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# Determinants of reproductive tract infection among fertile women in rural and urban areas of Eastern Gujarat: A community–based study

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## ABSTRACT

**Objective:** This study aimed to determine the prevalence of reproductive tract infections (RTIs) among fertile women in rural and urban areas.

**Methods:** A systematic random sampling was conducted in women aged 15-49 years from rural and urban areas in Eastern Gujarat, India. They were surveyed using a structured pretested questionnaire. Descriptive statistics and *Chi*-square tests were performed using IBM SPSS statistics 23 and Open Epi software for analysis.

**Results:** Of 192 women of reproductive age included in this survey, 96 each were from rural and urban area. The prevalence of RTIs was 64.6% and 66.7% for women from rural and urban areas, respectively. Rural women had a high level of awareness about RTIs compared to urban women, while approximately half of the women lacked knowledge about transmission. After exposure, burning micturition was predominant among rural women (54.2%), while vaginal discharge was the most common systom (57.3%) in urban women. Urban women demonstrated a higher tendency to seek healthcare (98.4%) compared to rural women (75.8%). Age, education, occupation, family type, marital status, menstrual hygiene practices, years of marriage and parity were significantly associated with RTIs in urban areas. Non-barrier contraceptive methods were associated with a higher prevalence of RTIs in both rural (25.9%) and urban (31.7%) areas.

**Conclusions:** The results indicate that urban and rural areas may be affected differently by various factors, with stronger associations observed in urban areas. Further contextual understanding analysis and in-depth research are required to gain more comprehensive insights.

**KEYWORDS:** Reproductive tract infections; Prevalence; Reproductive age; Health seeking behaviour

## 1. Introduction

Reproductive tract infections (RTIs) are defined as infections of the reproductive or genital tract that result in a loss of healthy life among sexually active women of reproductive age[1]. Any infection of the reproductive system includes three categories: Firstly, there are sexually transmitted infections such as gonorrhoea, chlamydia, cchancroid, and HIV; secondly, endogenous infections caused by the overgrowth of the normal flora of the reproductive tract; and thirdly, iatrogenic infections primarily caused by improper procedures such as unsafe abortions and unsanitary delivery methods[2]. RTIs which include both sexually transmitted infections (STIs) and non-sexually transmitted infections (non-STIs) of the reproductive tract, are responsible for significant ill-health throughout the world[3].

### Significance

Previous research has documented the high prevalence of reproductive tract infections (RTIs) on women's health. This study provides a comparative analysis of RTI prevalence and health seeking behaviors between rural and urban women in Eastern Gujarat, India. The study enhances our understanding of geographical variations and social-cultural factors affecting women health.

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Reproductive tract infections are increasingly recognized as a serious global health problem with impact on individual women and men, their families, and communities[2]. RTIs/STIs have a profound impact on sexual and reproductive health worldwide, the symptoms of which often go unnoticed, leading to devastating consequences for women[4].

RTIs affect both individual and families[5]. In developing countries, both the incidence and prevalence of RTIs/STIs are very high. They rank second as a cause of healthy life lost among women of reproductive age, following maternal morbidity and mortality[6]. The lack of knowledge and stigma associated with the illness were shown to be the primary causes of the high incidence[7]. A majority of women continue to suffer from RTIs, which lead to complications such as pelvic inflammatory disease, infertility, cervical cancer, post-abortion, puerperal sepsis, chronic pelvic pain, and ectopic pregnancy. RTIs in many cases are asymptomatic among women, making their detection and diagnosis difficult[8]. Inadequate treatment for the high rates of gynaecological morbidity, particularly infections of the reproductive system and sexually transmitted diseases, can be lethal[9]. A variety of factors that put women at risk of reproductive tract infection, such as socio-economic, demographic, sexual, medical, behavioural practices, and personal hygiene behaviour, have not been adequately explored in India[4]. RTIs/STIs have been recognized as major public and reproductive health challenges not only in India, but worldwide[10]. The burden of RTIs deprives women of the contribution in socioeconomic and cultural development[11].

