

Original Research Article

Urban-rural disparities in cervical cancer awareness and reproductive health practices among women in Rajkot, India: a cross-sectional survey study

Shweta Pathak*, Gopi Barvadiya, Rekha Parmar, Rahul Kundu

Department of Biosciences, Saurashtra University, Rajkot, Gujarat, India

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*Correspondence:

Dr. Shweta Pathak,

E-mail: spathak.26@gmail.com

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ABSTRACT

Background: Urban-rural disparities in cervical cancer awareness and reproductive health practices challenge prevention, early detection, and equitable healthcare delivery in low- and middle-income settings. Limited knowledge, sociocultural constraints, and unequal access to services adversely affect women's health, particularly in rural communities. Understanding these gaps is essential for designing targeted public health interventions. This study compared cervical cancer awareness, contraceptive use, and barriers to healthcare access among urban and rural women in Rajkot, India.

Methods: A community-based cross-sectional survey was conducted among women from urban and rural Rajkot using structured, pretested questionnaires. Data included sociodemographic characteristics, cervical cancer knowledge, screening awareness, contraceptive practices, and perceived healthcare barriers. Descriptive analysis and chi-square tests assessed statistically significant differences between urban and rural groups, with $p < 0.05$.

Results: Marked sociodemographic differences existed between groups. Urban women had higher educational attainment, including bachelor's degrees ($\chi^2=10.90$, $p=0.0043$), while rural women were largely employed in agriculture ($\chi^2=67.96$, $p < 0.0001$). Modern contraceptive use was significantly lower among rural women ($\chi^2=101.25$, $p < 0.0001$). Awareness of cervical cancer and screening methods was substantially higher among urban women ($p < 10^{-14}$). Screening barriers differed, with urban women reporting privacy concerns, whereas rural women faced transportation and cost constraints.

Conclusions: Pronounced urban-rural disparities in cervical cancer awareness, contraceptive use, education, and healthcare access persist among women in Rajkot. Tailored, context-specific public health strategies are needed to improve awareness, reduce structural barriers, and strengthen preventive and reproductive healthcare services for rural populations.

Keywords: Contraceptive use, Health disparities, HPV infection, Rural health, Screening barriers, Urban health

INTRODUCTION

Developing successful public health initiatives targeted at enhancing women's health outcomes requires an understanding of the differences in cervical cancer knowledge and reproductive health behaviours between urban and rural populations. Rural and urban populations differ greatly in terms of the socioeconomic determinants of health, which include access to healthcare, work, education, and money. Rural areas frequently have worse

health outcomes than metropolitan areas. These differences are especially noticeable in the fields of cancer prevention and reproductive health, where rural areas have higher rates of healthcare access hurdles and knowledge gaps, which result in delayed diagnosis and worse prognoses.¹

Despite being one of the most preventable cancers through excellent immunization, screening, and early identification, cervical cancer continues to rank among

the top causes of cancer-related mortality among women globally. The World Health Organization (WHO) stressed in its 2020 report how critical it is to eradicate cervical cancer as a public health issue by 2030. This challenging objective emphasizes the significance of fair access to immunizations and screening programs, which are disproportionately available in urban areas, underserving rural populations.² Progress toward this objective is still hampered by urban-rural health inequities, though, since rural women are less aware of and engage in preventative treatment.^{3,4}

Women's awareness of cervical cancer and their participation in preventative health activities are influenced by education, which is a crucial factor of health literacy. Higher educated women are typically more knowledgeable about cervical cancer, its risk factors, and the significance of early detection and immunization.⁵ On the other hand, rural women frequently encounter more obstacles to education, which restricts their access to vital health information and services. Due to socioeconomic and infrastructure limitations, rural women have a far lower likelihood of completing secondary or higher education.⁶ The lack of adequate healthcare facilities in rural areas exacerbates this educational disparity by limiting access to reproductive health services and cervical cancer screening.⁷

