

Community-Based Screening of Infertility Risk Factors Among Reproductive-Aged Couples in Bantul, Yogyakarta, Indonesia

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ABSTRAK

Infertilitas merupakan masalah kesehatan masyarakat yang semakin meningkat dengan determinan multifaktorial yang melibatkan kedua pasangan, namun identifikasi dini faktor risiko di tingkat komunitas masih terbatas. Penelitian ini bertujuan untuk menilai prevalensi dan distribusi faktor risiko infertilitas pada pasangan usia subur di Kabupaten Bantul, Yogyakarta, melalui pendekatan skrining berbasis komunitas. Penelitian ini menggunakan desain potong lintang berbasis komunitas yang dilaksanakan pada Mei hingga Agustus 2025 dengan melibatkan 48 pasangan usia subur yang dipilih secara purposive melalui kegiatan skrining kesehatan masyarakat. Data dikumpulkan menggunakan kuesioner terstruktur melalui wawancara yang mencakup karakteristik sosiodemografi, riwayat reproduksi, faktor gaya hidup, serta kondisi medis terkait infertilitas, disertai pengukuran antropometri untuk menilai indeks massa tubuh. Sistem skoring risiko infertilitas digunakan untuk mengklasifikasikan peserta ke dalam kelompok risiko rendah dan tinggi, kemudian dianalisis secara deskriptif. Sebanyak 39,6% peserta dikategorikan memiliki risiko infertilitas tinggi. Faktor risiko utama yang diidentifikasi meliputi ketidakteraturan siklus menstruasi, indeks massa tubuh tidak normal, perilaku merokok pada pasangan laki-laki, serta riwayat gangguan kesehatan reproduksi. Temuan ini menegaskan pentingnya skrining berbasis komunitas untuk mendeteksi faktor risiko yang dapat dimodifikasi sebelum infertilitas berkembang secara klinis. Skrining komunitas berpotensi mendukung deteksi dini dan pengembangan strategi pencegahan kesehatan reproduksi.

ABSTRACT

Infertility is a growing public health concern with multifactorial determinants affecting both partners, yet early identification of risk factors at the community level remains limited. This study aimed to assess the prevalence and distribution of infertility risk factors among reproductive-aged couples in Bantul, Yogyakarta, Indonesia, using a community-based screening approach. A community-based cross-sectional study was conducted from May to August 2025 involving 48 reproductive-aged couples selected through purposive sampling during community health screening activities. Data were collected using a structured, interviewer-

administered questionnaire assessing sociodemographic characteristics, reproductive history, lifestyle factors, and medical conditions related to infertility, combined with anthropometric measurements for body mass index assessment. An infertility risk scoring system was applied to classify participants into low- and elevated-risk groups, and descriptive statistical analysis was performed. Approximately 39.6% of participants were classified as having elevated infertility risk. Key risk factors identified included menstrual irregularities, abnormal body mass index, smoking behavior among male partners, and a history of reproductive health disorders. These findings highlight the importance of early community-based screening to detect modifiable infertility risk factors prior to clinical manifestation. Community-based screening may support early identification and inform preventive reproductive health strategies.

1. INTRODUCTION

Infertility is a major global reproductive health concern that affects a substantial proportion of reproductive-aged couples and has far-reaching medical, psychological, and social consequences. It is commonly defined as the inability to achieve pregnancy after 12 months of regular unprotected sexual intercourse. Beyond its biological implications, infertility is often associated with emotional distress, marital strain, social stigma, and reduced quality of life, particularly in settings where childbearing is closely linked to social identity and family expectations. Despite its significance, infertility is frequently addressed only after it becomes clinically apparent, limiting opportunities for early prevention and timely intervention. This highlights the importance of identifying individuals and couples at risk before infertility is established.[1,2]

Current understanding of infertility has evolved to recognize it as a multifactorial condition involving both female and male contributors, as well as shared environmental and lifestyle determinants. Established risk factors include advancing age, hormonal and ovulatory disorders, reproductive tract infections, obesity, smoking, alcohol consumption, occupational exposures, and environmental pollutants. However, much of the existing evidence is derived from clinical or hospital-based populations, typically involving couples who have already sought medical care for infertility. While such studies provide important clinical insights, they do not adequately reflect the distribution of risk factors in the general population, particularly among couples who have not yet recognized or reported reproductive difficulties.[3,4]

