Proceedings of the 6th International Conference on Biological Engineering and Medical Science
DOI: 10.54254/2753-8818/2026.36897

Urban–Rural Disparities in HPV Knowledge Among Women in China: A Cross-Sectional Study Based on CDC Survey Data

Isabella Yang

School of Xi'an TieYi International Curriculum Center, Xi'an, China
isabellayang2027@163.com

Abstract. Human papillomavirus (HPV) infection is one of the most important causes of cervical cancer. Although HPV vaccination and cervical cancer screening have been proven effective in reducing cervical cancer risk, the success of these preventive strategies depends greatly on women's awareness and understanding of HPV-related health information. Differences in health knowledge between urban and rural populations may influence women's ability to access preventive services and make informed health decisions. This study examined the difference in HPV knowledge between urban and rural women in China based on data from a China CDC cross-sectional survey conducted in 2018. The study included 7,238 women aged 20-45 years from six provinces in China, including 3,619 urban residents and 3,619 rural residents. HPV knowledge levels were classified into high and low categories. Statistical analyses included percentage comparisons, Pearson's chi-square test, and odds ratio (OR) analysis with 95% confidence intervals (CIs). The results showed that 52.69% of urban women had high HPV knowledge, compared with 36.75% of rural women. A significant difference was observed between the two groups ($\chi^2 = 185.42$, df = 1, $P < 0.001$). Urban women had higher odds of having high HPV knowledge than rural women (OR = 1.92, 95% CI: 1.75-2.11). The findings indicate that an obvious urban–rural gap exists in HPV knowledge among Chinese women. More targeted health education and information support may be needed in rural communities to improve awareness of HPV infection, vaccination, and cervical cancer prevention.

Keywords: human papillomavirus, HPV knowledge, urban–rural disparity, women, China, biostatistics

1. Introduction

Cervical cancer remains a major public health problem affecting women worldwide. Persistent infection with high-risk human papillomavirus (HPV) is recognized as the primary cause of cervical cancer. In recent decades, advances in HPV vaccination and cervical cancer screening have provided effective approaches for preventing cervical cancer [1-3]. Vaccination can reduce the risk of HPV infection, while regular screening allows early detection and treatment of cervical abnormalities. However, the effectiveness of these preventive measures depends not only on healthcare availability

© 2026 The Authors. This is an open access article distributed under the terms of the Creative Commons Attribution License 4.0 (https://creativecommons.org/licenses/by/4.0/).

DOI: 10.54254/2753-8818/2026.36897

but also on whether women understand HPV-related information and recognize the importance of prevention. In China, cervical cancer prevention has received increasing attention due to the growing awareness of women's health issues. Despite improvements in healthcare services and public health communication, differences in health knowledge remain between populations living in different areas. Previous studies have suggested that women in rural regions may have lower awareness of HPV and cervical cancer prevention compared with women in urban areas [4-6]. These differences may be related to multiple factors, including educational opportunities, economic conditions, healthcare accessibility, and available sources of health information. Health knowledge is an important factor influencing preventive behaviors. Women with better understanding of HPV infection, vaccination, and screening may be more willing to seek healthcare services and participate in prevention programs. Therefore, identifying inequalities in HPV knowledge is important for developing effective public health strategies. The original China CDC survey was conducted from June to September 2018 in six provinces: Jiangsu, Shandong, Hunan, Anhui, Shaanxi, and Sichuan [7]. The survey initially recruited 7,240 women aged 20–45 years. The purpose of this study was to describe the difference in HPV knowledge between the two groups and provide evidence for improving health education strategies aimed at reducing inequalities in cervical cancer prevention.

2. Theoretical background

HPV infection is widely recognized as a necessary factor in the development of cervical cancer. Although HPV infection is common among sexually active individuals, persistent infection with high-risk HPV types may cause cervical cell changes and eventually lead to cancer. Because cervical cancer develops through a long process, prevention and early detection provide important opportunities to reduce disease burden. HPV vaccination, cervical screening, and timely treatment of abnormal findings are considered key components of cervical cancer control.

However, the availability of prevention strategies does not automatically ensure their effective use. Women need appropriate knowledge to understand why vaccination and screening are important. Lack of awareness may influence attitudes toward preventive healthcare and may reduce participation in vaccination or screening programs. For this reason, examining differences in HPV knowledge is an important step in understanding health inequalities.

