrogenism, and ovulatory dysfunction. The international evidence-based guideline emphasizes assessment of reproductive goals and appropriate management of infertility in women with PCOS, with lifestyle optimization and ovulation induction forming important components of care [3]. Endometriosis is a chronic gynecological condition associated with pain and infertility. Its effects on fertility may involve inflammation, adhesions, altered pelvic anatomy, and other mechanisms. Reviews of endometriosis have demonstrated substantial reproductive and psychosocial effects and emphasize the importance of individualized fertility-oriented management. Therefore, understanding PCOS and endometriosis in the context of delayed parenthood is important for reproductive-health professionals. Early recognition and appropriate management may provide opportunities to address fertility risks before prolonged delays in conception occur.

Delayed Parenthood and Reproductive Health

Delayed parenthood is a complex phenomenon involving social, economic, personal, and biological factors. The seminar evidence indicates that most participants in the reviewed awareness studies desired children in the future, but financial stability, career development, work-life balance, childcare, and personal readiness influenced decisions regarding the timing of parenthood [4]. The relationship between delayed parenthood and reproductive health becomes particularly important when childbearing is postponed until a later reproductive age. Fertility does not remain constant throughout the reproductive lifespan, and age-related changes may influence the probability of natural conception and reproductive outcomes. The seminar's awareness studies found that participants had moderate knowledge of fertility decline but retained important misconceptions and knowledge gaps [5].

At the same time, reproductive disorders may independently reduce fertility. A woman who postpones pregnancy for personal reasons may subsequently encounter difficulty conceiving because of an underlying condition such as PCOS or endometriosis. Consequently, delayed parenthood and reproductive health conditions may interact, creating a more complex pathway to infertility.

Polycystic Ovary Syndrome and Delayed Parenthood

Overview of PCOS

PCOS is one of the most common endocrine and reproductive disorders affecting women of reproductive age. It is characterized by a combination of reproductive, hormonal, and metabolic abnormalities. The seminar describes PCOS in relation to irregular menstrual cycles, anovulation, hormonal imbalance, obesity, insulin resistance, and impaired fertility [6]. Ovulatory dysfunction is particularly important in relation to delayed parenthood because irregular or absent ovulation can reduce the likelihood of spontaneous conception. The 2023 international guideline recommends that fertility goals be incorporated into PCOS care and identifies letrozole as the preferred first-line pharmacological ovulation-induction treatment for anovulatory infertility when there are no other infertility factors.

PCOS and Infertility

The evidence included in the seminar demonstrates a strong association between PCOS and infertility. In the study presented by Joham et al. (2025), infertility was reported among 72% of women with PCOS compared with 16% of women without PCOS. Women with

PCOS were also more likely to use fertility-hormone treatment and seek fertility assistance. The reported adjusted odds ratio for infertility associated with PCOS was 14.9 (95% CI: 10.9–20.3) [7]. These findings indicate that PCOS can substantially affect reproductive outcomes. Ovulatory dysfunction may make conception more difficult and may increase the likelihood of fertility-treatment use. Thus, PCOS can become an important reproductive-health factor when parenthood is postponed.

PCOS, Infertility and Delayed Childbearing

The longitudinal Australian cohort study included in the seminar found that women with PCOS experienced higher rates of infertility, IVF treatment, and fertility-hormone treatment compared with women without PCOS. Women with PCOS were also more likely to have their first childbirth at an older age [8]. The study further identified PCOS and infertility as significant predictors of delayed childbearing. Importantly, late diagnosis of PCOS was independently associated with delayed childbearing, with the fully adjusted model showing an odds ratio of approximately 2.05.

These findings suggest that the timing of diagnosis may be clinically relevant. Delayed recognition of reproductive symptoms can postpone appropriate treatment and fertility planning, potentially increasing the period between reproductive intention and successful conception.