A distinct urban-rural difference is also evident in the use of contraceptives. Rural women frequently utilize traditional techniques or do not have access to contraception, whereas urban women are more likely to use modern methods. Few researchers from Asia and sub-Saharan Africa have repeatedly demonstrated that urban women report higher prevalences of contraception and have greater access to modern methods like hormonal contraceptives and intrauterine devices (IUDs), whereas rural women are more likely to face obstacles related to socioeconomic status, healthcare access, and education.^{8,9} The disparity in contraceptive use between urban and rural areas emphasizes the necessity of focused programs that address the particular difficulties rural women encounter in obtaining reproductive health care.¹⁰

Another area where there are clear differences between urban and rural areas is awareness of cervical cancer, particularly understanding of its link to human papillomavirus (HPV) infection and the availability of vaccinations. While rural women frequently lack basic knowledge about cervical cancer and its prevention, urban women are more likely to be aware of the condition and to engage in screening programs. Rural women are less likely to be aware of HPV, cervical cancer, or the related screening programs, according to studies conducted in Tanzania, India, and Uganda.¹¹⁻¹³ The lack of qualified healthcare personnel, logistical obstacles to receiving healthcare, and cultural beliefs all contribute to the low awareness levels among rural populations.¹⁴

Additionally, there are greater obstacles to cervical cancer screening in rural locations. Rural women's low screening participation is commonly attributed to cost, transportation challenges, and mistrust of healthcare practitioners.¹⁰ On the other hand, urban women are more likely to forego screening because they believe there are no symptoms or because they are worried about their privacy. This suggests that treatments that concentrate on behavioural modification, stigma reduction, and enhancing healthcare privacy may be beneficial for urban women, but rural women encounter substantial logistical obstacles.¹ Andersen's Behavioural Model of Healthcare Utilization, which highlights how contextual and individual factors, including social and economic constraints, affect healthcare-seeking behaviours, is consistent with these findings.^{15,16}

Context-specific public health approaches that acknowledge the particular difficulties faced by rural women are necessary to address these inequities. Enhancing access to instructional materials, bolstering rural healthcare systems, and lowering the financial and practical obstacles to screening should be the top priorities of these initiatives. These efforts are critical to achieving the United Nations Sustainable Development Goal 3 (SDG 3), which emphasizes ensuring health and well-being for all women globally.¹⁷ As part of the worldwide drive to eradicate cervical cancer, public health strategies must be tailored to the unique needs of rural communities to provide equitable access to life-saving services. However, few studies in India have systematically examined cervical cancer awareness and reproductive health practices by directly comparing urban and rural populations within the same sociocultural and geographic context.

Addressing this gap is essential for developing targeted interventions and optimizing resource allocation to bridge urban-rural disparities and reduce cervical cancer incidence and mortality. The present study focuses on women in Rajkot, Gujarat, to explore these disparities in a regionally specific context. This study aimed to assess and compare cervical cancer awareness, screening behaviors, and reproductive health practices among urban and rural women in Rajkot, India. We hypothesize that urban women will demonstrate higher levels of cervical cancer awareness and better reproductive health practices compared to their rural counterparts.

METHODS

Study design and setting

The Rajkot district of Gujarat state, India, which includes both urban and rural areas, provided a representative setting to examine disparities in cervical cancer awareness and reproductive health practices. This survey study used a community-based, cross-sectional design and was carried out between January and June 2024. Urban participants were selected randomly from city

neighbourhoods within the Rajkot Municipal Corporation, while rural participants were also randomly drawn from the nearby villages under the district's jurisdiction.

Study population and sampling

Women between the ages of 21 and 50 who had lived in the chosen urban and rural locations for at least a year made up the target group. A stratified random sampling procedure with multiple stages was employed. First, two rural blocks and two urban wards were chosen at random. Eligible women were then invited to participate in a random sampling of households drawn from voter lists. Women who rejected consent, were pregnant, or had a history of hysterectomy were not included. Given a predicted 20% difference in cervical cancer knowledge between urban and rural populations ($\alpha=0.05$, power =80%), a minimum sample size of 400 was determined to provide adequate statistical power. In the end, 500 ladies took part, 250 from each of the two regions.