World Health Organization's May 2024 factsheet estimated that more than 1 million STIs are acquired every day worldwide, with the majority of them being asymptomatic. About 8 million adults between 15-49 years old were infected with syphilis in 2022 and more than 500 million people aged 15-49 years were estimated to have a genital infection with herpes simplex virus (HSV or herpes). 1.1 million pregnant women were estimated to be infected with syphilis in 2022, resulting in over 390 000 adverse birth outcomes. More than 500 million people aged 15-49 years were estimated to have a genital infection with herpes simplex virus (HSV or herpes) STIs have a direct impact on sexual and reproductive health through stigmatization, infertility, cancers, and pregnancy complications and can increase the risk of HIV[12]. Thus, greater importance is to prevent future consequences. The consequences of RTIs for reproductive health can be severe and life-threatening. Women are more likely than men to experience the social stigma associated with gynaecological disorders, which makes them more likely to conceal their condition and be reluctant to discuss it with others. The lack of privacy, the absence of a female doctor at the hospital, the expense of the care, and their lower social standing makes married women in India hesitant to seek medical attention[4]. The health care-seeking behaviour of women is dependent on various socioeconomic conditions such as place of residence, education, work status of women, and standard of living[13].

It is now accepted that women's health status significantly impacts on the health of their children, the families, communities, and the environment. Yet, despite these assertions, and the rapid technological advances in several fields, many women still suffer from preventable morbidity and mortality[14]. Numerous symptom-based prevalence studies for RTIs have been carried out in both rural and urban areas of the nation. RTIs, including sexually transmitted infections (STIs), are a major public health issue among reproductive-age women worldwide, particularly in low-and middle-income countries. They can cause severe health complications such as infertility, ectopic pregnancy, chronic pelvic pain, and increased vulnerability to HIV. Our study adds specific data on comparing RTI prevalence between rural and urban women and health seeking behaviour. The aim of this study was to know prevalence of RTIs, related factors and health seeking behaviour among women of reproductive age residing in rural and urban areas of Eastern Gujarat.

## 2. Methods

### *2.1. Study design and location*

It is a community based cross sectional study conducted in Unnat Bharat villages under the Rural Health Training Centre in Bahadarpur and the Chhotaudepur district as well as Kishanwadi area of Vadodara city, over a period of six months from October1, 2023 to march 31, 2024.

### *2.2. Sample size and collection*

According to the prevalence of RTIs among women of reproductive age (15-49 years), based on their symptoms, which was 40.2%[15], a sample size of 96 was calculated using the formula $n=4pq/L^2$, with an allowable error 10%. Samples were collected from both rural and urban areas.

All women form reproductive age group (15-49 years) from the study area, who were willing to participate and give the written informed consent and were included in study. All women below 15 years or above 49 years, those who were pregnant and postmenopausal, on medication for any RTIs/STIs, suffering from any chronic illness and psychiatric illness and those unwilling to participate were excluded. A systematic random sampling technique was used to select 96 participants from both urban and rural areas. For rural areas, four villages (Gola-Gamdi, Lotiya, Raghunathpura, and Akhyatpura) of Unnat Bharat were selected purposively, with 24 participants from each village. For urban areas, 96 participants were selected from Kishanwadi area of Vadodara city purposively. According to population of particular area, a random number for a house was selected and then every 'n'th house was selected up to achieve the desired sample size.

Data collection had been done using a pre-design and pretested questionnaire. The questionnaire for the study focused on the socio-demographic profile of the women in reproductive age, obstetric and menstrual history, knowledge, and prevalence of RTIs, behavioural factors related to RTIs and health-seeking behaviors for RTIs.

### 2.3. Ethical approval

The ethical approval was obtained from the Sumandeep Vidyapeeth Institutional Ethics Committee (SVIEC/ON/Medi/SRP/Sep/23/28). All Participants were provided with an information sheet explaining the study and its objectives, and written informed consent was obtained from each participant prior to their inclusion in the study.

### 2.4. Data analysis

The study was conducted in two phases. In the first phase, data collection was performed using numeric data and text data, while in the second phase, data compilation, interpretation, analysis and report writing were carried out. Data entry was done in Microsoft Excel 2019, and data analysis was performed using IBM SPSS statistics 23 and OpenEpi software. The data were described as proportions as a part of descriptive statistics. A *Chi*-square *P* value ≤0.05 was considered as the level of significance.

