

Preplanned Studies

Burden of Vaginitis Among Chinese Women Aged 18–74 Years — Five Provinces, China, 2023

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Summary

What is already known about this topic?

Vaginitis is a prevalent and treatable gynecological condition in women that is associated with adverse reproductive outcomes, human papillomavirus (HPV) infection, and elevated human immunodeficiency virus (HIV) transmission risk.

What is added by this report?

This study identifies elevated infection risks among women aged 35–54 years, those with three or more pregnancies, and individuals who smoke or consume alcohol, with notably higher prevalence rates in Hubei and Yunnan Provinces. The findings demonstrate that awareness of cervical cancer screening serves as a protective factor, while emphasizing screening's crucial role in early vaginitis detection.

What are the implications for public health practice?

Public health interventions should prioritize women aged 35–54 years, those with multiple pregnancies, and individuals engaging in high-risk behaviors. Enhancing cervical cancer screening awareness and accessibility is essential for improving early detection and management of vaginal infections, thereby reducing reproductive health disparities.

Vaginitis, a prevalent infectious gynecological condition, is primarily caused by bacterial pathogens, *Trichomonas vaginalis*, and *Candida* species. While highly treatable, it exhibits significant incidence and recurrence rates (1). Chronic infections can adversely affect menstrual health, fertility, and pregnancy outcomes, impacting women's physical and mental well-being, quality of life, and intergenerational health (2–3). Despite these implications, comprehensive epidemiological data on vaginitis remains limited. A large-scale survey across five provinces, encompassing 37,353 participants, revealed a vaginitis prevalence of 32.2% (12,029 cases), with 88.8% of affected individuals seeking treatment from professional medical institutions. The highest prevalence was

observed among women aged 35–54 years and those reporting poor self-rated health, indicating a substantial disease burden. Notably, awareness of cervical cancer screening policies emerged as a potential protective factor against vaginitis. Conversely, women who participated in screenings for common gynecological diseases demonstrated higher vaginitis prevalence, suggesting that screening programs facilitate improved detection and diagnosis. These findings underscore the importance of enhancing health literacy and implementing targeted interventions for both prevention and early detection of gynecological conditions to advance women's health outcomes.

A cross-sectional survey was conducted in July 2023 across five provinces (Sichuan, Yunnan, Hubei, Fujian, and Shandong), selected from western, central, and eastern China and successful implementation of women's health screening programs. Using multi-stage stratified random sampling, 12 communities or villages were selected from each province, yielding 60 study sites. Local grid managers, who possessed detailed knowledge of resident populations, were trained as surveyors and administered questionnaires to women aged 18–74 years after obtaining informed consent. The structured online questionnaire captured data on sociodemographic characteristics, behavioral habits, self-rated health status, awareness of screening policies, and participation in common disease screenings. Vaginitis cases were identified through participant-reported clinical diagnoses from medical institutions. From 37,917 collected questionnaires, 37,353 were deemed valid (98% validity rate) after excluding duplicates and low-quality responses.

Statistical analysis comprised descriptive statistics for variable characterization and chi-squared tests to evaluate associations between biobehavioral factors and vaginitis infection. Variables demonstrating significance ($P < 0.01$) in chi-squared analysis, along with demographic variables, were incorporated into multivariable logistic regression models to control for potential confounding factors. To ensure robust

assessment of factor impacts on vaginitis infection, two sensitivity analysis models were developed: Model 1 analyzed diagnosed vaginitis cases ($n=12,029$) as the outcome variable, while Model 2 focused on cases treated at professional medical institutions ($n=10,682$). All analyses were performed using RStudio (version 2023.06.2+561, Posit, PBC, Boston, MA, USA).

