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## **Title page**

# **Reproductive Tract Infections among married women in peri-urban areas of Karachi, Pakistan: A population-based study.**

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**Abstract:**

**Background:** In Pakistan, there is dearth of information about RTIs. A study was conducted in Karachi, Pakistan to determine the prevalence of and number and types of RTIs among non-pregnant women residing in squatter settlements in Karachi and their health seeking behavior.

**Methods:** The eligible women were interviewed followed by physical and pelvic examination by a trained physician in a nearby clinic. For laboratory testing, samples swabs were collected from vagina and endocervix.

**Results:** Overall, 23.8% of the women had laboratory-diagnosed RTIs . Nearly 2.6% had trichomoniasis and 1.7% were positive for syphilis. Bacterial vaginosis was diagnosed in 8.8% and vaginal candidiasis in 13.2 %. The women considered symptoms as normal and did not seek treatment.

**Conclusion:** The study indicates a high prevalence of RTIs among married women aged 15-49 residing in squatter settlements of Karachi with Bacterial vaginosis to be the most prevalent endogenous infection and trichomoniasis as the most common STI.

Key words: RTs, Bacterial vaginosis, Trichomoniasis, vaginal discharge, married women

**Background:**

Worldwide, Reproductive Tract Infections (RTIs) contribute substantially for ill health of both women and men<sup>1</sup> with a gloomier situation in developing countries<sup>2</sup>. However, RTIs are gender asymmetric<sup>3</sup> both due to biological and social factors. Biologically, women are at the higher risk of being infected than men with a single act of intercourse with the infected partner<sup>4</sup>. In addition, women are more likely to suffer from asymptomatic RTIs leading to delay in seeking care and diagnosis resulting in long term complications such as Pelvic Inflammatory Disease (PID), tubal adhesions and infertility and ectopic pregnancy<sup>5</sup>. Of the social factors, not only women are likely to bear consequences due to lack of awareness about symptoms of RTIs but many infections being asymptomatic suffer negligence too. Furthermore, culture of silence makes the symptomatic women diffident for seeking care because of the embarrassment associated with symptoms of RTIs<sup>3</sup>.

Another important aspect vis-à-vis RTIs is its control which has become a main concern in many countries<sup>6</sup>. However, appropriate information is crucial in this context not only for apportion of resources but for planning of appropriate strategies to provide timely management<sup>7</sup>. The situation is particularly dismal for the developing countries due to the scarcity of epidemiological data and is one of the major hurdles in this regard where encumbrances of these infections have been estimated mostly from the results of the facility-based surveys. Only a few population-based studies have been conducted in India<sup>8</sup>, Bangladesh<sup>9</sup>, Egypt<sup>10</sup> and Nigeria<sup>11</sup>. Situation is not different in Pakistan as there is limited data on the prevalence of and health-seeking behavior for RTIs in the general population. A study was conducted in squatter settlements in Karachi, Pakistan to determine the prevalence of and number and types of RTIs among non-pregnant women residing in squatter settlements in Karachi and their health seeking behavior.

## **Materials and Methods:**

### **Study site and population**

This study was conducted in metropolitan city of Karachi where nearly 18.5 million people reside. The City-District of Karachi is divided into eighteen towns governed by elected municipal administrations. The towns are sub-divided into 178 union councils (UCs), which are the core element of the local government system.

For the study, three union councils were randomly selected whose household information was obtained from National Program for Family Planning (FP) and Primary Health Care (PHC). The program serves the underserved and poor communities of the rural and peri-urban areas for provision of FP and PHC services at their door steps. The program is implemented through Lady Health Workers (LHW) where each worker is allocated to serve 150 households. The health services provided by the LHWs are through monthly home visits and static health houses established within their residence.

### **Sampling strategy and enrollment**

A computerized list of all the households in three selected UCs was generated. A random sample of households was drawn for enrolling married non-pregnant women aged 15–49 years. Only one woman from each household was enrolled. An eligible respondent was randomly selected from households with more than one woman. Pregnant women and those who reported a delivery within last six weeks or having antibiotics within last two weeks were excluded. Approval for the study was obtained from the ethical review committee in Aga Khan University. Written, informed consent was obtained from all participating women. Before recruitment, the women were explained the process of enrollment, physical and vaginal examinations and samples collection for investigating RTIs and STIs. Additionally, they were informed that if found infected, free of cost treatment would be provided accordingly.