## 3. Results

Table 1 shows that a higher percentage (42.7%) of younger women in rural compared to urban (31.3%). All the women residing in both areas belong to Hindu religion. The majority of respondents (75.0%) in rural areas are from the scheduled tribes category, while in urban areas, the majority belong to scheduled castes (36.5%), followed by scheduled tribes (32.3%). Education levels are higher in urban areas compared to rural areas, with approximately 50.0% of women having education above higher secondary level in urban while 50.0% of women have education below the secondary level in rural. In both rural and urban areas, most respondents are housewives, comprising 57.3% and 67.7%, respectively, while among the respondents 2/3 live in joint families in both rural and urban areas. Most people in rural areas are in the lower-middle class (68.8%), while in urban areas, the majority were in the upper-middle class (55.2%) and the middle class (34.4%). Among the respondents, most of them (83.3%) were married in both areas, with 91.3% and 96.3% are staying with husbands in rural and urban areas, respectively.

Table 2 reflects the prevalence of RTIs among reproductive-age women (15-49 years), with approximately 64.6% and 66.7% among rural and urban women, respectively. Regarding knowledge of RTIs, more than 50.0% rural women have heard about RTIs compared to urban (49.0%). It might be due to effectiveness of rural outreach or community awareness campaigns, or the rural community may rely more on local communication. According to them, the most common symptom for RTIs is burning micturition, followed by vaginal discharge and lower abdominal pain. Unfortunately, nearly 50% of women did not know that how RTIs are transmitted, remaining women from both the areas said the ways of exposure such as poor genital hygiene, poor sanitary facilities and infected sexual partner. Among total participants, the most common symptom among rural women is burning micturition (54.2%), which is the second most symptom (50.0%) in urban. Vaginal discharge is the most common symptom (57.3%) among urban women and the second most common (44.8%) among rural women, followed by genital itching, lower abdominal pain and low backache in both areas.

The health-seeking behavior for RTIs among women is higher in urban areas, with 98.4% of urban women compared to rural women (75.8%). It indicates that urban women have a better understanding of RTIs and the importance of seeking treatment, while in rural areas, women may feel discouraged due to traditional beliefs and societal conventions. Among the women who sought treatment for RTIs, 41.9% of rural women preferred government facilities, while 71.9% of urban women preferred private clinics. Those who didn't seek treatment considered the symptoms of RTIs to be normal (Table 3).

**Table 1.** Socio-demographic profile of reproductive-age women [*n* (%)].

| Variables | Rural (*n*=96 ) | Urban (*n*=96 ) |
|---|---|---|
| Age (years) | | |
| 15-25 | 41 (42.7) | 30 (31.3) |
| 26-35 | 35 (36.5) | 35 (36.5) |
| 36-49 | 20 (20.8) | 31 (32.3) |
| Social-class[#] | | |
| General | 11 (11.5) | 18 (18.8) |
| OBC | 11 (11.5) | 12 (12.5) |
| SC | 2 (2.1) | 35 (36.5) |
| ST | 72 (75.0) | 31 (32.3) |
| Education | | |
| Illiterate | 15 (15.6) | 2 (2.1) |
| Literate without formal education | 2 (2.1) | 0 (0) |
| Primary | 17 (17.7) | 23 (24.0) |
| Secondary | 36 (37.5) | 25 (26.0) |
| Higher secondary | 23 (24.0) | 32 (33.3) |
| Postsecondary | 3 (3.1) | 14 (14.6) |
| Occupation | | |
| Daily wedger | 9 (9.4) | 2 (2.1) |
| House wife | 55 (57.3) | 65 (67.7) |
| Farmer | 20 (20.8) | 0 (0) |
| Service | 4 (4.2) | 11 (11.5) |
| Business | 0 (0) | 2 (2.1) |
| Others | 8 (8.3) | 16 (16.7) |
| Socio-economic class | | |
| Upper class | 0 (0) | 7 (7.3) |
| Upper middle class | 9 (9.4) | 53 (55.2) |
| Middle class | 15 (15.6) | 33 (34.4) |
| Lower middle class | 66 (68.8) | 3 (3.1) |
| Lower class | 6 (6.3) | 0 (0) |

[#]The Socio Economic and Caste Census 2011 (SECC)[15]; OBC: Other backward classes; SC: Scheduled castes; ST: Scheduled tribes.

