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*Original Article*

# Prevalence and Associated Risk Factors of Infertility Among Married Women of Indus Hospital in Tando Muhammad Khan

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## ABSTRACT

**Background:** Infertility is an important reproductive health problem associated with substantial clinical, social, and psychological consequences, while locally specific evidence from underserved populations in Pakistan remains limited. Objective: To determine the prevalence of infertility and describe relevant sociodemographic, clinical, and reproductive characteristics among married women attending Indus Hospital, Tando Muhammad Khan. **Methods:** This analytical cross-sectional study included 151 married women aged 18–40 years recruited through convenience sampling over six months. Data were collected using a structured questionnaire covering sociodemographic characteristics, reproductive history, medical history, and lifestyle-related factors. The questionnaire was pilot tested, with an internal-consistency coefficient of Cronbach's α = 0.79. Data was analyzed using IBM SPSS Statistics version 25, with categorical variables summarized as frequencies and percentages and chi-square analysis specified for categorical associations. **Results:** Of 151 participants, 124 (82.1%) were classified as fertile and 27 (17.9%) as infertile. Among women with infertility, 11 (40.7%) had primary infertility and 16 (59.3%) had secondary infertility. The largest age group was 25–29 years (31.8%), 64.9% of participants were housewives, 57.0% lived in urban areas, and 62.3% belonged to nuclear families. **Conclusion:** Infertility was identified in 17.9% of this hospital-based sample, with secondary infertility accounting for the majority of infertility cases. The findings characterize the reproductive-health burden encountered in this clinical population, although the cross-sectional design and convenience sampling warrant cautious interpretation and limit population-level generalization. **Keywords:** Infertility; Primary Infertility; Secondary Infertility; Risk Factors; Prevalence.

## INTRODUCTION

Infertility is commonly defined as failure to achieve pregnancy after 12 months of regular unprotected sexual intercourse and represents an important reproductive health problem affecting individuals, couples, and families (1). Globally, infertility affects a substantial proportion of the reproductive-age population, with recent estimates indicating that approximately one in six adults experience infertility during their lifetime (2). The burden is also considerable in Pakistan, where infertility has been reported among a substantial proportion of married couples and remains an important but incompletely characterized reproductive health concern (3). Beyond difficulties in achieving pregnancy, infertility can generate considerable demand for diagnostic services, fertility treatment, and longer-term reproductive healthcare.

The etiology of infertility is multifactorial and may involve female factors, male factors, or contributions from both partners (4). Among women, reproductive and gynecological conditions that may contribute to impaired fertility include ovulatory disturbances, structural uterine abnormalities, tubal pathology, endometriosis, endocrine disorders, and other reproductive-system abnormalities (4,5). Clinical and epidemiological investigations conducted in Pakistan have also identified associations between infertility and a range of reproductive, medical, and sociodemographic characteristics, although the magnitude and distribution of these factors vary between populations and healthcare settings (6,7). Menstrual irregularities and disorders affecting ovulation are particularly relevant because disruption of normal reproductive physiology may reduce the probability of spontaneous conception.

The consequences of infertility extend beyond its biological manifestations. Women experiencing infertility may encounter psychological distress, anxiety, social stigma, marital strain, and substantial financial pressure related to repeated investigations and treatment (8). Evidence from Pakistan has similarly demonstrated impaired fertility-related quality of life and psychological consequences among individuals seeking infertility treatment (9). These experiences may be intensified by gendered social expectations surrounding childbearing, particularly in settings where women are disproportionately held responsible for a couple's inability to conceive (10). Consequently, assessment of infertility should consider not only reproductive and clinical determinants but also its broader psychosocial implications.

Although infertility has been investigated in several populations, evidence remains unevenly distributed across Pakistan. Studies from different regions have demonstrated variation in the demographic characteristics, clinical presentations, and reproductive risk profiles of affected couples (6,7). Hospital-level evidence from underserved areas can therefore provide useful information regarding the burden encountered by healthcare services and the characteristics of women presenting within those settings. Tando Muhammad Khan represents a setting for which locally specific evidence remains limited, restricting the ability of healthcare providers to characterize infertility and its associated clinical and reproductive factors within the population they serve. Accordingly, the present study aimed to determine the prevalence of infertility among married women attending Indus Hospital, Tando Muhammad Khan, and to examine sociodemographic, clinical, and reproductive factors associated with infertility status.