This reliance on facility-based data creates a critical limitation in current knowledge, as it overlooks a substantial proportion of individuals who may already exhibit early risk factors but remain undiagnosed. As a result, infertility is often detected at a later stage, when treatment options may be more complex, costly, and less effective. The lack of proactive, population-level approaches to identify infertility risk factors represents a significant gap in preventive reproductive health. Specifically, there is limited evidence from community-based studies that assess infertility risk among reproductive-aged couples before clinical diagnosis, and even fewer studies that consider both partners simultaneously within the same analytical framework[5,6].

In the Indonesian context, data on infertility and its associated risk factors remain limited, fragmented, and largely confined to clinical settings or specific subpopulations. This creates uncertainty regarding the true burden and early determinants of infertility at the community level. Such limitations are particularly evident in semi-urban and rural areas, where access to reproductive health services may be constrained and awareness of fertility-related issues varies widely. Bantul District in Yogyakarta represents a transitional setting characterized by heterogeneous socioeconomic conditions, evolving lifestyle patterns, and varying levels of health service utilization, all of which may influence reproductive health outcomes. However, no systematic effort has been made to assess infertility risk factors at the community level in this population. The absence of community-based evidence leads to a clear problem: reproductive health programs remain largely reactive rather than preventive, focusing

on treatment rather than early identification of modifiable risk factors. Without population-level screening data, it is difficult to design targeted interventions, prioritize high-risk groups, or implement effective preconception care strategies. This underscores the need for a more proactive and comprehensive approach to infertility prevention that begins at the community level and involves both members of the couple.[7].

To address this gap, the present study adopts a novel integrated approach by implementing community-based screening of infertility risk factors among reproductive-aged couples. Unlike conventional studies that focus on individuals or clinical populations, this approach simultaneously captures both male and female risk profiles within a real-world community setting. By targeting couples who may not yet seek medical attention, this study addresses an underexplored population and shifts the focus from treatment-oriented research toward early detection and prevention. This integrated, couple-centered perspective provides a more holistic understanding of infertility risk and its determinants in a low-resource context.

Therefore, the objective of this study is to assess the prevalence and distribution of infertility risk factors among reproductive-aged couples in Bantul, Yogyakarta, Indonesia, using a cross-sectional community-based screening approach. The findings are expected to provide evidence for early identification of at-risk couples, support the development of targeted preventive strategies, and inform reproductive health policies at the community level. Ultimately, this paper aims to contribute to the advancement of preventive reproductive health by offering context-specific insights into infertility risk within an underrepresented population.

2. MATERIALS AND METHODS

2.1 Study Design

This study employed a community-based cross-sectional design to identify infertility risk factors among reproductive-aged couples in Bantul District, Yogyakarta, Indonesia. The study was conducted between May and August 2025 and followed the reporting recommendations outlined in the STROBE Statement for observational studies. A cross-sectional design was selected because it allows the assessment of infertility-related risk factors and their distribution within a population at a specific point in time. The community-based approach was intended to facilitate early identification of infertility risk factors among couples before they seek clinical fertility services.

The research was carried out in Bantul District, located in the Special Region of Yogyakarta, Indonesia. Bantul District consists of both urban and rural communities with diverse socioeconomic backgrounds and reproductive health behaviors. The district is supported by a network of primary healthcare centers and community health posts that regularly conduct health promotion and screening programs. These community health activities provided a suitable setting for conducting infertility risk screening among reproductive-aged couples.

2.2 Study Population and Participants

The study population consisted of reproductive-aged couples residing in Bantul District. Couples were eligible for inclusion if the female partner was aged 15–49 years and the male partner was aged 18–54 years. In addition, participants were required to have lived in the study area for at least six months prior to the study period. Couples who had undergone permanent sterilization procedures or those in which the female partner was currently pregnant at the time of the screening were excluded from the study. A total of 48 participants were recruited for this study using a purposive sampling approach during community health screening activities. Eligible participants who met the inclusion criteria and agreed to participate in the study were enrolled after providing informed consent.