The sample size was estimated to be 1050 with 350 women from each union council.

## Data Collection

The women who consented to participate were administered questionnaire by trained interviewers to collect information on the following areas: menstrual and obstetric history (menstrual pain and irregularities, number of births, places of delivery and birth attendants, pregnancy outcomes), gynecologic symptoms (vaginal discharge; itching, sores or ulcers in the genital area; lower abdominal pain; frequency, burning or pain during micturation), health-seeking behavior (treatment sought, health care providers consulted, if not, why), sexual history (age at marriage, frequency of and pain during sexual intercourse) and contraceptive use (use of modern/natural contraceptive methods).

Once the interview was complete, each woman was then taken to a nearby clinic where a trained female physician conducted a physical examination including a speculum examination of the cervix and vagina followed by a bimanual pelvic examination to detect clinical signs of RTIs. For laboratory testing, the physician collected samples swabs from the vagina and endocervix after cleaning of the ectocervix. It was ensured that women must not be menstruating on the day of examination and sample collection because menstrual blood could interfere with the laboratory tests.

Four tests were done at the time of sample collection: 1) Vaginal pH measured with a pH strip indicator, 2) Vaginal wet mounts prepared and immediately examined for evidence of candidiasis, 3) Gram staining of vaginal smears prepared for presence of clue cells and 4) amine odor tests

Following samples were collected: an endocervical swab for *Neisseria gonorrhoeae*, Gram stained smears for clue cells, a high vaginal swab for bacterial vaginosis and *Candida spp.*, and a posterior fornix swab for *Trichomonas vaginalis*. A blood sample was collected for the diagnosis of syphilis. Table 1 describes the samples, tests, and criteria used for diagnosing the respective RTI

Specimens were transported at the appropriate temperature to and were tested at the Microbiology Department of Aga Khan University Hospital (AKUH). Twenty percent of all investigations done in on-site clinics were double-checked in AKUH for quality control.

Respondents positive for any infection were provided treatment immediately. In cases of STIs, treatment was provided for both the partners. Women were re-contacted individually if the laboratory reports indicated either a need for any modifications to treatment or identified infections not diagnosed at the time of examination. All women who were advised treatment had a follow-up visit at their homes and were asked for the symptoms and offered a retest if they agreed.

### **Statistical Methods**

Data were double-entered using Epi-Info and error rate was less than 1%. The statistical analyses were done using SPSS software (version 14.0 for windows). The prevalence of infection (with 95% confidence intervals) was calculated using the confirmed laboratory results. Categorical data were compared using chi square test of independence.

## **Results**

### **Participation**

The calculated sample size was 1050 but a total of 1002 women were actually interviewed with the response rate of 95.4%. The main reasons for declining to participate in the study included lack of permission from the family, fear of getting some disease diagnosed and non-availability of husbands to get their permission. Of the 1002 women interviewed, a total of 945 underwent physical and pelvic examination and their samples could be collected. The main reasons for refusal for examination and sample collection included fear for pelvic examination and prick for blood collection, lack of permission from husband/in laws for visiting the facility and fear of getting some serious illness diagnosed.

### **Social and Demographic Characteristics**

On average, the women were 31.0 years old, and their husbands were 28.2 years old (Table 2). Nearly one third of them (37%) were illiterate and one quarter reported to have completed

secondary education. Women's mean ages at marriage and menarche were  $18.3 \pm 4.0$  and  $13.2 \pm 1.1$  years respectively. Of the 1002 women, 123 reported (12.2%) to be infertile. Remaining 879 women reported a total of 3892 pregnancies. A little over 40% reported 4 and more pregnancies.

## **Prevalence of infections**

### **Clinical histories**

Women were asked about the symptoms related to RTIs. Nearly 57% of women reported having some kind of gynecological symptoms. Many women reported multiple complaints; the most common symptoms reported were vaginal discharge and lower abdominal pain mentioned by 48.2% and 18.5% women respectively. (Table 3)

### **Laboratory-diagnosed RTIs**

Overall, 23.8% of the women had laboratory-diagnosed RTIs (Table 4). Approximately 2.6% had trichomoniasis and 1.7% was positive for syphilis. Many more women had endogenous RTIs: bacterial vaginosis was diagnosed in 8.8% and vaginal candidiasis in 13.2%. No women had ulcers or warts on vulva or mucopurulent cervical discharge and gonorrhoea was not detected in any sample.