**Table 2.** Knowledge and prevalence of RTI symptoms [*n* (%)].

| Variables | Rural (*n*=96) | Urban (*n*=96) |
|---|---|---|
| Heard about RTIs | 53 (55.2) | 47 (49.0) |
| Exposure to RTI symptoms (last 6 months) | 62 (64.6) | 64 (66.7) |
| Knowledge about symptoms | | |
| Discharge | 47 (49.0) | 44 (45.8) |
| Dyspareunia | 7 (7.3) | 9 (9.4) |
| Dysuria | 13 (13.5) | 20 (20.8) |
| Lower abdominal pain | 48 (50.0) | 37 (38.5) |
| Burning micturition | 51 (53.1) | 45 (46.9) |
| Genital ulcer | 9 (9.4) | 3 (3.1) |
| Knowledge about transmission route | | |
| Poor sanitary facility | 25 (26.0) | 31 (32.3) |
| Poor Genital hygiene | 41 (42.7) | 46 (47.9) |
| Infected sexual partner | 5 (5.2) | 14 (14.6) |
| Do not know | 54 (56.3) | 49 (51.0) |
| Experienced RTI symptoms | | |
| Vaginal-discharge (foul-smelling) | 43 (44.8) | 55 (57.3) |
| Genital ulcer/sore | 0 (0) | 1 (1.0) |
| Genital itching | 31 (32.3) | 44 (45.8) |
| Lower abdominal pain | 26 (27.1) | 22 (22.9) |
| Low backache | 11 (11.5) | 7 (7.3) |
| Burning on micturition | 52 (54.2) | 48 (50.0) |
| Swelling and redness in the genital area | 6 (6.3) | 2 (2.1) |

Table 4 shows the association between RTI symptoms and socio-demographic factors. In rural area, the highest incidence of RTI symptoms (26.0%) is found among the women aged 15-25 years while the prevalence is higher in age group above 25 years in urban, which is statistically significant ($P$<0.001). Regarding education, there is an impact of literacy among urban women because prevalence of RTIs is lower, which is statistically significant ($P$=0.042). However, the prevalence is higher among rural women. In both areas, housewife are the largest groups having RTI symptoms, with 36.5% and 56.3%, respectively. There was a significant association ($P$<0.001) between occupation and RTI symptoms in urban area. The majority of women with RTI symptoms are in joint family from both rural and urban areas with prevalence of 42.7% and 40.6%, respectively. The association is statistically significant for urban women ($P$=0.045).

According to Table 5, which focuses on association of RTIs with marital, obstetric, and behavioural factors, RTI symptoms are more prevalent among married women in both rural and urban, at 56.3% and 64.6%, respectively. In rural areas, women who use sanitary pads have a lower prevalence of RTI symptoms compared to those using unsanitary usage. In urban areas, the prevalence is nearly same regardlessof sanitary pads usage, which is significant according to $P$ value. Women with longer marriage durations (>15 years) had a high percentage of RTI symptoms, 24.0% and 25.0% in rural and urban areas, respectively, which is significant for urban women ($P$<0.001). Primiparous are less affected by RTIs, while there is a higher prevalence among the women with more parity from both areas, which is statistically significant for urban women ($P$<0.001). Among the types of contraceptives, non-barrier methods are more associated with incidence of RTI symptoms, both in rural (28.1%) and urban (34.4%).This association shows statistical significance in urban areas ($P$<0.001).