3. Methods

This study was based on data from a cross-sectional survey conducted by the Chinese Center for Disease Control and Prevention in 2018. The survey was carried out in six provinces: Jiangsu, Shandong, Hunan, Anhui, Shaanxi, and Sichuan. The original survey included 7,240 women aged 20-45 years. After excluding participants with incomplete information related to residential area and HPV knowledge, 7,238 women were included in the present analysis. Among them, 3,619 participants were from urban areas and 3,619 participants were from rural areas. The distribution of HPV knowledge differed significantly between urban and rural women. Pearson's chi-square test showed that HPV knowledge distribution was significantly different between the two residential groups ($\chi^2 = 185.42$, $df = 1$, $P < 0.001$). This result indicates that the difference observed between urban and rural women was unlikely to be explained by chance alone. In addition, the odds ratio analysis showed that urban women had 1.92 times higher odds of having high HPV knowledge compared with rural women (95% CI: 1.75-2.11).

DOI: 10.54254/2753-8818/2026.36897

4. Results

Table 1 presents the observed distribution. Of 3,619 urban women, 1,907 had high knowledge and 1,712 had low knowledge. The corresponding proportions were 52.69% high knowledge and 47.31% low knowledge. Among rural women, 1,330 of 3,619 had high knowledge (36.75%), whereas 2,289 (63.25%) had low knowledge. Thus, low knowledge predominated in the rural group, whereas high knowledge was slightly more common in the urban group. The high-knowledge proportion was 15.94 percentage points greater in urban than rural women. As shown in Figure 1, the contrast is visually substantial despite the equal group sizes.

Table 1. HPV knowledge level by residential area

Residential area	High knowledge, n (%)	Low knowledge, n (%)	Total
Urban	1,907 (52.69)	1,712 (47.31)	3,619
Rural	1,330 (36.75)	2,289 (63.25)	3,619
Overall	3,237 (44.72)	4,001 (55.28)	7,238

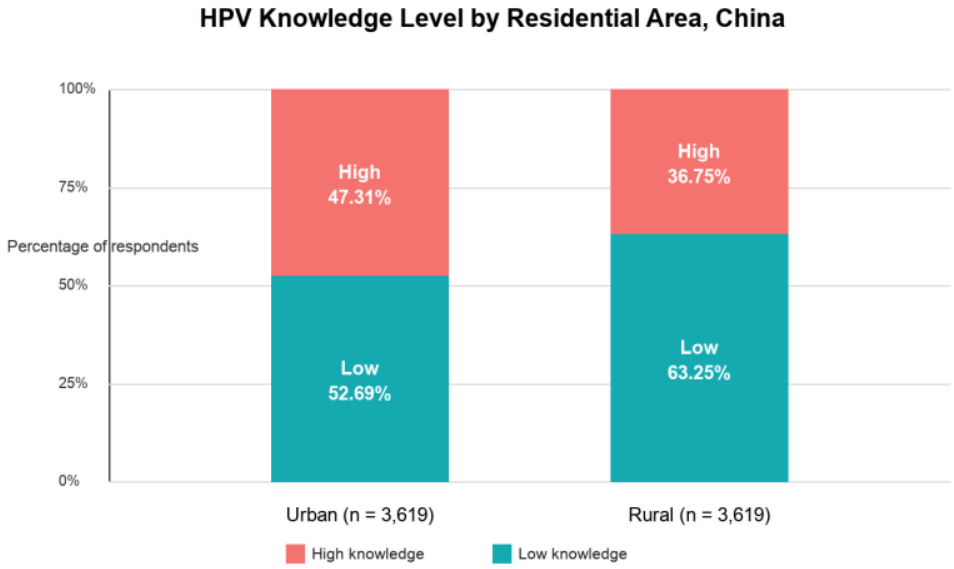

Figure 1. Within-area distribution of high and low HPV knowledge among urban and rural women

5. Discussion

5.1. Interpretation of key findings

The observed difference may be related to several social and healthcare factors. One possible explanation is that urban residents generally have greater access to medical information. Cities usually have more healthcare institutions, public health campaigns, and opportunities for direct communication with healthcare professionals. Women living in urban areas may therefore have more chances to learn about HPV infection, cervical cancer, vaccination, and screening.

Education may also influence HPV knowledge. Health information often requires the ability to understand medical concepts and evaluate different sources of information. Individuals with higher

DOI: 10.54254/2753-8818/2026.36897

educational backgrounds may be more capable of obtaining and interpreting health information. Since educational opportunities may differ between urban and rural areas, this difference could contribute to the differences in HPV awareness.

Another possible factor is healthcare accessibility. Urban areas often have better-developed healthcare systems and more frequent health promotion activities. Rural communities may face challenges such as fewer healthcare resources, longer distances to medical facilities, and limited availability of professional health education. These differences may reduce opportunities for rural women to receive accurate HPV-related information.

In addition, the sources through which women obtain health information may differ between urban and rural populations. Urban women may have greater access to online health resources, hospital-based education programs, and workplace health activities. Rural women may depend more on traditional community-based information channels, which may not always provide sufficient or updated information about HPV prevention.