### **Symptoms and Infections**

Among the 539 women who initially reported symptoms, nearly one third had RTIs according to the laboratory findings (Table 4). Some had multiple infections, as 169 infections occurred in 161 women. By comparison, 18% of the 406 women who did not report any symptoms at that time had laboratory-diagnosed RTIs. Women suffering from BV were mostly symptomatic compared to vaginal candidiasis where 13% of the women were asymptomatic.

### **Treatment-Seeking Behavior**



Among symptomatic women, a little over half (56%) had not sought any treatment for their gynecologic problems. The main reason for not seeking care for the symptoms reported by almost half of them was assuming their symptom to be normal. Other less common reasons were a health facility situated far away from home, hesitation in discussing the problem with a male provider, waiting for LHWs to visit home and husband's non-availability for accompanying to visit a facility. Of the 44% who had sought treatment, the first choice for majority of the women was home remedies or traditional medicines advised by friends or relatives. The preferred HCP was a traditional or a faith healer for those who consulted one. A very small proportion went to local qualified practitioners.

## **DISCUSSION**

The study indicates a high prevalence of RTIs among married women aged 15-49 residing in squatter settlements of Karachi with Bacterial Vaginosis to be the most prevalent endogenous infection and trichomoniasis as the most common STI. Similar findings have been shown by other community-based studies conducted in Pakistan<sup>12-15</sup>. Parallel trends have been evident by the studies conducted in South Asian regions such as India<sup>16, 17</sup> and Bangladesh<sup>18,19</sup> which reveal endogenous infections to be more prevalent compared to STIs. However, there has been some difference for the prevalence of two common endogenous infections i.e. bacterial vaginosis and thrush. Our study has revealed higher prevalence of thrush similar to studies conducted in Pakistan<sup>13-15</sup>, India<sup>16,17</sup> and Bangladesh<sup>18</sup>. However, two studies conducted in India showed a higher prevalences of bacterial vaginosis compared to candidal infections<sup>20,21</sup>.

The high prevalence of endogenous infections among women of child bearing age is alarming as these have been identified to end up in severe consequences such as pelvic inflammatory disease<sup>22</sup> and poor pregnancy outcomes. The later include premature rupture of membranes<sup>23</sup>, and preterm labor and delivery<sup>24</sup>. The situation becomes alarming in a country like Pakistan where 70% of deliveries are conducted by unskilled birth attendants<sup>25</sup> unlikely to be able to manage the premature newborn.

Additionally, infections during pregnancy and post partum period such as chorioamnionitis<sup>26</sup> postpartum endometritis<sup>27</sup>, post-caesarean delivery wound infections and postsurgical

infections<sup>28</sup> have been associated with presence of prior vaginal endogenous infections. The women of child bearing age in our study are at the risk of aforementioned conditions. Attempts should be made to screen and treat vaginal infections during pregnancy as studies have shown that such management for BV result in reduced incidences of maternal and neonatal morbidities<sup>29,30</sup>.

The presence of *Trichomonas vaginalis* (TV) infection among study participants is also a matter of great concern. TV has been reported to be the most common curable STI worldwide and is likely to increase the risk of HIV transmission<sup>1,2</sup>. The later is a matter of concern for a country like Pakistan which is categorized as 'low prevalence and high risk' in context of HIV/AIDS.

There are certain limitations in the study in relation to laboratory tests used for diagnosing RTIs. For detecting gonorrhoeae and trichomoniasis, culture and microscopy were used instead of polymerase chain reaction (PCR). PCR has higher sensitivity and specificity than culture and microscopy<sup>31</sup>. This could have resulted in missing a considerable proportion of two infections.

An important aspect of the study is poor health seeking behavior of women both in terms of neglecting the symptoms and opting for a non-scientific treatment. Neglecting the symptoms not only leads to underreporting of RTIs but keeps the women infected for a long time with all of its consequences.

The preference of traditional healers over qualified practitioners by the infected women was due to negligence, social inhibition and inappropriate health care system.