**Table 3.** Health-seeking behaviours for RTIs among women in rural and urban areas [*n* (%)].

| Variables | Rural (*n*=62) | Urban (*n*=64) |
|---|---|---|
| Seek treatment for RTIs | 47 (75.8) | 63 (98.4) |
| Place prefer to seek treatment | | |
| Government facility | 26 (41.9) | 17 (26.6) |
| Private clinic | 21 (33.9) | 46 (71.9) |

**Table 4.** Association of RTI symptoms with socio-demographic characteristics [*n* (%)].

| Variables | Rural (*n*=96) | | | Urban (*n*=96) | | |
|---|---|---|---|---|---|---|
| | Present | Absent | *P* | Present | Absent | *P* |
| Age (years) | | | | | | |
| 15-25 | 25 (26.0) | 16 (16.7) | | 10 (10.4) | 20 (20.8) | |
| 26-35 | 21 (21.9) | 14 (14.6) | 0.268 | 27 (28.1) | 8 (8.3) | **<0.001** |
| 36-49 | 16 (16.7) | 4 (4.2) | | 27 (28.1) | 4 (4.2) | |
| Education | | | | 1 (1.0) | 1 (1.0) | |
| Illiterate | 13 (13.5) | 2 (2.1) | | 21 (21.9) | 2 (2.1) | |
| Primary | 13 (13.5) | 6 (6.3) | 0.808 | 17 (17.7) | 8 (8.3) | **0.042** |
| Secondary | 20 (20.8) | 16 (16.7) | | 18 (18.8) | 14 (15.6) | |
| Higher secondary | 14 (14.6) | 9 (9.4) | | 7 (7.29) | 7 (7.29) | |
| Post secondary | 2 (2.1) | 1 (1.0) | | | | |
| Occupation | | | | | | |
| House wife | 35 (36.5) | 20 (20.8) | | 54 (56.3) | 11 (11.5) | |
| Daily wager | 7 (7.3) | 2 (2.1) | | 1 (1.0) | 1 (1.0) | |
| Farmer | 14 (14.6) | 6 (6.3) | 0.445 | 0 (0) | 0 (0) | **<0.001** |
| Service | 3 (3.1) | 1 (1.0) | | 5 (5.2) | 6 (6.3) | |
| Business | 0 (0) | 0 (0) | | 1 (1.0) | 1 (1.0) | |
| Others | 3 (3.1) | 5 (5.2) | | 3 (3.1) | 13 (13.5) | |
| Family type | | | | | | |
| Nuclear | 21 (21.9) | 11 (11.5) | 0.880 | 25 (26.0) | 6 (6.3) | **0.045** |
| Joint | 41 (42.7) | 23 (24.0) | | 39 (40.6) | 26 (27.1) | |

*P*-value determined by *Chi*-square test.

**Table 5.** Association of RTI symptoms with marital status, obstetric and behavioural factors [*n* (%)].

| Variables | Rural (*n*=96) | | | Urban (*n*=96) | | |
|---|---|---|---|---|---|---|
| | Present | Absent | *P* | Present | Absent | *P* |
| Marital status | | | | | | |
| Married | 54 (56.3) | 26 (27.1) | 0.182 | 62 (64.6) | 18 (18.8) | **<0.001** |
| Unmarried | 8 (8.3) | 8 (8.3) | | 2 (2.1) | 14 (14.6) | |
| Menstrual hygiene practices | | | | | | |
| Sanitary pads | 11 (11.5) | 10 (10.4) | | 32 (33.3) | 29 (30.2) | |
| Menstrual underwear | 17 (17.7) | 5 (5.2) | 0.376 | 4 (4.2) | 1 (1.0) | **<0.001** |
| Locally manufacturedpads | 33 (34.4) | 18 (18.8) | | 22 (22.9) | 1 (1.0) | |
| Menstrual underwear and locally manufactured pads | 1 (1.0) | 1 (1.0) | | 6 (6.3) | 1 (1.0) | |
| Marriage duration (years) | | | | | | |
| <5 | 14 (14.6) | 7 (7.3) | | 7 (7.3) | 8 (8.3) | |
| 5-10 | 9 (9.4) | 8 (8.3) | 0.254 | 15 (15.6) | 6 (6.3) | **<0.001** |
| 11-15 | 8 (8.3) | 5 (5.2) | | 16 (16.7) | 1 (1.0) | |
| >15 | 23 (24.0) | 6 (6.3) | | 24 (25.0) | 3 (3.1) | |
| Parity | | | | | | |
| 0 | 11 (11.5) | 5 (5.2) | 0.614 | 4 (4.2) | 5 (5.2) | **<0.001** |
| 1-2 | 31 (32.3) | 15 (15.6) | | 46 (47.9) | 11 (11.5) | |
| ≥3 | 12 (12.5) | 6 (6.3) | | 12 (12.5) | 2 (2.1) | |
| Contraception usage | | | | | | |
| Yes | 35 (36.5) | 17 (17.7) | 0.409 | 48 (50.0) | 12 (12.5) | **<0.001** |
| No | 19 (19.8) | 9 (9.4) | | 14 (14.6) | 6 (6.3) | |
| Type of contraception | | | | | | |
| Barrier methods | 8 (8.3) | 2 (2.1) | 0.407 | 15 (15.6) | 8 (8.3) | **<0.001** |
| Non-barrier methods | 27 (28.1) | 15 (15.6) | | 33 (34.4) | 4 (4.2) | |
| Not using contraception | 19 (19.8) | 9 (9.4) | | 14 (14.6) | 6 (6.3) | |

