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Health literacy levels on cervical cancer among Chinese women: A systematic review and meta-analysis

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ADMINISTRATIVE INFORMATION

Support - None.

Review Stage at time of this submission - Piloting of the study selection process.

Conflicts of interest - None declared.

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Amendments - This protocol was registered with the International Platform of Registered Systematic Review and Meta-Analysis Protocols (INPLASY) on 3 January 2025 and was last updated on 3 January 2025.

INTRODUCTION

Review question / Objective In 2020, cervical cancer was the fourth most common cancer among women worldwide, with 604, 000 new cases and 342, 000 deaths. China bears nearly one-fifth of the global burden, with age-standardized incidence and mortality rates of 11.35 and 3.42 per 100, 000, respectively. Despite the WHO's 2020 global strategy to eliminate cervical cancer, including targets for HPV vaccination, screening, and treatment by 2030, China faces significant challenges due to low HPV vaccination rates (2.24% in 2020) and insufficient screening coverage (25.7% among women aged 20–64 in 2015). Barriers include economic factors, geographic access, and limited awareness. Health literacy, encompassing knowledge, attitudes, and behaviors, is critical for improving prevention efforts. However, studies assessing cervical cancer health literacy in China, including knowledge of screening and HPV vaccination, remain limited.

This review aims to systematically evaluate the cervical cancer health literacy of Chinese women. Key questions include:

1. What is the current level of knowledge, attitudes, and behaviors regarding cervical cancer prevention among Chinese women?
2. How does cervical cancer health literacy influence screening uptake and HPV vaccination rates?
3. What interventions can enhance cervical cancer health literacy and improve prevention outcomes in China?

Condition being studied Cervical cancer is the fourth most common cancer among women globally, with 604, 000 new cases and 342, 000 deaths in 2020. It is caused primarily by persistent infection with high-risk human papillomavirus (HPV) types. The disease disproportionately affects women in developing countries, including China, which accounts for nearly one-fifth of the global burden. Despite advances in prevention, such as HPV vaccination and screening, China faces

significant challenges due to low vaccination rates (2.24% in 2020) and insufficient screening coverage. Cervical cancer health literacy, encompassing knowledge, attitudes, and preventive behaviors, plays a critical role in improving prevention and early detection efforts.

METHODS

Participant or population Women aged ≥ 18 years in mainland China, excluding cervical cancer patients, pregnant women, and healthcare professionals.

Intervention The exposures to be reviewed are cervical cancer health literacy components, defined as: 1. Knowledge: Women's understanding of cervical cancer, including risk factors, symptoms, prevention strategies (such as HPV vaccination and screening), and treatment options. 2. Attitudes: Women's perceptions and beliefs about cervical cancer screening, the benefits of early detection, and willingness to receive HPV vaccination. This includes their acceptance and trust in related health interventions and services. 3. Preventive behaviors: Actions undertaken to prevent cervical cancer, specifically the uptake of cervical cancer screening (e.g., Pap smear and HPV testing) and HPV vaccination. This review focuses on studies assessing these three components in women aged ≥ 18 years in mainland China to evaluate their cervical cancer health literacy comprehensively.

Comparator As this review primarily synthesizes cross-sectional prevalence rates such as awareness rates, uptake of HPV vaccination, and cervical cancer screening rates, direct comparators or control groups are not applicable.

Study designs to be included Quantitative studies, including cross-sectional and observational studies with rigorous data designs conducted in mainland China.

Eligibility criteria Inclusion Criteria: Women aged ≥ 18 years in mainland China. Studies reporting cervical cancer-related knowledge, attitudes, and preventive behaviors. Studies with sufficient data to report key indicators: knowledge awareness rates, proportions of positive attitudes, cervical cancer screening rates, and HPV vaccination rates. Original research conducted in mainland China with reliable data and rigorous design. Exclusion Criteria: Case reports, reviews, and qualitative studies.

Non-original research, studies without full text, or those outside the scope of the geographic (non-mainland China) or linguistic (non-English/Chinese) focus.

Studies targeting specific populations, such as cervical cancer patients, pregnant women, or healthcare professionals.

Studies with design bias, poor data quality, or incomplete datasets.

Information sources We conducted a comprehensive search of PubMed, Web of Science, PsycINFO, CINAHL, China National Knowledge Infrastructure (CNKI), Wanfang Data, and China Science and Technology Journal Database in both English and Chinese, covering the period from January 1, 2016, to December 10, 2024. This timeframe was selected as HPV vaccines were first introduced in mainland China in 2016. The search strategy combined broad search terms and Medical Subject Headings (MeSH), including keywords such as "cervical cancer," "cervical cancer screening," "knowledge," "attitude," and "HPV vaccine." Boolean operators (AND, OR) were applied to refine and combine these terms. The detailed search strategy is provided in Supplementary Table X. Additionally, we manually reviewed the reference lists of relevant studies and systematic reviews to identify any additional eligible studies missed during the database search.