## **Conclusion**

The findings of the study have certain policy implications for improving the reproductive health of women in the country. Women require appropriate health education about gynecologic morbidity specially focusing on stigma and embarrassment related to RTIs. Additionally, we recommend concentrating on training of the health care providers and provision of health care through Primary Health Care. This would make the services more accessible resulting in women feeling comfortable in seeking treatment and not discouraged by trepidation for solitude and confidentiality. Integration of health services could be a solution as proposed by ICPD to deal

these issues holistically and has been supported by many studies conducted in regional countries. However, an effective and an efficient delivery system is the need of the day for improving the health status of women in the country.

**Competing interests**

The authors declare that there are no competing interests for this study. The study was conducted by funding provided by University Research Council, Aga Khan University, Karachi, Pakistan.

**Authors' contributions**

NS conceived of the study, participated in its design, carried out the literature review and wrote the first draft of the manuscript. TSA performed many of the interviews, trained and supervised the data collection and analyzed the data. EK provided technical input for the investigations and diagnosis component. Both TSA and EK and edited the final draft of the paper. All authors read and approved the final manuscript.

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Table 1: Laboratory and clinical Assays and criteria for diagnosis of various RTIs

Laboratory Diagnosed RTIs	Sample	Detection Assay	Criteria
<b>STIs</b>			
Trichomoniasis	Post vaginal Fornix	Culture on Diamond's medium  Wet Mount preparation	Positive culture of viable <i>Trichomonas vaginalis</i> or  positive wet mount preparation test
Syphilis	Serum	Rapid Plasma reagin test  Particle agglutination test	Current infection: Positive serology by rapid plasma reagin test  Past infection: Positive result on the <i>Treponema pallidum</i> particle agglutination test
Gonorrhea	Cervical Smear	Culture on Thayer-Martin selective agar medium  Gram Staining	Isolation of <i>Neisseria gonorrhoeae</i>  identification of gram-negative intracellular diplococci
<b>Endogenous Infections</b>			
Bacterial Vaginosis	High vaginal swab	Per vaginal examination pH strip indicator amine odor tests Gram staining	Presence of at least three of the following: watery vaginal discharge elevated pH (>6) positive amine odor test presence of clue cells
Vaginal candidiasis	High vaginal swab	Culture on Sabouraud's medium	Positive culture with the presence of clinical signs (red, inflamed tissue and curdy white discharge)

Table 2: Percentage distribution of married women aged 15-49 years, by selected social, demographic and reproductive characteristics, Karachi, 2007-08

<b>Variables</b>	<b>Women (n=1002)</b>
<b>Age in years</b>	
Mean age	31.0 ± 6.8
< 20	6.1
21-30	47.2
31-40	38.9
41 - 46	7.8
<b>Literacy Status</b>	
Illiterate	36.9
Primary	17.4
6-10	24.9
Secondary & above	6.6
<b>Age at marriage (years)</b>	
Mean age	18.3 ± 4.0
12-15	26.6
16-20	49.4
21-25	19.5
26 and >	4.5
<b>Number of pregnancies</b>	
	3.5 ± 2.2
0	3.0
1-3	55.5
4-6	30.2
7 and>	11.1



Table 3: Prevalence of gynecological symptoms among women surveyed in squatter settlements in Karachi, in 2007-08

<b>Symptoms</b>	<b>n</b>	<b>%</b>
Vaginal discharge	483	48.2
Vulvar itching/ burning	109	10.8
Lower abdominal pain	185	18.4
Painful micturation	148	14.7
Painful coitus	98	9.9

Table 4: Numbers and percentages of women with laboratory- diagnosed RTIs

Laboratory-Diagnosed RTIs	Total women (n=945)		Women with symptoms (n=539)		Women without symptoms (n=406)	
	n	%	n	%	n	%
<b>STIs</b>						
Trichomoniasis	25	2.6	19	3.6	6	1.5
Syphilis	2	0.2	2	0.2	0	0.0
Gonorrhea	0	0.0	0	0.0	0	0.0
<b>Endogenous infections</b>						
Bacterial Vaginosis	83	8.7	69	12.8	14	3.4
Vaginal candidiasis	132	13.9	79	14.6	53	13.2
Total	242	25.6	169	31.3	73	17.9

The proportion of symptomatic women was significantly greater ( $p \leq 0.05$ ) than the proportion asymptomatic for all infections except vaginal candidiasis