*P*-value determined by *Chi*-square test.

## 4. Discussion

In the presented study, the prevalence of RTI symptoms among reproductive-age women (15-49 years) was found to be 64.6% in rural and 66.7% in urban areas. The similar RTI prevalence in both areas suggests that RTIs are not confined to specific geographic areas but are a universal health concern. Similarly, in a study by Verma *et al*., they found that the prevalence of RTI symptoms was almost similar in both urban (42.3%) and rural areas (42.0%) in Delhi[16]. In a study conducted by Shivangi Kumari *et al*., the prevalence of RTIs was found to be 42.8% in rural areas and 37.6% in peri-urban areas of Aligarh, Uttar Pradesh[17]. A study by Gupta *et al*. reported that the prevalence RTIs among women in the reproductive age group was 41.2%[18]. A study conducted by Kosambiya *et al*. in Surat, Gujarat, found the prevalence of RTI to be higher in urban areas (69.0%) than rural areas (53%)[19].

In presented study, 55.2% and 49.0% of women heard about RTI symptoms in rural and urban areas, respectively. This finding suggests that rural areas might benefit from more targeted health education efforts, the active engagement of community health workers, and potentially more communal information-sharing practices. In a study from Himachal Pradesh, among the individuals, 27.1% heard about at least one reproductive tract infection[18].

In both rural and urban areas in our study, the most recognized RTI symptoms was burning micturition, with 53.1% and 46.9%, respectively. The knowledge about symptoms among women included awareness of discharge (49.0% in rural and 45.8% in urban, respevtively) and lower abdominal pain (50.0% in rural and 38.5% urban areas, respevtively). A study performed by Kosambiya *et al*. found that 14.0% of women are aware of discharge as a symptom of infection, while 8.0% reported dyspareunia and 9.0% reported dysuria, pelvic pain, with differing knowledge levels among rural and urban women, at 22% and 41%, respectively[19]. In the present study, women knew poor genital hygiene could result in RTI symptoms in both rural (42.7%) and urban (47.9%) areas, followed by poor sanitary facilities (26.0% and 32.3% in rural and urban areas, respectively), and infected sexual partners (14.6% in rural and 5.2% in urban areas). It highlights that urban women are more aware of this risk factors. In the study by Kosambiya *et al.*, most 32.0% participants believe the disease is acquired from the infected spouse[19]. Shivangi Kumari *et al*. reported that 77.3% of respondent in rural area and 66.2% in peri-urban area with symptoms of RTIs/STIs, were found to have poor menstrual hygiene[17].