## MATERIALS AND METHODS

This quantitative analytical cross-sectional study was conducted at Indus Hospital in Tando Muhammad Khan, Pakistan, over a six-month period. The target population comprised married women attending the hospital who were within the reproductive-age range specified for the study. A total of 151 participants were included. Eligibility was restricted to married women aged 18–40 years. Women who were unwilling to participate, did not complete the study questionnaire, or did not satisfy the eligibility criteria were excluded.

Participants were recruited using convenience sampling. Hospital records indicated a monthly population of approximately 246 potentially relevant attendees. The required sample was determined using sample-size calculator software with a 95% confidence level and 5% margin of error, resulting in a final sample of 151 women. For analysis, participants were classified according to fertility status as fertile or infertile, and women identified as infertile were further categorized as having primary or secondary infertility. These classifications were used to describe the prevalence and pattern of infertility within the study sample.

Data were collected using a structured questionnaire designed to obtain information on sociodemographic characteristics, reproductive history, relevant medical history, and lifestyle-related factors. The questionnaire underwent pilot testing in approximately 10% of the intended population; individuals participating in the pilot assessment were not included in the final study sample. The instrument was also reviewed by experts for content appropriateness. Internal consistency assessment conducted using SPSS yielded a Cronbach's alpha coefficient of 0.79. Participants able to complete the

English version received a hard-copy questionnaire, whereas the questionnaire was translated into the local language for participants requiring language assistance. Questionnaire completion required approximately 10–15 minutes.

Data were analysed using IBM SPSS Statistics version 25. Categorical variables were summarized using frequencies and percentages. The chi-square test was specified to examine associations between fertility status and categorical clinical and reproductive factors, with statistical significance defined as $p < 0.05$. All participants provided informed consent before data collection, and confidentiality of participant information was maintained throughout the study.

## RESULTS

A total of 151 married women aged 18–40 years were included in the analysis. The largest age group comprised women aged 25–29 years (n = 48, 31.8%), followed by those aged 30–34 years (n = 41, 27.2%), 18–24 years (n = 32, 21.2%), and 35–40 years (n = 30, 19.8%). Secondary or high-school education was the most frequently reported educational level (n = 58, 38.4%), while 45 women (29.8%) had primary education, 30 (19.9%) had higher or postgraduate education, and 18 (11.9%) had no formal education. Most participants were housewives (n = 98, 64.9%), whereas 53 (35.1%) were employed. Eighty-six participants (57.0%) lived in urban areas and 65 (43.0%) in rural areas.

*Table 1. Sociodemographic Characteristics of Study Participants (N = 151)*

| Variable | Category | n | % |
|---|---|---|---|
| **Age, years** | 18–24 | 32 | 21.2 |
| | 25–29 | 48 | 31.8 |
| | 30–34 | 41 | 27.2 |
| | 35–40 | 30 | 19.8 |
| **Education** | No formal education | 18 | 11.9 |
| | Primary education | 45 | 29.8 |
| | Secondary/high school | 58 | 38.4 |
| | Higher education/postgraduate | 30 | 19.9 |
| **Occupation** | Housewife | 98 | 64.9 |
| | Employed | 53 | 35.1 |
| **Residence** | Urban | 86 | 57.0 |
| | Rural | 65 | 43.0 |
| **Monthly household income, PKR** | <40,000 | 62 | 41.1 |
| | 40,000–60,000 | 71 | 47.0 |
| | >60,000 | 18 | 11.9 |
| **Family type** | Nuclear | 94 | 62.3 |
| | Joint | 57 | 37.7 |
| **Duration of marriage** | <5 years | 39 | 25.8 |
| | 5–10 years | 71 | 47.0 |
| | >10 years | 41 | 27.2 |

With respect to socioeconomic and household characteristics, 71 women (47.0%) reported a monthly household income of PKR 40,000–60,000, 62 (41.1%) reported an income below PKR 40,000, and 18 (11.9%) reported an income above PKR 60,000. Nuclear family households accounted for 94 participants (62.3%), compared with 57 (37.7%) living in joint-family arrangements. Seventy-one women (47.0%) had been married for 5–10 years, 41 (27.2%) for more than 10 years, and 39 (25.8%) for fewer than 5 years.