Data collection instrument

A standardized, pre-tested questionnaire created in the local language Gujarati and subsequently translated into English, was used to gather.¹⁸⁻²⁰ There were four parts to the tool: (a) sociodemographic traits (occupation, age, and education); (b) using contraceptives and practicing reproductive health; (c) awareness and understanding of cervical cancer (vaccine, HPV infection, and screening); (d) obstacles to obtaining services for cervical cancer screening. In order to improve clarity and cultural relevance, the questionnaire was pre-tested on 30 women (who were not included in the final analysis) and

examined for face validity by three public health specialists.

Data collection procedure

Trained female health workers administered face-to-face interviews in private household settings. Each interview lasted approximately 20-25 minutes. To reduce reporting bias, respondents were assured of anonymity, and questions were framed neutrally.

Statistical analysis

SPSS version 26.0 was used to enter and analyze the data (IBM Corp., Armonk, NY). Sociodemographic factors, contraceptive use, and awareness levels were compiled using descriptive statistics. The Chi-square (χ^2) test was used to compare categorical data in order to evaluate the differences between urban and rural groups. The threshold for statistical significance was $p<0.05$. Where applicable, precise p values for very significant differences were provided.

RESULTS

There were some significant disparities between the sociodemographic traits of women from rural and urban areas. Urban women were more prevalent in the 21-30 and 31-40 age groups, while rural women were more prevalent in the 31-40 and 41-50 age groups. Despite these minor differences in age distributions, the difference was not statistically significant ($\chi^2=5.27$, $df=2$, $p=0.072$). This implies that the observed age variance is probably the result of chance.

Table 1: Comparison of socio-demographic status of women in urban and rural areas.

Features	Urban (%)	Rural (%)	χ^2	P value
Age (in years)				
21-30	45 (18.00)	33 (13.20)	5.27	0.072
31-40	52 (20.8)	72 (28.80)		
41-50	19 (7.60)	26 (10.40)		
Education level				
≤Junior high school/college	71 (28.40)	45 (18.00)	10.90	0.0043
High school/college	52 (20.80)	41 (16.40)		
≥Bachelor	93 (37.20)	29 (11.60)		
Career status				
Farming	42 (16.80)	187 (74.80)	67.96	<0.05
Homemakers	77 (30.80)	128 (51.20)		
Enterprises and businesses	83 (33.20)	57 (22.80)		
Individuals	29 (11.60)	76 (30.40)		
Contraceptive methods				
IUD ring	53 (21.20)	12 (4.80)	101.25	<0.05
Condoms	127 (50.80)	59 (23.60)		
No measures	72 (28.80)	167 (66.80)		
Contraceptives	31 (12.40)	18 (7.20)		
Safety period	64 (25.60)	104 (41.60)		

Table 2: Knowledge about cervical cancer among urban and rural women.

Knowledge about cervical cancer	Urban (%)	Rural (%)	χ^2	P value
Did you know about cervical cancer screening				
Heard of but not screened	32 (12.80)	72 (28.80)	65.56	<0.05
Never heard of it	12 (4.80)	56 (22.4)		
Screened (≥ 1 time)	45 (18.00)	10 (4.00)		
Understood but not screened	36 (14.40)	93 (37.20)		
Is it known that cervical cancer is associated with HPV infection				
Know	121 (48.40)	75 (30.20)	106.42	<0.05
No idea	23 (9.20)	178 (71.20)		
Have you heard of the HPV vaccine?				
No idea	15 (6.00)	187 (74.80)	158.21	<0.05
Injected	72 (28.80)	16 (6.40)		
Known but not injected	75 (30.00)	94 (37.60)		
Did you know that cervical cancer can be detected and prevented early through early screening?				
No idea	40 (16.00)	85 (34.00)	58.64	<0.05
Know	84 (33.60)	16 (6.40)		

*HPV- human papilloma virus.

Table 3: Reasons for not having cervical cancer screening among urban and rural women.