In rural area in our study, the most reported symptoms were burning micturition (54.2%), followed by foul-smelling vaginal discharge (44.8%), genital itching (32.3%), and lower abdominal pain (27.1%). However, in urban areas, the most reported symptoms were foul-smelling vaginal (57.3%), followed by burning micturition (50.0%), genital itching (45.8%), and lower abdominal pain (22.9%). Similar study conducted by Shivangi Kumari *et al*., revealed the most common symptom was vaginal discharge (40.0% in rural, 34.0% in peri-urban), followed by lower abdominal pain (25.0% in rural, 26.0% in peri-urban)[17]. A study conducted by Gupta *et al*. resulted most common symptoms was foul-smelling vaginal discharge (30.0%), followed by vaginal itching (11.0%) and lower abdomen pain (14.0%)[18]. In a study by Bhilwar *et al*., most frequently symptoms included abdominal pain (68.2%), back pain (69.6%), and vaginal discharge (59.3%)[20].

In our study, compared to rural women (75.8%), urban women with RTIs (98.4%) were more likely to seek treatment. Apart from those women who did not seek treatment considered RTI symptoms to be normal. It reflects that urban women may have a better understanding of RTIs and the importance of seeking treatment, whereas in rural, traditional beliefs, social norms and stigma may discourage women from seeking medical help for reproductive health issues. Among the women who sought treatment, 41.9% preferred government facilities and 71.9% preferred private clinics in rural and urban areas, respectively. These differences highlighted the impact of affordability, and perceived quality on healthcare preferences. In research by Verma *et al*., 73.0% and 45.6% sought treatment in urban and rural areas, respectively. In an urban area, 70.0% consulted a private practitioner, and 30.0% went to a government hospital. Whereas, in rural areas, 45.6% sought treatment, 51.0% consulted a private practitioner, and 49.0% went to a government hospital[16]. Another study by Kosambiya *et al*. suggested that RTI symptoms were higher in urban areasat 59.0%, compared to 29.0% in rural areas. Among them, 21.0% sought treatment at a government hospital, 9.0% at a private hospital, 3.0% self-treated, and 11.0% did not[19]. A study at Himachal Pradesh by Gupta *et al*. concluded that 52.0% of participants sought hospital treatment for reproductive tract infections, with 2.9% not seeking due to the unavailability of a female doctor and 1.7% being hesitant due to embarrassment[18].

In rural area in present study, the highest prevalence of RTI symptoms (26.0%) was found in the 15-25-year age group. In urban area, both 26-35 years and 36-49 years age groups showed a prevalence of 28.1% for RTI symptoms. The relationship between age and RTI symptoms is statistically significant ($P$<0.001) in urban area above 25 years age. Verma *et al*. resported RTI symptoms was highest in the 18-25 years age group (rural: 53.3%; urban: 54.0%) compared to other age groups; the difference was not found statistically significant[16]. Shivangi Kumar *et al*. reported that the prevalence of RTIs in the 35-45 age group was found to be 50.0% in rural and 41.4% in peri-urban areas[17]. A similar study by Gupta *et al*. found 53.5% RTIs in women aged 15-25 years, thus it

was not statistically significant[18].

In our study, 20.8% of respondents with RTI symptoms had received secondary education in rural areas. In urban areas, there was a significant association ($P$=0.042), with higher symptoms among those with primary education (21.9%). It reflects that education affects RTI prevalence, with rural women having a higher prevalence due to less education levels. A comparative study conducted in Delhi showed that RTI symptoms were most common (54.0%) among respondents who were illiterate and significantly decline with increasing education level ($P$=0.030)[16]. A study by Gupta *et al*. found that illiterate women had a higher prevalence of RTIs (66.7%) compared to women with a high schooleducation(45.3%). This suggests that as education level increases, the prevalence of RTIs decreases. However, the $P$-value of 0.105 suggests that these observed differences are not statistically significant[18].

In both areas in our study, housewife is the largest group with RTI symptoms, accounting for 36.5% and 56.3%, respectively. There was a significant association ($P$<0.001) between occupation and RTI symptoms in urban area. Gupta *et al*. found RTI symptoms were more prevalent in agricultural worker (61.9%), followed by employed and home-maker with 49.5% and 48.4%, respectively. However, there was no statistically significant ($P$=0.153) difference in RTI prevalence among these occupation groups[18].