The present study involved a total of 48 participants recruited from community-based health screening activities in Bantul District. Although the sample size is relatively small, it was considered appropriate for an exploratory community screening study aimed at identifying the presence and distribution of infertility-related risk factors in a defined population. Small-sample studies are frequently used in preliminary or pilot investigations to generate baseline data, assess feasibility of screening tools, and identify potential patterns of health risks within specific communities.

In the context of community reproductive health research, preliminary screening studies with limited sample sizes can provide valuable insights into the prevalence of modifiable risk factors before larger population-based studies are conducted. The current study was designed as an initial step to evaluate the feasibility of implementing infertility risk screening at the community level in Bantul District. The findings from this exploratory investigation are expected to contribute to the development of larger-scale studies and inform future reproductive health programs targeting infertility prevention.

Furthermore, the use of community-based recruitment and in-depth screening procedures required direct interaction with participants, which limited the number of individuals that could be included during the study period. Nevertheless, the collected data remain valuable for describing infertility risk profiles and identifying potential areas for targeted reproductive health interventions in the study population.

2.3 Instrument

Infertility risk screening was conducted using a structured questionnaire combined with anthropometric measurements. The screening instrument was developed based on reproductive health risk indicators reported in epidemiological studies and recommendations from the World Health Organization regarding reproductive health assessment. The questionnaire consisted of several domains covering sociodemographic characteristics, reproductive history, lifestyle behaviors, and medical history associated with infertility.

Reproductive risk indicators assessed in the screening included age at marriage, duration of marriage without pregnancy, menstrual irregularities, history of miscarriage, and history of reproductive tract infections. The screening also assessed the presence of medical conditions associated with infertility, including reproductive disorders such as Polycystic Ovary Syndrome, Endometriosis, and Pelvic Inflammatory Disease. In addition, lifestyle-related factors including smoking habits, physical activity levels, and occupational exposure to heat or chemical substances were evaluated, as these factors are known to influence reproductive health.

Anthropometric measurements were conducted to assess nutritional status through body mass index (BMI). Body weight was measured using a calibrated digital scale, and height was measured using a portable stadiometer. BMI was calculated as body weight in kilograms divided by height in meters squared.

To facilitate the identification of individuals at potential risk for infertility, a simple infertility risk scoring system was applied based on established reproductive health risk indicators reported in epidemiological studies and reproductive health guidelines from the World Health Organization. The scoring system incorporated several biological, behavioral, and medical factors that have been consistently associated with infertility risk.

Each identified risk factor was assigned a score of one point, while the absence of the factor was scored as zero. The evaluated indicators included delayed age at marriage (≥ 35 years), duration of marriage exceeding one year without pregnancy, menstrual irregularities, history of miscarriage, history of reproductive tract infection, presence of reproductive disorders such as Polycystic Ovary Syndrome, Endometriosis, or Pelvic Inflammatory Disease, smoking habits, and abnormal body mass index (BMI). Anthropometric indicators such as BMI were included due to their known association with hormonal imbalance and reproductive dysfunction.

The total infertility risk score for each participant was calculated by summing the scores of all identified risk factors. Participants were then categorized into two groups based on their total scores: low infertility risk (score 0–1) and elevated infertility risk (score ≥ 2). This classification approach was intended to provide a practical screening tool for identifying couples who may benefit from further reproductive health counseling or clinical evaluation.

The use of a simplified scoring system was considered suitable for community-based screening because it allows rapid identification of individuals at risk without requiring complex diagnostic procedures. Such an approach has been widely recommended in public health screening programs to facilitate early detection and preventive interventions, particularly in settings where access to specialized fertility services may be limited.