*Table 2. Fertility Status and Type of Infertility Among Study Participants*

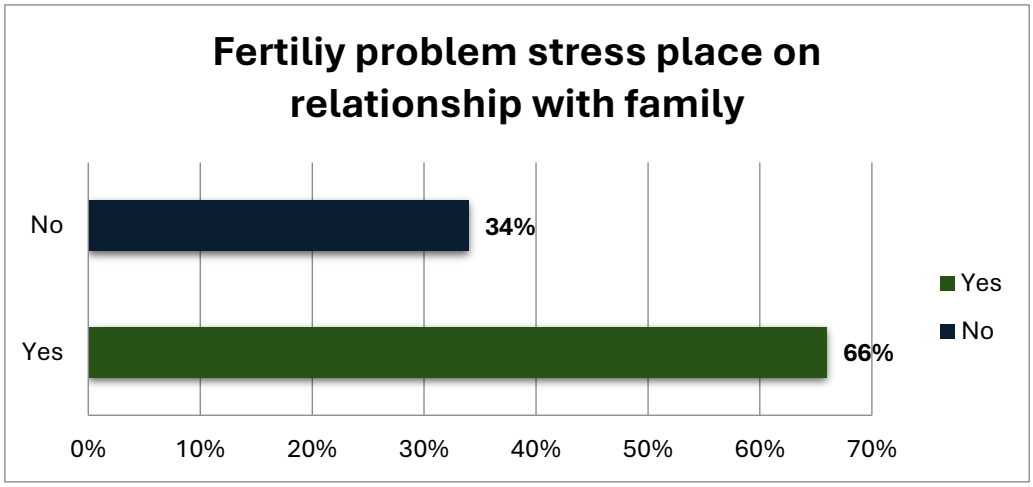
| Variable | Category | n | % |
|---|---|---|---|
| **Fertility status (N = 151)** | Fertile | 124 | 82.1 |
| | Infertile | 27 | 17.9 |
| | Total | 151 | 100.0 |
| **Type of infertility (n = 27)** | Primary infertility | 11 | 40.7 |
| | Secondary infertility | 16 | 59.3 |
| | Total | 27 | 100.0 |

Of the 151 participants, 27 were classified as infertile, corresponding to an observed infertility proportion of 17.9%, while 124 women (82.1%) were classified as fertile. Among the 27 women with infertility, 11 (40.7%) had primary infertility and 16 (59.3%) had secondary infertility. Secondary infertility therefore accounted for the larger proportion of infertility cases identified in the sample. The remaining clinical and reproductive association analyses require reconciliation of their underlying denominators before they can be presented as definitive inferential results. Accordingly, only internally consistent participant characteristics and fertility-status findings are presented here pending reconciliation of the corresponding clinical-factor cross-tabulations.

*Table 3. Fertility Status and Clinical/Reproductive Factors (n = 45)*

| Variable | Category | n | % |
|---|---|---|---|
| **Menstrual cycle** | Regular | 19 | 42.2 |
| | Irregular | 26 | 57.8 |
| **PCOS** | Yes | 16 | 35.6 |
| | No | 29 | 64.4 |
| **Previous miscarriage** | Yes | 12 | 26.7 |
| | No | 33 | 73.3 |
| **Thyroid disease** | Yes | 8 | 17.8 |
| | No | 37 | 82.2 |
| **Diabetes mellitus** | Yes | 6 | 13.3 |
| | No | 39 | 86.7 |
| **Pelvic inflammatory disease** | Yes | 10 | 22.2 |
| | No | 35 | 77.8 |
| **Previous infertility treatment** | Yes | 21 | 46.7 |
| | No | 24 | 53.3 |
| **IVF treatment** | Yes | 9 | 20.0 |
| | No | 36 | 80.0 |

Table 3 summarizes the clinical and reproductive profile of the 45 infertile women enrolled in the study. Irregular menstrual cycles were reported by 57.8% of participants. Polycystic ovary syndrome POC was diagnosed in just over a third of the cohort (35.6%), and roughly a quarter of women (26.7%) had experienced a prior miscarriage. In terms of comorbid conditions, thyroid disorders and diabetes mellitus were present in 17.8% and 13.3% of participants, respectively, and 22.2% had a documented history of pelvic inflammatory disease PID. Prior infertility treatment had been sought by nearly half the sample (46.7%), and one in five women (20.0%) had previously undergone in vitro fertilization.