5.2. Limitations

Although the findings demonstrate a significant association between residential area and HPV knowledge, the results should be interpreted carefully. This study used a cross-sectional design, meaning that it can identify relationships between variables but cannot prove that residential area directly causes differences in knowledge. Other factors, including education level, household income, and healthcare conditions, may also influence HPV knowledge. These factors were not adjusted for in this simple analysis.

5.3. Implications for public health practice

The findings of this study have important implications for public health practice. Improving HPV knowledge among women should be considered an essential part of cervical cancer prevention, especially in areas where health information resources are limited. Rural communities may benefit from more targeted education programs that provide clear and practical information about HPV infection, vaccination, and cervical cancer screening. Health education should not only focus on increasing awareness but also address common misunderstandings and encourage women to participate in appropriate preventive services.

Community healthcare workers may play an important role in reducing the knowledge gap. Compared with large-scale health campaigns, community-based education can provide information that is closer to people's daily lives. Local healthcare providers can communicate with women directly, answer questions, and provide reliable information based on community needs. This approach may be particularly useful in rural areas where access to specialized medical resources is limited.

The results also suggest that improving HPV knowledge requires cooperation between different sectors. Public health organizations, healthcare institutions, and local communities should work together to develop effective communication strategies. Educational materials should be designed in a simple and understandable way, considering differences in education levels and local conditions. Digital health communication may also provide additional opportunities, but traditional community-based methods remain important for populations with limited access to technology.

DOI: 10.54254/2753-8818/2026.36897

6. Conclusion

The analysis of 7,238 Chinese women reveals notable gaps in HPV knowledge between urban and rural groups. Urban participants were 1.92 times more likely to have high HPV knowledge (95% CI 1.75-2.11; $P < 0.001$). This finding matches earlier Chinese research, which also reported poorer HPV awareness for women living in rural regions.

We cannot treat this residential difference as direct proof of causation. Where people live often ties to education level, household income, and local healthcare conditions, and these factors were not adjusted for in our simple analysis. Better health knowledge also does not guarantee people will get screened or receive vaccines. Still, this obvious knowledge gap suggests we need practical public-health measures for rural communities. Local health workers and community channels can deliver simple health messages about HPV infection and cervical screening.

This study has some drawbacks. We only used aggregated data, so key sampling information was missing. Confounding variables were not considered, which may bias our crude OR result. As cross-sectional data, it cannot confirm cause-and-effect relationships. Besides, our sample might not be representative other whole national population, and we had no records about real-world vaccine uptake or cervical disease cases. Future research needs individual-level data and multivariable logistic regression.

To sum up, rural areas should receive more HPV education together with local vaccination and screening support. Readers should be cautious: these results do not represent actual cervical cancer incidence or real vaccine acceptance.

References

[1] World Health Organization. (2024). Human papillomavirus and cancer. *World Health Organization*. https://www.who.int/news-room/fact-sheets/detail/human-papilloma-virus-and-cancer

[2] Bray, F., Laversanne, M., Sung, H., Ferlay, J., Siegel, R. L., Soerjomataram, I., & Jemal, A. (2024). Global cancer statistics 2022: GLOBOCAN estimates of incidence and mortality worldwide for 36 cancers in 185 countries. *CA: A Cancer Journal for Clinicians, 74*(3), 229–263.

[3] Lei, J., Ploner, A., Elfström, K. M., Wang, J., Roth, A., Fang, F., Sundström, K., Dillner, J., & Sparén, P. (2020). HPV vaccination and the risk of invasive cervical cancer. *The New England Journal of Medicine, 383*(14), 1340–1348.

[4] Li, J., Li, L. K., Ma, J. F., Wei, L. H., Niyazi, M., Li, C. Q., Xu, A. D., Wang, J. B., Liang, H., Belinson, J., & Qiao, Y. L. (2009). Knowledge and attitudes about human papillomavirus (HPV) and HPV vaccines among women living in metropolitan and rural regions of China. *Vaccine, 27*(8), 1210–1215.

[5] Di, J., Rutherford, S., Wu, J., Song, B., Ma, L., Chen, J., & Chu, C. (2015). Knowledge of cervical cancer screening among women across different socio-economic regions of China. *PLOS ONE, 10*(12), e0144819.

[6] Liu, T., Li, S., Ratcliffe, J., & Chen, G. (2017). Assessing knowledge and attitudes towards cervical cancer screening among rural women in eastern China. *International Journal of Environmental Research and Public Health, 14*(9), 967.

[7] Wang, B., He, M., Chao, A., Engelgau, M. M., Saraiya, M., Wang, L., & Wang, L. (2015). Cervical cancer screening among adult women in China, 2010. *The Oncologist, 20*(6), 627–634. https://doi.org/10.1634/theoncologist.2014-0303