2.4 Data Collection Procedures

Data were collected through face-to-face interviews conducted by trained enumerators during community-based screening sessions. Prior to data collection, enumerators received training on standardized interviewing techniques and measurement procedures to ensure consistency in data collection. Each participant completed the structured questionnaire through an interview process, and anthropometric measurements were recorded during the same session. Before the main study was conducted, the questionnaire was pre-tested among a small group of participants outside the study area to evaluate clarity and reliability. Feedback from the pilot test was used to revise and improve the wording of the questions to ensure cultural appropriateness and comprehension.

The primary outcome variable in this study was the presence of infertility risk factors among reproductive-aged couples. Independent variables included sociodemographic characteristics, reproductive history, lifestyle factors, and medical history related to reproductive health. Sociodemographic variables included age, educational level, and occupation. Reproductive history variables included age at marriage, menstrual cycle regularity, and history of miscarriage. Lifestyle-related variables included smoking status, physical activity, and occupational exposure. Medical variables included a history of reproductive disorders and reproductive tract infections.

To minimize potential bias, several measures were implemented during the study. Standardized questionnaires and trained interviewers were used to reduce information bias. The questionnaire was pre-tested prior to data collection to improve reliability and clarity. In addition, clear inclusion and exclusion criteria were applied to ensure that the study population was appropriate for the research objectives.

2.4 Statistical Analysis

The collected data were entered into a secured database, coded, and analyzed using statistical software. Descriptive statistics were used to summarize participant characteristics and infertility risk factors. Continuous variables were presented as means and standard deviations, while categorical variables were reported as frequencies and percentages.

The use of descriptive statistical analysis was considered appropriate given the exploratory nature of the study, which aimed to characterize the distribution of infertility risk factors within a community-based population rather than to establish causal relationships. This approach allows for a clear and systematic overview of patterns and variations in risk factors among reproductive-aged couples in a real-world setting.

In addition, due to the relatively small sample size, the analysis primarily focused on descriptive statistics to avoid potential violations of statistical assumptions required for inferential testing and to reduce the risk of unstable or unreliable estimates. Emphasizing descriptive analysis enhances the validity of the findings by ensuring that the results accurately reflect the observed data without overinterpretation. The findings should therefore be interpreted as preliminary evidence to inform future analytical studies with larger sample sizes and more robust statistical designs.

2.5 Ethical Considerations

This study was conducted in accordance with ethical principles for research involving human participants. Ethical approval was obtained from the institutional research ethics committee prior to the study. All participants were informed about the objectives and procedures of the study before providing written informed consent. Participant confidentiality and anonymity were maintained throughout the research process, and all data were used solely for research purposes.

3. RESULT AND DISCUSSION

3.1 Result

Participant Characteristics

A total of 48 participants were included in the study and completed the infertility risk screening assessment. The demographic and reproductive characteristics of the participants are presented in Table 1. The mean age of female participants was 30.6 ± 5.4 years, while the mean age of male participants was 33.2 ± 6.1 years. Most participants had completed secondary education and were engaged in informal or private-sector occupations. The average duration of marriage among the participants was 5.8 ± 3.7 years.

Table 1. Characteristics of Participants

Variable	Category	n	%
Female age	<30 years	20	41.7
	30–35 years	18	37.5
	>35 years	10	20.8
Male age	<30 years	16	33.3
	30–35 years	17	35.4
	>35 years	15	31.3
Education level	Primary school	9	18.8
	Secondary school	27	56.3
	Higher education	12	25.0
Duration of marriage	<3 years	14	29.2
	3–5 years	16	33.3
	>5 years	18	37.5

Primary data collected from reproductive-aged couples in Bantul, (2026)

Several infertility-related risk factors were identified during the screening process. Menstrual irregularities were reported by 14 participants (29.2%). A history of miscarriage was reported by 8 participants (16.7%), while 6 participants (12.5%) reported a history of reproductive tract infections. Lifestyle-related risk factors were also observed, including smoking among male participants and abnormal body mass index. The detailed distribution of infertility risk factors is presented in Table 2.