The above chart showed the majority of participants (66%) reported that stress from their reproductive experiences negatively impacted their family relationships, while 34% maintained good relationships despite the stress. This indicates that conceiving difficulties can significantly affect family dynamics for many women.

*Table 4. Comparison of Clinical/Reproductive Factors between Fertile and Infertile Participants*

| Clinical/Reproductive Factor | Infertile Not present | Infertile presents | $\chi^2$ | p-value |
|---|---|---|---|---|
| **Menstrual irregularity** | 22 | 26 | 19.98 | <0.001 |
| **PCOS** | 9 | 16 | 16.78 | <0.001 |
| **Previous miscarriage** | 15 | 12 | 3.36 | 0.067 |
| **Thyroid disease** | 9 | 8 | 2.71 | 0.100 |
| **Diabetes mellitus** | 7 | 6 | 1.83 | 0.176 |
| **Pelvic inflammatory disease** | 8 | 10 | 6.47 | 0.011 |
| **Previous infertility treatment** | 5 | 21 | 38.99 | <0.001 |
| **IVF treatment** | 3 | 9 | 12.71 | <0.001 |

Table 4 compares clinical and reproductive factors between fertile and infertile married women. Infertile women had a significantly higher rate of menstrual irregularities (26% vs. 22%; $\chi^2(1) = 19.98$, $p < 0.001$) and polycystic ovary syndrome (PCOS) (16% vs. 9%; $\chi^2(1) = 16.78$, $p < 0.001$). Additionally, a higher proportion of infertile women reported a history of pelvic inflammatory disease (PID) (10% vs. 8%; $\chi^2(1) = 6.47$, $p = 0.011$), and they were more likely to have undergone previous infertility treatment (21% vs. 5%; $\chi^2(1) = 38.99$, $p < 0.001$) and IVF (9% vs. 3%; $\chi^2(1) = 12.71$, $p < 0.001$). In contrast, previous miscarriages, thyroid disease, and diabetes mellitus were not significantly associated with infertility ($p > 0.05$). These findings highlight that menstrual irregularity, PCOS, PID, and prior infertility treatment are significantly linked to infertility, while the latter conditions show no significant association.

## DISCUSSION

The present study identified infertility in 17.9% of the 151 married women attending Indus Hospital, Tando Muhammad Khan. This proportion is numerically similar to the approximately 17.5% lifetime prevalence reported in global estimates, although direct comparison requires caution because the global estimate reflects population-level lifetime infertility whereas the present investigation used a hospital-based convenience sample (2). A recent systematic review and meta-analysis of infertility in South Asia similarly demonstrated a considerable regional burden, reinforcing the importance of infertility as a reproductive-health concern across diverse healthcare settings (11). In contrast, Vannya et al. reported an infertility prevalence of approximately 12% in their study population, illustrating the variability that can arise from differences in population characteristics, sampling approaches, infertility definitions, and healthcare settings (12). Accordingly, the 17.9% observed in the present study should be interpreted as the proportion identified within the sampled hospital population rather than as a population-representative estimate for Tando Muhammad Khan.

Secondary infertility accounted for 59.3% of infertility cases in the present study, compared with 40.7% for primary infertility. This pattern differs from some reports in which primary infertility predominated. Jabeen et al. described both primary and secondary infertility within a Pakistani population, emphasizing that the relative distribution of the two forms may differ across settings (1), while Vannya et al. reported primary infertility in approximately 65.8% of affected participants (12). Pakistani evidence has also highlighted distinctive sociodemographic and reproductive characteristics among women with secondary infertility (7), while hospital-based investigations have demonstrated substantial heterogeneity in clinical infertility patterns between regions (6). Such differences may reflect variations in age at marriage, previous pregnancy history, reproductive tract morbidity, access to antenatal and

postnatal healthcare, treatment-seeking behaviour, and the population from which participants are recruited.