Among the study participants, 54% were urban residents (Table 1). The sample demonstrated broad representation across educational backgrounds, occupations, and income levels. Based on established research, data collection encompassed pregnancy history, smoking status, alcohol consumption, physical and mental health status, awareness of cervical cancer screening policies, and participation in women's common disease screening programs. Chi-squared analyses revealed significant associations ($P<0.001$) between all examined factors and vaginitis prevalence. Sensitivity analysis using Model 2 (patients receiving professional treatment) validated the findings from Model 1 (diagnosed vaginitis cases).

Figure 1 presents the multivariable logistic regression analysis results. Women aged 35–54 years demonstrated a moderately elevated risk of vaginal infections compared to those aged 18–34 years [odds ratio (OR)=1.183, 95% confidence interval (CI): 1.109, 1.262]. After covariate adjustment, women aged 55–74 showed reduced risk relative to the 18–34 age group (OR=0.851, 95% CI: 0.767, 0.944). Infection rates were significantly higher among women from Hubei and Yunnan provinces compared to Shandong Province. Married status was associated with increased infection risk (OR=1.17, 95% CI: 1.062, 1.29). A strong dose-response relationship emerged between pregnancy number and infection risk, with women reporting three or more pregnancies showing the highest risk (OR=4.835, 95% CI: 4.255, 5.495). Both smoking (OR=1.186, 95% CI: 1.036, 1.357) and alcohol consumption (OR=1.606, 95% CI: 1.52, 1.697) emerged as significant risk factors. Additionally, participants reporting poor physical and mental health status demonstrated substantially higher infection rates compared to those reporting good health.

After controlling for confounding variables, awareness of cervical cancer screening policies emerged as a protective factor against vaginal infections (OR=0.922, 95% CI: 0.856, 0.993). Women with familial cervical cancer history showed increased infection susceptibility (OR=1.677, 95% CI: 1.274, 2.207). Notably, cervical screening participation was associated with significantly higher infection detection

rates compared to non-participation (OR=2.170, 95% CI: 2.033, 2.315). Higher infection prevalence was observed among women who participated in gynecological disease screening, particularly those who accessed paid screening services or both paid and free screening programs. Even participants utilizing only free screening services showed elevated infection rates compared to non-participants. Sensitivity analysis (Figure 2) demonstrated consistent epidemiological patterns between diagnosed cases and treated patients, with risk factor associations remaining stable across both analytical models.

DISCUSSION

While existing vaginitis research predominantly focuses on clinical diagnostics and treatment (4), this study provides comprehensive epidemiological data on vaginitis among Chinese women, revealing a prevalence rate of 32.2%. Since the study included only clinically confirmed cases, undiagnosed infections may have been overlooked, potentially underestimating the true prevalence and suggesting an even greater disease burden. Evidence indicates a potential association between vaginitis and cervical cancer, characterized by shared risk factors and frequent co-occurrence (5–6). China's cervical cancer screening program incorporates comprehensive gynecological examinations, including medical history assessment, external and vaginal examinations, pelvic examinations, and vaginal discharge analysis, effectively integrating vaginitis detection into routine health assessments. Our findings identify women aged 35–54 as a high-risk group for vaginitis, aligning with China's cervical cancer screening program's target age range of 35–64 years. While experts advocate for expanding screening to younger and older age groups to address broader health needs, current resource constraints necessitate focusing on high-risk populations, a strategy supported by our findings.

Women aged 18–34 represent a particularly vulnerable population for vaginitis, often experiencing stigma and hesitancy toward gynecological consultations, resulting in delayed care-seeking behavior (7). Limited reproductive health knowledge frequently leads to inappropriate hygiene practices, either insufficient or excessive, disrupting vaginal microbiota and increasing infection risk (8). Given the rising prevalence in this demographic, local governments should consider prioritizing screening programs to enhance awareness and promote

TABLE 1. Characteristics of women with vaginitis aged 18–74 years in five provinces, China (N=37,353).