Reasons	Urban (%)	Rural (%)	χ^2	P value
Reasons for not getting screened for cervical cancer				
No symptoms, no need	34 (13.60)	10 (4.00)	83.50	<0.05
Fear or shyness of having a gynecological examination	53 (21.20)	90 (36.00)		
I don't trust the doctor, and I'm afraid I'll be paid in vain	12 (4.80)	70 (28.00)		
No time to go to the hospital	19 (7.60)	98 (39.20)		
Unsupportive husband, unaccompanied	12 (4.80)	57 (22.80)		
Poor transportation and inconvenience in getting back and forth	13 (5.20)	47 (18.80)		
Fear of privacy breach	26 (10.40)	71 (28.40)		
Screening is expensive and economically problematic	29 (11.60)	103 (41.20)		

The education levels of urban and rural women, however, differed significantly ($\chi^2=10.90$, $df=2$, $p=0.0043$). While lower education levels were more prevalent in rural regions, urban women were more likely to hold a bachelor's degree or above (37.2%) than rural women (11.6%). This suggests that residency and educational attainment are strongly correlated.

The two groups' employment statuses also varied significantly. While urban women were more likely to work in business or at home, rural women were much more likely to be farmers (74.8%) than their urban counterparts (16.8%). There was a considerable correlation between residence and occupational status, as seen by the very significant difference ($\chi^2=67.96$, $df=3$, $p<0.0001$).

Significant variations were also observed in contraceptive practices. While rural women were more likely to report not taking any form of contraception (66.8%) or depending on the safety period (41.6%), urban women were more likely to use condoms (50.8%) and IUDs (21.2%). The choice of contraceptive method and residence were highly significantly correlated ($\chi^2=101.25$,

$df=4$, $p=5.33 \times 10^{-21}$), indicating that there are significant differences in access to or preference for contraceptive methods between the two contexts.

Urban women consistently showed much greater levels of awareness across all areas when comparing their knowledge and awareness of cervical cancer. Most urban respondents were aware of the HPV vaccine, had heard of or had experienced cervical cancer screening, understood the link between HPV infection and cervical cancer, and appreciated the significance of early diagnosis. Rural women, on the other hand, were less knowledgeable; many of them claimed to have never heard of screening or vaccinations. The findings that cervical cancer knowledge is significantly lower in rural regions were supported by the highly significant results of the Chi-square tests for each category (p values ranging from 3.80×10^{-14} to 4.42×10^{-35}).

Lastly, there were notable differences between the two groups in the reasons given for not getting screened for cervical cancer. Practical and systemic obstacles like expense, lack of transportation, mistrust of healthcare practitioners, or need for companionship were more

commonly mentioned by rural women. Conversely, urban women were more likely to blame non-participation on privacy concerns or a lack of symptoms. The statistical significance of this difference ($\chi^2=83.50$, $df=7$, $p=2.66 \times 10^{-15}$) suggests that customized interventions need to target the unique challenges that each group faces.

Overall, the results show significant differences between rural and urban women in terms of access to screening, awareness of cervical cancer, employment, education, and usage of contraceptives. These statistically significant disparities point to the necessity of focused health education and resource distribution, especially in underserved rural areas.

DISCUSSION

Significant sociodemographic differences between urban and rural women were found in this study, especially in the areas of education, employment, usage of contraceptives, awareness of cervical cancer, and screening uptake. These discrepancies highlight structural injustices that have been extensively documented in both domestic and foreign studies. Our results demonstrate the critical need for inclusive, diverse public health approaches that take into consideration the particular difficulties faced by rural communities.

Educational disparities and health literacy

Rural women are far less likely to complete secondary or higher education because of socioeconomic and infrastructure impediments, and the notable difference in educational attainment between urban and rural women ($p=0.0043$) is in line with global trends.⁵ According to research, just 7% of young women in rural Ethiopia finished post-secondary education, whereas 18% did so in metropolitan regions.²¹ Health literacy, which affects people's capacity to make knowledgeable decisions regarding preventative care, including the use of contraceptives and cervical cancer screening, is intimately related to education. Therefore, improving health outcomes for rural women requires expanding their educational prospects.²²

Employment patterns and economic inequities

According to our research, urban women were more likely to work in business or domestic duties, whereas rural women were primarily employed in agriculture (74.8%). This trend is consistent with data from the International Labour Organization (2023), which shows that in many low- and middle-income nations, rural women continue to work primarily in agriculture. In rural areas, women's access to healthcare treatments is severely hampered by economic uncertainty, time constraints, and occupational rigidity.^{23,24} Furthermore, rural women are disproportionately burdened with unpaid care and household duties, which restricts their ability to seek

medical attention.²⁵ Improving rural women's access to healthcare requires addressing these financial obstacles.