Delayed Diagnosis of PCOS

The seminar's Indian study by Renae et al. (2021) provides additional evidence regarding the reproductive burden associated with PCOS. Women with PCOS experienced greater difficulties becoming pregnant and were more likely to seek medical consultation for infertility. Difficulty becoming pregnant was the strongest factor associated with previous PCOS diagnosis in the study [9].

PCOS can also coexist with metabolic and psychological concerns. The study reported higher levels of obesity, depression, hypertension, and high cholesterol among women with PCOS compared with women without PCOS. Therefore, PCOS management should extend beyond ovulation alone and address the broader reproductive, metabolic, and psychological health of the individual.

Endometriosis and Delayed Parenthood

Overview of Endometriosis

Endometriosis is a chronic gynecological disorder characterized by the presence of endometrial-like

tissue outside the uterine cavity. It commonly affects the ovaries and pelvic structures and can be associated with inflammation, adhesions, pelvic pain, dysmenorrhea, and infertility [10]. The relationship between endometriosis and infertility is well established, although the mechanisms are complex. Current reviews describe possible contributions from pelvic inflammation, adhesions, altered pelvic anatomy, tubal dysfunction, and other reproductive mechanisms.

Endometriosis and Infertility

The Finnish population-based cohort presented in the seminar provides strong evidence of poorer reproductive outcomes among women with endometriosis. Infertility was diagnosed in 17.2% of women with endometriosis compared with 3.2% of women without endometriosis [11]. The study also found a substantial difference in first live birth. A first live birth occurred in 40.2% of women with endometriosis compared with 66.3% of women without endometriosis. The incidence-rate ratio for first live birth was 0.51 (95% CI: 0.49–0.52). These findings demonstrate that endometriosis is associated with reduced reproductive success and may contribute to delays in achieving parenthood.

Endometriosis-Related Pain and Reproductive Difficulties

Endometriosis is not solely a fertility disorder; pain is an important component of the condition. The study by Charles et al. included in the seminar reported substantially higher rates of dysmenorrhea, dyspareunia, and chronic pelvic pain among women with endometriosis. Infertility was also more common in the endometriosis group [12]. Pain and reproductive difficulties may affect quality of life and family planning. A qualitative systematic review found that endometriosis-associated infertility can influence family-planning decisions and cause substantial emotional distress for women and their partners, supporting the need for fertility counselling and psychosocial care.

Disease Severity and Fertility Outcomes

The severity of endometriosis may also influence reproductive outcomes. In the seminar study, pregnancy and live-birth outcomes declined as disease severity increased. Pregnancy outcomes decreased from 85% in minimal disease to 35% in severe disease, while live-birth outcomes decreased from 80% to 30%. The same study reported lower pregnancy and implantation outcomes among women with endometriosis. Overall, in-

creasing disease severity was associated with greater reproductive difficulties [13].

However, current evidence also emphasizes that disease stage alone does not necessarily predict fertility. Recent reviews suggest that the relationship between anatomical severity and fertility is complex, and treatment decisions should consider the whole patient rather than relying solely on staging.

Endometriosis and First Live Birth

The reduced first-live-birth rate reported in the Finnish cohort is particularly relevant to delayed parenthood. Women with endometriosis had approximately 49% lower incidence of first live birth compared with women without endometriosis. The lower cumulative first-live-birth rate persisted across reproductive ages [14]. This suggests that endometriosis may influence the achievement of parenthood even when women are actively attempting conception. Consequently, early recognition of symptoms and fertility-oriented counselling may be particularly valuable for women who wish to postpone or plan future pregnancy.

Comparison of PCOS and Endometriosis

PCOS and endometriosis are different conditions, but both can contribute to infertility and delayed parenthood.

Both conditions demonstrate why delayed parenthood should be considered in the context of reproductive health. PCOS primarily affects fertility through ovulatory and endocrine-metabolic disturbances, whereas endometriosis may affect fertility through multiple inflammatory, anatomical, and reproductive mechanisms.