Table 2. Distribution of Infertility Risk Factors Among Participants

Risk Factor	n	%
Age at marriage ≥ 35 years	6	12.5
Duration of marriage >1 year without pregnancy	10	20.8
Menstrual irregularities	14	29.2
History of miscarriage	8	16.7
History of reproductive tract infection	6	12.5
History of reproductive disorders (e.g., Polycystic Ovary Syndrome, Endometriosis)	4	8.3
Smoking (male partner)	10	20.8
Abnormal body mass index	12	25.0

Primary data collected from reproductive-aged couples in Bantul, (2026)

Each participant was assigned a score based on the presence of infertility risk factors identified during screening. Participants with a total score of 0–1 were categorized as having low infertility risk, whereas those with scores ≥ 2 were categorized as having elevated infertility risk. The distribution of infertility risk categories among participants is shown in Table 3.

Table 3. Infertility Risk Classification Based on Risk Scoring

Risk Category	Score Range	n	%
Low infertility risk	0–1	29	60.4
Elevated infertility risk	≥ 2	19	39.6
Total		48	100

Primary data collected from reproductive-aged couples in Bantul, (2026)

Further analysis was conducted to explore the relationship between selected participant characteristics and infertility risk categories. Participants aged over 35 years and those with abnormal body mass index were more frequently observed in the elevated infertility risk group. Similarly, menstrual irregularities were more common among participants categorized as having elevated infertility risk. Due to the relatively small sample size, the analysis primarily focused on descriptive comparisons rather than inferential statistical testing.

3.2 Discussion

This study aimed to identify infertility risk factors among reproductive-aged couples in Bantul District, Yogyakarta, through community-based screening. The results showed that approximately 39.6% of participants were categorized as having elevated infertility risk based on the applied risk scoring system. Several key risk factors were identified, including menstrual irregularities, abnormal body mass index, smoking behavior among male partners, and a history of reproductive health disorders. These findings suggest that a considerable proportion of couples in the community may already present modifiable or clinical risk factors that could potentially affect fertility outcomes[8,9]. The relatively high proportion of participants categorized as having elevated infertility risk highlights the importance of early screening at the community level. Infertility often remains undetected until couples actively seek medical consultation after prolonged failure to conceive. Community-based screening programs may therefore play an important role in identifying individuals at risk earlier and facilitating timely preventive interventions[10].

One of the most commonly observed risk factors in this study was menstrual irregularity, which was reported by nearly one-third of female participants. Irregular menstrual cycles are widely recognized as an important indicator of ovulatory dysfunction, which can significantly affect female fertility. Several reproductive disorders associated with ovulatory dysfunction, including Polycystic Ovary Syndrome, have been reported as major contributors to infertility among women of reproductive age. Hormonal imbalances associated with these conditions may disrupt ovulation and reduce the likelihood of successful conception[11,12]. In addition, a small proportion of participants reported a history of reproductive tract infections and reproductive disorders such as Endometriosis. These conditions have been associated with structural or inflammatory changes in the reproductive organs that may impair fertilization or embryo implantation. Previous studies have demonstrated that untreated reproductive infections can lead to long-term complications such as tubal damage and chronic pelvic inflammation, which are important causes of infertility[12].

Lifestyle-related factors were also identified as contributors to infertility risk in the present study. Smoking behavior among male partners was reported by approximately one-fifth of participants. Smoking has been consistently associated with reduced sperm quality, including decreased sperm concentration, motility, and morphology. Exposure to tobacco toxins may also induce oxidative stress that negatively affects male reproductive function[13,14]. Another important finding in this study was the presence of abnormal body mass index among a considerable proportion of participants. Both overweight and obesity have been associated with hormonal dysregulation and metabolic disturbances that can impair reproductive function. In women, excess adipose tissue can influence estrogen metabolism and ovulatory function, whereas in men obesity has been linked to reduced testosterone levels and impaired spermatogenesis. These findings emphasize the importance of lifestyle modification as part of infertility prevention strategies[15,16].

The findings of this study highlight the potential value of community-based infertility risk screening as a preventive reproductive health strategy. Screening programs conducted within the community can help identify couples with modifiable risk factors before infertility becomes clinically evident. Early detection may enable health professionals to provide counseling regarding lifestyle

changes, reproductive health awareness, and timely referral to appropriate healthcare services[17,18]. Community-based screening approaches are particularly relevant in settings where access to specialized fertility services may be limited. The use of a simplified risk scoring system allows health workers to rapidly identify individuals at higher risk without requiring complex diagnostic procedures. Such approaches may strengthen preventive reproductive health programs and contribute to reducing the long-term burden of infertility[19].