In our study, among married women, 56.3% and 64.6% reported RTI symptoms in rural and urban areas, respectively. The prevalence of RTIs is higher among married women as most of the respondents are married, which may be affected by their partners. In urban areas, the association between marital status and RTI symptoms was significant ($P$<0.001). Kosambiya *et al*. found that 95.0% married women experienced RTI symptoms[19].

According to the current study, women in rural areas who use sanitary pads have a lower prevalence (11.5%) of RTI symptoms compared to those who do not use them. However, among urban women, the prevalence is almost the same regardless of sanitary padsusage, which is statistically significant($P$<0.001). Verma *et al*. concluded that there was no significant difference in the prevalence of symptoms due to menstrual hygiene practices[16]. A study found that using cloth for menstruation, as opposed to sanitary napkins, is associated with a higher risk of the specified RTIs[20].

Our study indicated that women with longer marriage durations (>15 years) had a high percentage of RTI symptoms , with 24.0% and 25.0% in rural and urban areas, respectively. It suggests that longer exposure to reproductive married life has a higher chance of developing RTIs, it might be due to partner-related factors and repeated exposure. Similarly, Bhilwar *et al*. found that being 25 years or older significantly increases the chances experiencing RTIs[20].

In our study, primiparous are less affected, while the prevalence increases with higer parity among women in both areas. It could be related to recurrent pregnancies, hormonal swings, greater infection exposure, immune system adaptations, and cervical alterations, which all lead to a higher RTI prevalence in multiparous women. There is a significant association ($P$<0.001), with women having parities 1-2 showing the highest prevalence of RTI symptoms in urban areas. Verma *et al*. found that RTIs/STIs was higher in females with more than two parities, with 51.9% in rural areas and 45.1% in peri-urban areas[16]. Another study by Bhilwar *et al*. suggested that having three or more pregnancies is associated with a significantly higher likelihood of a certain outcome compared to having fewer than three pregnancies ($P$= 0.003)[20].

In presented study, there was no significant association between contraception usage and RTIs in rural areas ($P$=0.409), while urban areas ($P$<0.001) shows significant associtation. This suggests that the impact of contraception on RTI risk is not consistent and may be influenced by various factors such as diverse contraceptive methods, hygiene practices. Verma *et al*. reported that contraceptive users had a lesser prevalence (38.6%) of RTI symptoms compared to nonusers (54.0%), and the difference was statistically significant ($P$=0.021)[16].

In our study, women using non-barrier methods have a higher prevalence in rural areas (28.1%) and urban areas (34.4%), compare to those who have used barrier methods such as intrauterine contraceptive device, antra injection, sterilization, which showed prevalence with 8.3% in rural areas and 15.6% in urban areas. It reflects that barrier methods are effective. The higher RTIs prevalence among non-barrier users could be due to direct sexual contact, post-surgical complications, less frequent healthcare follow-up, and higher parity compared to those using barrier methods. A study by Kosambiya *et al*. noted RTI symptoms in 14.0% of rural and 39.0% of urban barrier users[19]. Another study by Shivangi Kumari *et al*. revealed that barrier methods had lower prevalences of RTIs at 36.8% and 33.3%, in rural and urban area, respectively, compared to non-barrier users[17].

## 5. Conclusions

Our study found that prevalence of RTIs is similar in rural and urban areas. However, awareness of RTIs is higher in rural areas, while health-seeking behaviors for RTI symptoms are higher in urban women. This could be due to various factors, including accessibility, awareness, economic constraints, social stigma, or cultural factors affecting rural women's healthcare-seeking behaviours. Our observations suggest that different factors may influence RTI symptoms in rural and urban settings.

## Conflict of interest statement

The authors declare that there is no conflict of interest.

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This study received no extramural funding.

## Data availability statement

The data supporting the findings of this study are available from the corresponding author upon request.

## Authors' contributions

Dhakate BV searched article, collected data, interpreted data. Rana B created tables. Gohil K searched for articles. Chauhan G supervised entire process of research study from tool development to data analysis. Pankaj N provided opinions for the manuscript. Pandit N gave expert opinions on the study. All authors approved the final version of the manuscript.

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