Early Interventions for PCOS and Delayed Parenthood

Lifestyle Modification

Lifestyle modification is an important component of PCOS management. The intervention study included in the seminar incorporated dietary modification, physical activity, weight management, behavioural counselling, and sleep management. Following the lifestyle intervention, ovulation increased from 38% to 72%, menstrual regularity increased from 42% to 76%, and conception increased from 29% to 58%. The need for fertility treatment decreased from 48% to 26%, while average time to conception decreased from 14.2 to 8.1 months. Metabolic outcomes also improved, including BMI, insulin resistance, waist circumference, and physical activity adherence. The international PCOS guideline similarly recommends healthy eating and

regular physical activity as part of PCOS care and pre-conception optimization.

Lifestyle Modification and Metformin

The seminar also reviewed evidence regarding combined lifestyle modification and metformin. The intervention incorporated dietary modification, physical activity, behavioural counselling, and metformin to improve insulin sensitivity. Following intervention, menstrual regularity and ovulation increased, insulin resistance decreased, and conception outcomes improved. Delayed conception decreased from 62% to 34%, while average time to conception decreased from 15.4 to 8.7 months.

However, metformin should be used according to individual clinical circumstances. The international guideline recognizes metformin as an option in PCOS but notes that its role and efficacy for ovulation induction differ from those of letrozole.

Lifestyle Modification and Letrozole

Letrozole is an important fertility treatment for anovulatory infertility associated with PCOS. The seminar's intervention study combined lifestyle modification with letrozole and reported improvements in ovulation, clinical pregnancy, and live-birth outcomes. The study reported an increase in ovulation from 35% to 62%, clinical pregnancy from 18% to 28%, and live birth from 15% to 27.5%. Delayed conception decreased from 62% to 34%, while average time to conception decreased from 15.2 to 8.4 months. The 2023 international PCOS guideline identifies letrozole as the preferred first-line pharmacological treatment for anovulatory infertility in women with PCOS when there are no other infertility factors.

Management of Endometriosis-Associated Fertility Problems

Management of endometriosis-associated infertility requires individualized assessment. Treatment decisions should consider age, duration of infertility, symptoms, disease location and severity, ovarian reserve, tubal function, previous treatment, and reproductive goals.

Historically, surgical treatment was frequently used in the management of endometriosis-associated infertility. However, contemporary evidence emphasizes that surgery, particularly ovarian surgery, may affect ovarian reserve and should therefore be carefully considered. Assisted reproductive technologies have an increasingly important role in fertility management for selected women with endometriosis.

A recent review emphasizes that fertility preservation

Table 1. Comparison of PCOS and Endometriosis

Aspect	PCOS	Endometriosis
Primary nature	Endocrine and metabolic reproductive disorder	Chronic inflammatory gynecological disorder
Major fertility mechanism	Ovulatory dysfunction	Multifactorial impairment of fertility
Menstrual features	Irregular or absent menstruation	Dysmenorrhea and menstrual pain
Major associated features	Hyperandrogenism, obesity, insulin resistance	Pelvic pain, adhesions, inflammation
Fertility consequence	Difficulty conceiving due to impaired ovulation	Reduced fertility and reproductive success
Diagnosis	May be delayed or overlooked	Often associated with diagnostic delay
Important fertility intervention	Lifestyle optimization and ovulation induction	Individualized fertility management and, where appropriate, ART
Reproductive-health priority	Restore/optimize ovulation and metabolic health	Preserve fertility and manage symptoms/disease appropriately

and reproductive counselling should be considered as part of long-term management because endometriosis is a chronic condition that may affect reproductive potential. Therefore, management should not focus only on symptom control. For women who wish to become parents, reproductive goals should be incorporated into treatment planning.

Importance of Early Diagnosis and Fertility Awareness

Early diagnosis is important for both PCOS and endometriosis. In PCOS, delayed diagnosis has been associated with delayed childbearing in the seminar evidence. In endometriosis, diagnostic delays are also recognized as an important clinical problem, partly because symptoms may be attributed to normal menstruation or treated symptomatically without definitive diagnosis.