Characteristics	Total	Model_1_Vaginitis Diagnosis Model		P	Model_2_Medical Institution Treatment Model		P
		Disease group (%) n=12,029	Non-disease group (%) n=25,324		Disease group (%) n=10,682	Non-disease group (%) n=26,671	
Age (year)				<0.001			<0.001
18–34	13,641	23.1	42.9		23.8	41.6	
35–54	19,902	67.3	46.6		67.0	47.8	
55–74	3,810	9.6	10.5		9.3	10.6	
BMI (kg/m ²)				<0.001			<0.001
<18.5	2,691	4.3	8.6		4.5	8.3	
18.5–24	26,399	71.7	70.2		71.9	70.2	
24–28	7,047	20.7	18.0		20.5	18.2	
≥28	1,216	3.2	3.3		3.1	3.3	
Region				<0.001			<0.001
Shandong	7,933	17.3	23.1		16.6	23.1	
Fujian	7,235	16.2	20.9		16.8	20.4	
Hubei	6,945	23.8	16.1		23.7	16.5	
Sichuan	7,565	20.2	20.3		20.2	20.3	
Yunnan	7,675	22.4	19.6		22.7	19.7	
Area type				<0.001			<0.001
Rural	16,976	43.8	46.2		42.8	46.5	
Urban	20,377	56.2	53.8		57.2	53.5	
Marital Status				<0.001			<0.001
Unmarried	7,748	9.1	26.3		8.9	25.5	
Married	29,605	90.9	73.7		91.1	74.5	
Education background				<0.001			<0.001
Bachelor and above	8,658	19.2	25.1		20.1	24.4	
Junior college	8,095	20.6	22.2		21.1	21.9	
High school	7,785	23.2	19.7		23.2	19.9	
Middle school	9,946	29.7	25.2		28.7	25.8	
Primary school	2,869	7.3	7.9		6.9	8.0	
Career				<0.001			<0.001
Government officials	6,451	18.5	16.7		19.0	16.6	
Private enterprise personnel	2,948	8.4	7.7		8.6	7.6	
Managers in non-civil service system	1,552	4.7	3.9		4.7	3.9	
Individual Merchants/freelancers	11,593	31.1	31.0		31.5	30.8	
Farmers/migrant workers	8,813	23.8	23.5		22.8	23.9	
Unemployed	3,165	9.2	8.1		9.2	8.2	
Retired	464	1.9	0.9		1.8	1.0	
Student	1,765	0.7	6.6		0.6	6.4	
Other	602	1.7	1.6		1.7	1.6	
Annual household income				<0.001			<0.001
<30 thousand	16,339	41.6	44.8		40.2	45.2	
30–80 thousand	12,596	34.8	33.2		35.2	33.1	
≥80 thousand	8,418	23.6	22.0		24.5	21.7	

Continued

Characteristics	Total	Model_1_Vaginitis Diagnosis Model			Model_2_Medical Institution Treatment Model		
		Disease group (%) n=12,029	Non-disease group (%) n=25,324	P	Disease group (%) n=10,682	Non-disease group (%) n=26,671	P
Number of pregnancies				<0.001			<0.001
0	7,430	5.1	26.9		5.1	25.8	
1–2	20,404	55.4	54.3		55.3	54.4	
≥3	9,519	39.5	18.8		39.5	19.9	
Smoking				<0.001			<0.001
No	36,079	96.0	96.9		96.0	96.8	
Yes	1,274	4.0	3.1		4.0	3.2	
Drinking				<0.001			<0.001
No	25,893	61.2	73.2		60.9	72.7	
Yes	11,460	38.8	26.8		39.1	27.3	
Self-assessed physical health				<0.001			<0.001
Good	25,204	55.8	73.0		56.1	72.0	
Ordinary	11,248	40.5	25.2		40.2	26.1	
Poor	901	3.7	1.8		3.6	1.9	
Self-assessed mental health				<0.001			<0.001
Good	28,349	68.1	79.6		68.2	79.0	
Ordinary	8,357	29.5	19.0		29.5	19.5	
Poor	647	2.4	1.4		2.3	1.5	
Family cancer status				<0.001			<0.001
No	37,090	98.9	99.5		98.8	99.5	
Yes	263	1.1	0.5		1.2	0.5	
Aware of cervical cancer screening policies							
No	6,601	14.1	19.4		13.8	19.2	
Yes	30,752	85.9	80.6		86.2	80.8	
Participated in cervical examination							
No	14,664	19.5	48.7		18.7	47.5	
Yes	22,689	80.5	51.3		81.3	52.5	
Participated in examinations for common women's diseases				<0.001			<0.001
Never participated	8,650	10.7	29.1		10.4	28.2	
Free inspection	5,469	10.7	16.5		10.4	16.4	
Inspection at own expense	4,647	16.1	10.7		16.4	10.9	
Self-paid & free	18,587	62.5	43.7		62.8	44.5	