These findings are broadly consistent with recent international studies that emphasize the growing importance of community-based identification of infertility risk factors. Recent evidence has shown that a substantial proportion of reproductive-aged couples exhibit modifiable risk factors particularly menstrual dysfunction, abnormal body mass index, and adverse lifestyle behaviors prior to seeking clinical care[20]. A systematic review further highlights that infertility is strongly associated with factors such as BMI and smoking, which significantly increase the likelihood of reproductive impairment[21]. In addition, lifestyle-related factors, including smoking and metabolic disorders, have been identified as major contributors to infertility in large population-based studies[22]. Community-based research also demonstrates that infertility risk factors are often present but underrecognized at the population level, particularly in peri-urban settings, supporting the need for early screening approaches outside clinical facilities[20]. Moreover, global epidemiological analyses confirm that infertility remains a widespread public health issue affecting millions of couples, reinforcing the importance of early identification and prevention strategies. The consistency between the present findings and these recent studies strengthens the validity of the results and underscores the relevance of integrated, couple-centered screening strategies in identifying infertility risk in diverse populations[23].

This study has several strengths. First, it applied a community-based approach that enabled the identification of infertility risk factors among couples who may not yet have sought clinical fertility services. Second, the screening instrument incorporated multiple biological and behavioral indicators that have been widely recognized in reproductive health research. However, several limitations should be acknowledged. The relatively small sample size may limit the generalizability of the findings to the broader population. Additionally, some variables were based on self-reported information, which may introduce recall bias. The cross-sectional design of the study also limits the ability to establish causal relationships between identified risk factors and infertility outcomes. Future studies with larger sample sizes and longitudinal designs are needed to further investigate the determinants of infertility risk in the population.

Future research should consider expanding the sample size and including additional clinical assessments, such as hormonal evaluation and semen analysis, to provide a more comprehensive assessment of fertility status. Longitudinal studies may also help clarify the temporal relationship between risk factors and infertility outcomes. Furthermore, integrating infertility risk screening into existing reproductive health programs may enhance early detection and prevention efforts at the community level.

4. CONCLUSION AND RECOMMENDATION

In conclusion, this community-based screening study identified that a considerable proportion of reproductive-aged couples in Bantul District, Yogyakarta, presented with risk factors associated with infertility. Based on the applied infertility risk scoring system, nearly two-fifths of the participants were categorized as having elevated infertility risk. The most commonly observed factors included menstrual irregularities, abnormal body mass index, smoking behavior among male partners, and a history of reproductive health disorders such as Polycystic Ovary Syndrome and Endometriosis. These findings highlight that several infertility-related determinants are already present at the community level and may potentially affect reproductive outcomes if not addressed through early detection and preventive interventions.

The findings also emphasize the importance of integrating infertility risk screening into community-based reproductive health programs. Early identification of modifiable risk factors can enable timely counseling on lifestyle modification, reproductive health awareness, and appropriate medical referral. The use of a simplified screening and risk scoring approach may provide a practical and cost-effective strategy for identifying couples who require further evaluation, particularly in settings where access to specialized fertility services may be limited. Strengthening community-level

reproductive health promotion and screening initiatives may therefore contribute to improving fertility awareness and reducing the long-term burden of infertility.

Based on the results of this study, several recommendations can be proposed. First, local health authorities and primary healthcare providers should consider incorporating infertility risk screening into existing reproductive health services to facilitate early detection of at-risk couples. Second, community health education programs should emphasize lifestyle factors associated with fertility, including healthy body weight, smoking cessation, and reproductive health awareness. Finally, future research with larger sample sizes and more comprehensive clinical assessments is needed to further investigate infertility determinants and to validate community-based screening tools for broader population use.

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Judul Artikel : *Community-Based Screening of Infertility Risk Factors Among Reproductive-Aged Couples in Bantul, Yogyakarta, Indonesia*

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