Main outcome(s)

1. Awareness rate of cervical cancer knowledge: Participants' understanding of cervical cancer, including prevention and treatment. It is measured using a questionnaire, with the awareness rate defined as the proportion of participants scoring above a predefined threshold.

2. Proportion of women with positive attitudes: Proportion of women with favorable perceptions towards cervical cancer screening and HPV vaccination. Cervical cancer screening rate: Proportion of women who have undergone cervical cancer screening (e.g., Pap smear or HPV test).

3. HPV vaccination rate: Proportion of women who have received the HPV vaccine.

Quality assessment / Risk of bias analysis The methodological quality of the included studies was independently assessed by two reviewers (C.C.H. and Z.Y.L), with discrepancies resolved through discussion with a third reviewer (J.M.). The Joanna Briggs Institute (JBI) Critical Appraisal Checklist for Analytical Cross-Sectional Studies was used, comprising eight items evaluating participant selection, exposure and outcome measurement,

confounding factors, and data analysis. Each item was rated as "yes," "no," "unclear," or "not applicable." Studies were categorized as high quality (5 "yes" responses), moderate quality (3–5 "yes" responses), or low quality (3 "yes" responses).

Strategy of data synthesis The primary outcome measures were assessed for normality using five transformation methods: raw rates, logarithmic, logit, arcsine, and Freeman-Tukey double arcsine transformations. Pooled estimates of cervical cancer-related knowledge awareness, positive attitudes, screening rates, and HPV vaccination rates, along with their corresponding 95% confidence intervals (CIs), were calculated. Heterogeneity across studies was evaluated using the I^2 statistic. A fixed-effects model was applied when $I^2 \leq 50\%$, while a random-effects model was used for $I^2 > 50\%$. Publication bias was assessed using funnel plots and quantitatively tested with Egger's test. Sensitivity analyses were performed to evaluate the stability and reliability of the results. All statistical analyses were conducted using R software (version 4.2.2), with statistical significance set at $P < 0.05$. For data that cannot be pooled in meta-analysis, a narrative synthesis will be used to summarize findings, providing a qualitative description of patterns, trends, and differences across studies.

Subgroup analysis

Rationale: Subgroup analysis will be conducted to investigate potential variations in cervical cancer-related knowledge, attitudes, and preventive behaviors (screening or HPV vaccination) across different demographic and contextual factors. These analyses aim to identify disparities and determinants that influence health literacy and behaviors, providing insights for targeted interventions and policies.

Subgroup definitions:

1. Geographic region: Urban versus rural populations to assess differences in access to healthcare and awareness levels.
2. Age groups: Women aged 18–30 years, 30–50 years, and 50 years to examine differences in knowledge, attitudes, and behaviors by life stage.
3. Educational level: Participants with low, medium, and high educational attainment to explore how education influences cervical cancer health literacy.
4. Socioeconomic status (SES): Based on income or occupation to assess SES as a barrier or enabler of screening and vaccination.

Planned analytic approach:

1. Meta-regression: To examine the influence of subgroup variables (e.g., age, education, SES) on pooled prevalence rates of outcomes.
2. Tests of interaction: To assess statistical differences in effects between subgroups.
3. Sensitivity analysis: To ensure robustness of results across different subgroups.

All statistical analyses will be conducted using R software (version 4.2.2), with heterogeneity assessed using the I^2 statistic and subgroup effects presented with corresponding 95% confidence intervals.

Sensitivity analysis Sensitivity analysis will evaluate the robustness and reliability of the pooled estimates for cervical cancer-related knowledge, attitudes, screening rates, and HPV vaccination rates. To ensure consistency, primary outcomes will undergo various transformations (e.g., raw rates, logarithmic, logit, arcsine, and Freeman-Tukey double arcsine), and both fixed- and random-effects models will be applied depending on heterogeneity levels ($I^2 \leq 50\%$ for fixed-effects, $I^2 > 50\%$ for random-effects). The influence of individual studies will be assessed through leave-one-out analysis, while subgroup analyses (e.g., geographic region, age, education, and socioeconomic status) will test for variations across different populations. Publication bias will be evaluated using funnel plots and adjusted with trim-and-fill methods if necessary. All analyses will be conducted using R software (version 4.2.2) to ensure accuracy and reliability.

Country(ies) involved China.

Keywords Cervical cancer health literacy; Knowledge, attitude, and practice (KAP); HPV vaccination; Cervical cancer screening.

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