Contraceptive use and reproductive health

The present study showed that women in urban areas were significantly more likely to use modern forms of contraception, such as IUDs and condoms, than women in rural areas. Conversely, women in rural areas were more likely to use conventional techniques or none at all. National data from Ethiopia and other sub-Saharan African nations, which show that urban women take contemporary contraceptives at higher rates, are in line with these findings.²⁶ Women in rural areas were 28% less likely than their urban counterparts to use contemporary contraception, according to a 2023 analysis of the Ethiopian Demographic and Health Survey. This disparity was attributed to lower income and education levels.²¹ Geographic differences in the use of contraceptives highlight the necessity for targeted interventions that improve access to family planning services in rural areas.

Cervical cancer awareness and screening practices

The difference in cervical cancer screening participation and understanding between urban and rural women was one of the study's most startling findings. The awareness of cervical cancer and associated preventative strategies was considerably greater among urban women (p values $<10^{-14}$), which is in line with Tanzanian studies.^{8,27,28} Cervical cancer screening program participation is much lower in rural areas due to a combination of cultural beliefs, limited awareness, and practical obstacles to healthcare access. Though progress is still unequal, especially between urban and rural areas, the World Health Organization (WHO) stresses the significance of eradicating cervical cancer by 2030 through immunization, screening, and treatment.⁸

Barriers to screening and health service utilization

Systemic hurdles to cervical cancer screening, including lack of mobility, expense, and mistrust of healthcare practitioners, were mentioned by rural women in this study. These results are consistent with studies carried out in Tanzania, where rural women encountered significant logistical obstacles when trying to obtain screening services.¹² On the other hand, urban women were more likely to say that they did not participate in screening because they did not have symptoms or because they were worried about their privacy. This implies that whereas rural interventions should address financial and practical impediments to access, urban programs should concentrate on behavioural change communication and stigma reduction. These trends are consistent with Andersen's behavioural model, which emphasizes how contextual and individual factors influence healthcare use.¹⁵ This model has been used in studies conducted in China and Ethiopia to better understand healthcare-

seeking behaviours and to identify enabling factors such as income and access to services.²⁹

Implications for public health interventions

The discrepancies found in this research provide compelling evidence for the necessity of customized public health initiatives that target the unique obstacles that urban and rural women encounter. The implementation of mobile screening and immunization clinics, community-based health education facilitated by reliable local leaders, the incorporation of reproductive health services into primary care settings, and financial and transportation support systems have to be the top priorities for rural women. Enhancing awareness, addressing privacy issues, and offering emotional assistance should be the main priorities for metropolitan women. These focused tactics complement global health programs like the WHO's cervical cancer elimination strategy and the Sustainable Development Goals (SDG 3: Good Health and Well-Being).³ The World Bank, Gates Foundation, and others just pledged around \$600 million. and UNICEF to expand vaccination, screening, and treatment globally highlights the importance of addressing disparities in access to preventive measures.³⁰

This study's comparative design, thorough statistical analysis, and diverse study sample are among its strong points. The study does have several drawbacks, though. The cross-sectional methodology makes it difficult to determine causal links, and responses about delicate subjects like cervical cancer screening and the usage of contraceptives may have been skewed by self-report bias. Furthermore, even though the study sample was diverse, it's possible that the results won't apply to other nations or areas, requiring additional validation in various settings.

CONCLUSION

The findings demonstrate significant urban-rural disparities in cervical cancer awareness, contraceptive utilization, educational attainment, and access to healthcare services among women in Rajkot. These inequities underscore the need for targeted, context-specific public health interventions aimed at enhancing awareness, improving health literacy, reducing structural and socioeconomic barriers, and strengthening preventive, reproductive, and screening healthcare services, particularly among rural populations.

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