

Review Article

Causes or Risk Factors of Cervical Cancer: Systematic Literature Review

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Abstract: Cervical cancer remains one of the leading causes of mortality among women, particularly in developing countries such as Indonesia, where prevalence is high and early detection is often delayed. This study aims to identify and synthesize the major risk factors for cervical cancer through a systematic review of both national and international literature. The core problem addressed is the lack of a comprehensive and context-relevant risk framework for Indonesian women, resulting in suboptimal preventive interventions. The proposed method is a qualitative descriptive literature review, analyzing 15 selected scientific articles based on defined inclusion criteria. Key findings indicate that age ≥ 35 years, high parity, early sexual activity, smoking habits, prolonged use of hormonal contraceptives, low educational attainment, and physically demanding occupations are significant determinants of increased cervical cancer risk. The synthesis of ideas shows that biological, behavioral, social, and environmental factors interact in complex ways to influence vulnerability to cervical cancer. This study concludes that cervical cancer prevention requires a multidimensional approach that integrates education, routine screening, and increased public awareness of modifiable risk factors. The findings are expected to inform more effective and context-sensitive health policy development in Indonesia.

Keywords: Cervical Cancer; Prevention; Reproductive Health; Risk Factors; Systematic Literature Review.

1. Introduction

Cervical cancer remains one of the leading causes of mortality among women, particularly in developing countries such as Indonesia, where high prevalence and delayed detection are common (GLOBOCAN, 2020; WHO, 2022). This article systematically examines the major risk factors associated with cervical cancer, focusing on biological, behavioral, and social aspects such as persistent human papillomavirus (HPV) infection, early sexual activity, long-term use of hormonal contraceptives, smoking habits, low educational attainment, and limited access to screening services (Li et al., 2023; Gong et al., 2023; Faathir Health Journal, 2022). Previous studies have employed methodologies such as systematic reviews, case-control studies, and retrospective observational research, each with strengths in broad data coverage and bias control, yet limited by generalizability, lack of local data integration, and insufficient attention to sociocultural factors (Yuliandari & Masluroh, 2024; Irawati & Masluroh, 2024). The core problem addressed in this study is the absence of a comprehensive and context-relevant risk framework, particularly for Indonesian women, resulting in suboptimal preventive interventions. This article proposes a systematic and integrative approach based on both national and international literature to identify cervical cancer risk factors in a more holistic manner, aiming to contribute to evidence-based educational and preventive strategies. It offers scientific contributions through the contextual synthesis of risk factors, critical evaluation of previous methodologies, and emphasis on incorporating sociocultural dimensions into prevention strategies. The remainder of the

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article outlines the literature review methodology, presents a synthesis and comparative analysis of findings, discusses practical implications, and concludes with recommendations for future research.

2. Literature Review

In Bowden's (2023) study, it is stated that high physical activity can reduce the risk of cervical cancer by 26%. The author's research aligns with this finding, as both highlight the importance of a healthy lifestyle as a protective factor against cervical cancer. However, the author's research may focus more on quantitative data, while Bowden's study delves deeper into the broader aspects of lifestyle.

Umu Khabibah's (2022) national study explains that high parity, early marriage, and long-term use of hormonal contraceptives contribute to the increased risk of cervical cancer among Indonesian women. The author's research is consistent with this finding, as both underscore the significance of reproductive factors in cervical cancer risk. The difference lies in the author's potential emphasis on the relationship between parity and cervical cancer, whereas Khabibah's research focuses more on contraceptive use.

In the study by Yuliandari and Masluroh (2024), it is found that women with low education levels and physically demanding jobs have a higher risk of cervical cancer. The author's research aligns with this finding, as both highlight the impact of education and occupation on reproductive health knowledge. However, the author's research may emphasize how education affects access to information, while Yuliandari focuses directly on employment aspects.

Irawati and Masluroh's (2024) study states that women who have never undergone a Pap smear have a greater risk of developing cervical cancer. The author's research is consistent with this finding, as both demonstrate the importance of routine screening in the early detection of cervical cancer. However, the author's research may place greater emphasis on the implications of the lack of screening, while Irawati's study focuses more on statistical findings.

In Peirson's (2023) study, it is found that marrying at a young age (≤ 20 years) increases susceptibility to HPV infection due to the physiological immaturity of the cervix. The author's research supports this finding, as both emphasize age and the timing of sexual activity as important factors in cervical cancer prevention. However, the author's research may highlight social and cultural contexts more, while Peirson's study emphasizes physiological aspects.