Note: P-values are from Pearson chi-square tests.

Abbreviation: BMI=body mass index.

preventive behaviors. Moreover, married women with multiple pregnancies, particularly those with three or more, require special attention due to the significant impact of maternal health on both individual well-being and future generations, emphasizing the necessity for targeted health education initiatives (9).

This study demonstrated that poor physical and mental health status significantly increased vaginitis risk, emphasizing the interconnected nature of systemic

and reproductive health (10). Risk-associated behaviors, including smoking and alcohol consumption, were linked to higher infection rates (8). The presence of familial cervical cancer history suggested potential genetic or shared environmental influences on vaginal health susceptibility. Notable regional variations in prevalence, likely attributable to environmental factors and healthcare policy differences, underscore the necessity for geographically

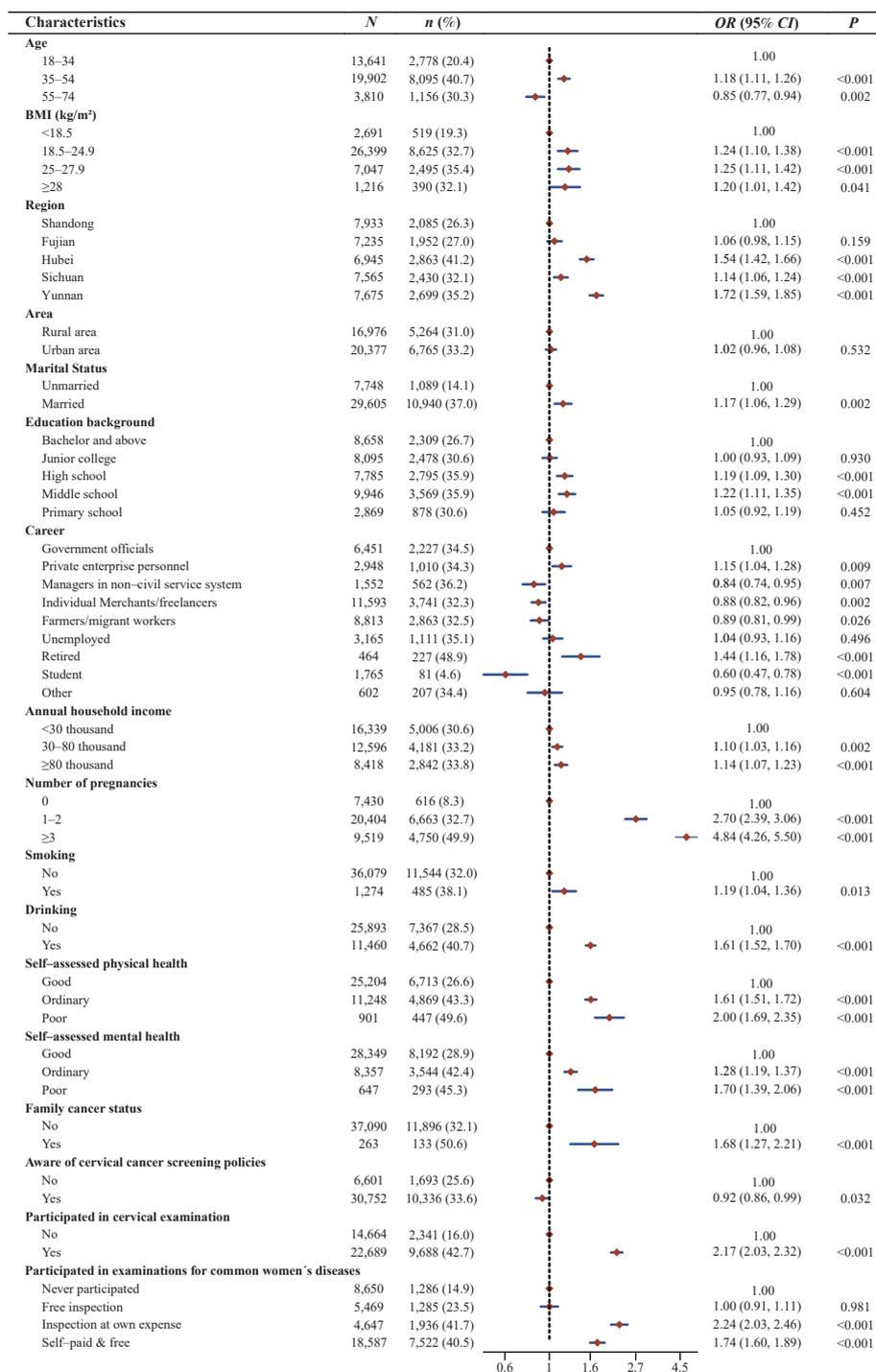


FIGURE 1. Multivariable logistic regression analysis of vaginitis epidemiology among women aged 18–74 years across five provinces in China ($N=37,353$, $n=12,029$).

Abbreviation: OR=odds ratio; CI=confidence interval; BMI=body mass index.

tailored gynecological healthcare interventions.

The findings indicate that cervical cancer screening policies may serve as an effective mechanism for enhancing women's health literacy, contributing to improved awareness and detection of both vaginitis and other gynecological conditions. The higher

incidence rates observed among women participating in gynecological screening programs highlight these initiatives' crucial role in early detection and clinical management. These results emphasize that regular screening programs represent a fundamental strategy for both vaginitis prevention and comprehensive