The sociodemographic profile of the present sample provides additional context for interpreting the observed infertility burden. Women aged 25–29 years formed the largest age group, accounting for 31.8% of participants. Mahey and Gupta similarly reported that a substantial proportion of women attending an infertility clinic were within the younger reproductive-age range, although infertility-service populations can differ considerably according to referral pathways and treatment stage (13). In contrast, Pakistani women accessing assisted reproductive technology have been reported to be older on average, which may reflect progression from initial fertility concerns to advanced treatment after longer durations of unsuccessful conception (14). Educational and socioeconomic characteristics may also influence awareness, healthcare access, and utilization of fertility services. Pakistani evidence has linked education and other socioeconomic characteristics with perceptions and utilization of assisted reproductive technologies (15), whereas population-based evidence from Ethiopia demonstrates that infertility occurs across markedly different educational, employment, and residential contexts (16). These comparisons reinforce the importance of interpreting sociodemographic findings within their specific healthcare and social setting rather than assuming that one clinical population represents the broader reproductive-age population.

Treatment-related variables require particularly careful interpretation in cross-sectional infertility research. A previous history of infertility treatment or use of in vitro fertilization may be strongly concentrated among women already experiencing difficulty conceiving because these interventions generally occur after infertility has been recognized. Consequently, such variables are more appropriately considered indicators of previous diagnosis, disease duration, healthcare utilization, or treatment-seeking behaviour than independent etiological risk factors. Research examining treatment-seeking among infertile women has shown that engagement with formal fertility services is strongly shaped by the recognition of infertility and subsequent pathways to care (17). Similarly, perceptions of assisted reproductive technology and socioeconomic access to treatment vary substantially within Pakistan (15). Treating prior infertility treatment itself as a causal exposure would therefore risk reverse-temporality bias in a cross-sectional analysis.

The clinical and reproductive variables evaluated in this study, including menstrual-cycle characteristics and endocrine or gynecological conditions, remain important domains in infertility assessment even when causal relationships cannot be established from cross-sectional data. Polycystic ovary syndrome is a major reproductive endocrine disorder associated with ovulatory dysfunction and infertility, and contemporary international guidance emphasizes systematic assessment of reproductive and metabolic manifestations in affected women (18). A regional systematic review and meta-analysis has likewise demonstrated a substantial prevalence of PCOS among women presenting with infertility (19). More broadly, endocrine and reproductive disorders including PCOS and endometriosis constitute important components of infertility evaluation and management (20), while population-based analyses have continued to investigate reproductive and endocrine characteristics associated with female infertility (21). These data support the clinical relevance of carefully defined reproductive and endocrine variables, but independent risk attribution requires temporally appropriate designs and analyses capable of accounting for potential confounding.

Infertility also has important psychological and social implications that extend beyond the biological inability to conceive. Hospital-based research has documented substantial infertility-related psychological stress among affected women (8), while evidence from Karachi has linked depression and resilience with fertility-related quality of life among patients presenting for infertility treatment (9). In Pakistan, gendered expectations surrounding reproduction may further shape the experiences of both women and men, including marital pressure, social stigma, and the financial burden associated with prolonged attempts to obtain fertility care (10). These considerations support integration of sensitive

counseling, psychosocial assessment, and appropriate referral pathways into reproductive-health services, particularly where fertility evaluation and treatment may impose substantial social and economic burdens.

Several limitations should be considered when interpreting the present findings. The study was conducted at a single hospital and used convenience sampling, limiting external validity and preventing the sample from being regarded as representative of all married women in Tando Muhammad Khan or the wider region. The cross-sectional design establishes the distribution of characteristics at a single period and cannot establish temporal or causal relationships between potential exposures and infertility. The relatively small number of participants classified as infertile may also limit the precision of subgroup comparisons. In addition, questionnaire-based collection of reproductive and medical histories may be affected by recall or reporting bias. Future multicentre or community-based investigations with probability-based recruitment, clearly prespecified exposure definitions, adequate numbers of infertility cases, and appropriately adjusted multivariable analyses would provide stronger estimates of infertility prevalence and associated factors.

## CONCLUSION

Infertility was identified in 17.9% of married women included in this hospital-based sample from Tando Muhammad Khan, with secondary infertility representing 59.3% of infertility cases and therefore occurring more frequently than primary infertility. These findings demonstrate an appreciable reproductive-health burden among women attending the study setting but should be interpreted within the limitations of a single-centre cross-sectional study using convenience sampling. The findings support greater attention to timely fertility assessment and context-appropriate reproductive healthcare, while larger community-based and multicentre studies using robust sampling and adjusted analytical approaches are needed to establish population prevalence and independently associated risk factors.

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