Fertility awareness should therefore include education about:

- normal reproductive aging;
- menstrual irregularities;
- symptoms suggestive of PCOS;
- symptoms suggestive of endometriosis;
- factors associated with infertility;
- when fertility assessment should be considered; and
- available fertility-treatment options.

The seminar's awareness studies demonstrate that although many individuals have reasonable awareness of fertility decline, important knowledge gaps remain. Education should not be used to pressure individuals into earlier parenthood. Rather, it should enable informed reproductive decision-making and help individuals understand when professional assessment may be beneficial.

Research Gaps

The literature reviewed indicates several important areas requiring further research. First, more longitudinal research is needed to understand the interaction between delayed parenthood, PCOS, endometriosis, age, and fertility outcomes over the reproductive lifespan. Second, there is a need for more research from India and other low- and middle-income settings, particularly regarding delayed diagnosis, access to fertility services, fertility awareness, and reproductive-health education.

Third, further research is required to determine how early identification of PCOS and endometriosis can influence long-term reproductive outcomes. Fourth, intervention studies should evaluate not only conception and live birth but also quality of life, psychological well-being, treatment burden, cost, and long-term reproductive health. Finally, fertility-awareness interventions should be evaluated to determine whether improved knowledge actually results in earlier diagnosis, appropriate healthcare-seeking, and better reproductive outcomes.

Implications for Nursing and Reproductive Health Practice

Nurses and other reproductive-health professionals have an important role in addressing health conditions associated with delayed parenthood.

Health education

Nurses can educate women about menstrual health, fertility, age-related fertility changes, PCOS, and endometriosis.

Early identification

Menstrual irregularities, severe dysmenorrhea, chronic pelvic pain, infertility concerns, and symptoms suggestive of PCOS should be recognized and appropriately

referred for assessment.

Lifestyle counselling

For women with PCOS, nurses can support healthy eating, physical activity, weight management, sleep, and treatment adherence.

Fertility counselling

Women with reproductive health conditions should receive information regarding fertility expectations, treatment options, and when specialist consultation may be appropriate.

Psychological support

PCOS and endometriosis may affect body image, emotional well-being, relationships, and family planning. Nurses can provide supportive communication and facilitate referral when psychological or couple-based support is needed.

Continuity of care

Long-term follow-up is important because both PCOS and endometriosis can require ongoing management. Reproductive goals should be reassessed as women's circumstances change.

Conclusion

Delayed parenthood is a multifactorial reproductive-health issue influenced by social, economic, personal, and biological factors. While career development, financial stability, education, relationships, and personal readiness influence the timing of parenthood, reproductive health conditions can create additional barriers to achieving pregnancy.

PCOS and endometriosis are particularly important because both are strongly associated with infertility and poorer reproductive outcomes. The evidence reviewed in the seminar demonstrates that women with PCOS experience higher rates of infertility, fertility-treatment use, and delayed childbearing, while delayed diagnosis may further increase the likelihood of postponing childbirth. Endometriosis is similarly associated with infertility, chronic pelvic pain, reduced first-live-birth rates, and poorer reproductive outcomes, particularly with increasing disease severity.

Early recognition and appropriate management may help reduce the reproductive consequences of these conditions. In PCOS, lifestyle modification can improve metabolic and reproductive health, while pharmacological treatments such as letrozole may improve ovulation and pregnancy outcomes in women with anovulatory infertility. For endometriosis, individualized fertility-oriented management and

careful consideration of fertility-preserving strategies are important.

Overall, reproductive-health education, early diagnosis, timely referral, fertility counselling, and individualized management should form an important part of care for women with PCOS and endometriosis. Addressing these conditions early may help women make informed reproductive decisions and improve their opportunities to achieve desired parenthood.

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