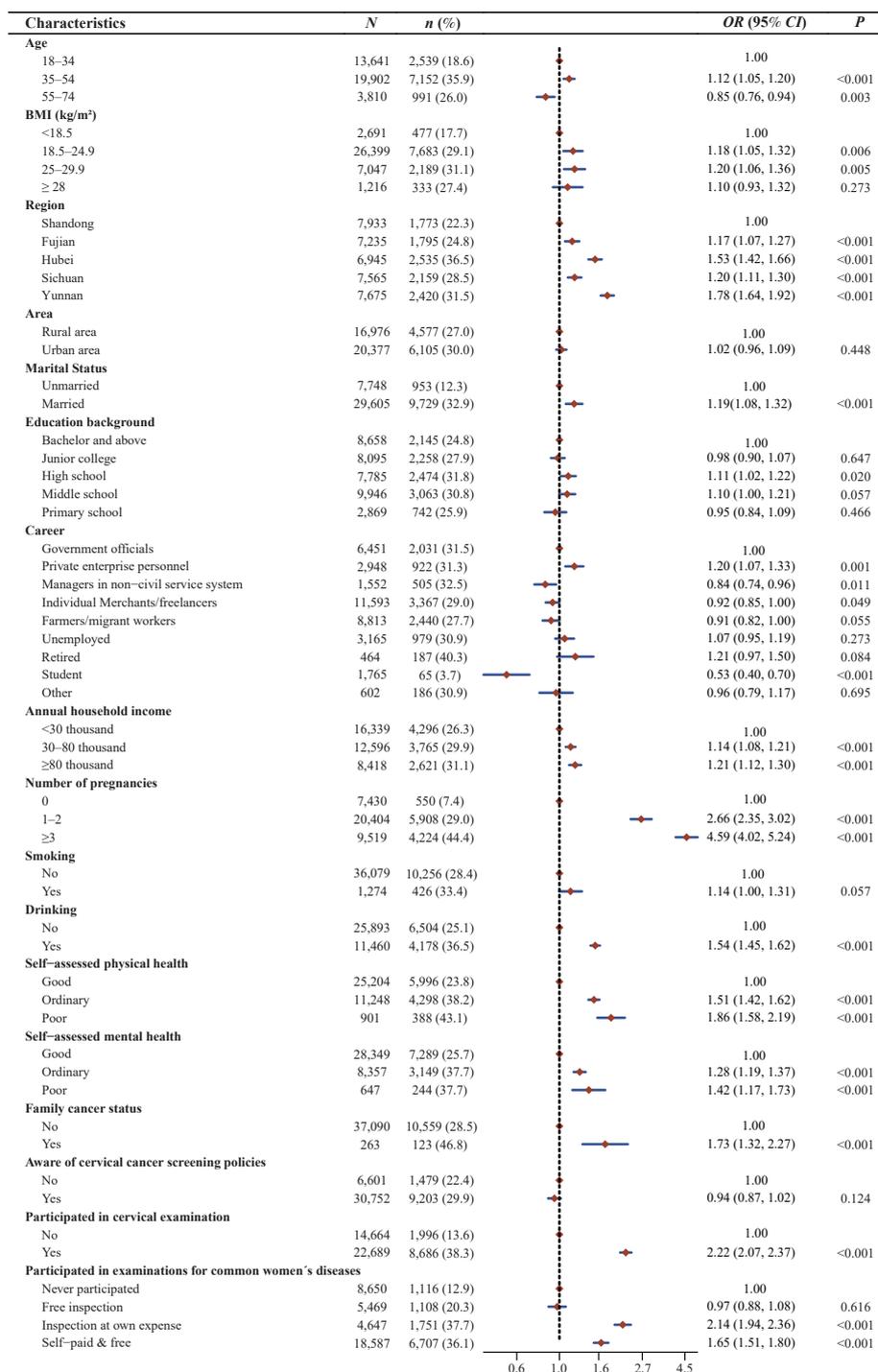


FIGURE 2. Multivariable logistic regression analysis of vaginitis cases treated in professional medical institutions among women aged 18–74 years across five provinces in China ($N=37,353$, $n=10,682$). Abbreviation: OR=odds ratio; CI=confidence interval; BMI=body mass index.

reproductive health improvement.

This study has several limitations. First, the absence of detailed classifications by vaginitis type and severity may limit the specificity of our findings. Second, the cross-sectional design precludes definitive causal inferences. Third, data collection constraints prevented

recording the precise timing of infections, potentially introducing temporal bias. Longitudinal studies are needed to elucidate temporal relationships and establish causality.

This investigation advances the epidemiological understanding of vaginitis while demonstrating the

significant role of cervical cancer screening policies in disease prevention and management. The integration of regular screenings, encompassing both cervical cancer and common gynecological examinations, is crucial for early detection of conditions like vaginitis. National health policies should maintain cervical cancer screening as a priority while expanding its scope to include surveillance and management of common gynecological conditions. To address regional healthcare disparities and improve women's health outcomes, enhanced disease surveillance systems are essential. Furthermore, targeted health education initiatives should focus on high-risk reproductive-aged women and populations with lower educational or employment levels. These comprehensive strategies are fundamental to achieving equitable reproductive healthcare and improving overall women's health outcomes.

Conflicts of interest: No conflicts of interest.

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