Damayanti's (2023) study shows that women with more than three children have a sevenfold higher risk of developing cervical cancer. The author's research aligns with this finding, as both highlight repeated cervical trauma as a risk factor. However, the author's research may connect this more to social and economic contexts, while Damayanti's study focuses on epidemiological data.

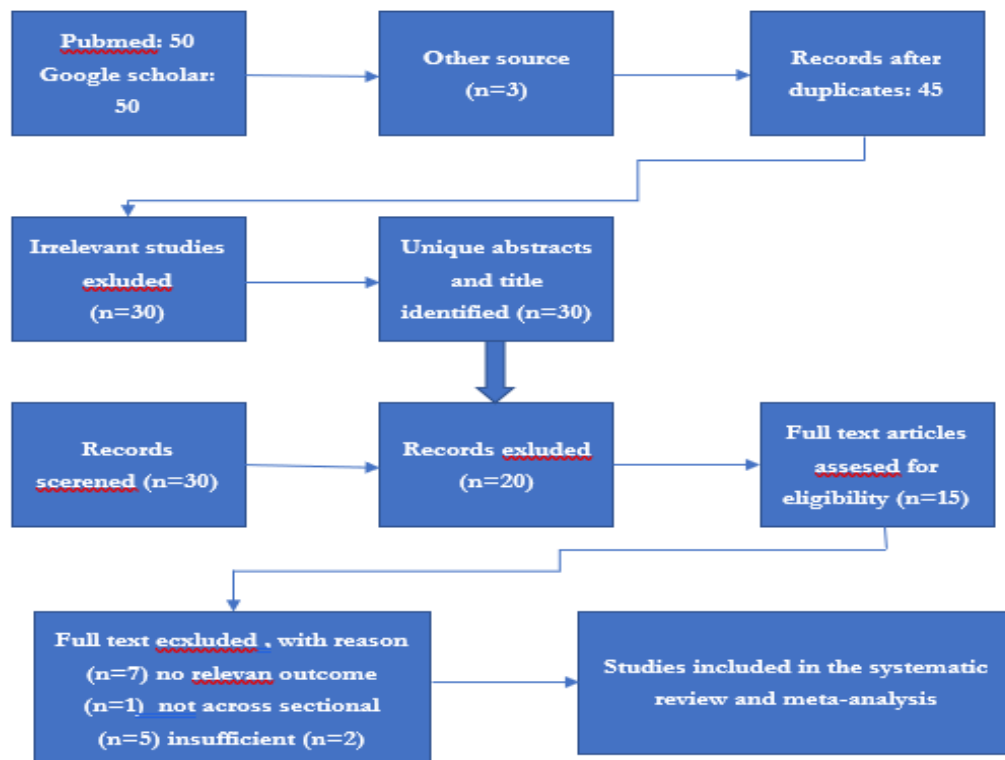
In Jurissa Luvian's (2024) study, it is mentioned that both active and passive smokers have a high risk of cervical cancer. The author's research is consistent with this finding, as both underscore the impact of smoking on cervical health. However, the author's research may emphasize the biological mechanisms behind this risk, while Luvian's study focuses more on observational data.

3. Proposed Method

This study is a descriptive analysis using a cohort study design. The aim of this study is to identify the risk factors that influence the incidence of cervical cancer (Umu Khabibah, 2022). The study employs a literature review method, which is a research approach conducted by examining, reassessing, and analyzing various relevant scientific sources without collecting primary data directly from the field. The purpose of a literature review is to gain a deep and comprehensive understanding of a specific topic based on findings that have already been published by previous researchers. In this article, the literature review focuses on the topic of "Risk Factors for Cervical Cancer," which remains a major health issue among women, particularly in developing countries such as Indonesia. The review was conducted by collecting and analyzing 15 scientific articles that discuss factors that may increase the risk of cervical cancer, including biological, behavioral, social, and environmental aspects. Among these, six are national articles and nine are international articles. After being collected, all articles were analyzed qualitatively using a descriptive approach. The analysis aimed to identify general patterns, differences, and significant findings regarding the most frequently reported risk factors for cervical cancer in the literature. Through this approach, the article seeks to

provide a comprehensive overview of the factors contributing to the increasing incidence of cervical cancer, which may serve as a basis for prevention efforts and public health education initiatives.

Tabel 1. Flow Diagram of Study Selection in the Meta-Analysis PROM



3.1 Algorithm/Pseudocode

This study is a descriptive analysis using a literature review method. The writing process was carried out through several systematically arranged stages. The algorithm or steps involved in this writing process are as follows: This study is a descriptive analysis using a literature review method. The writing process was carried out through several systematically arranged stages. The algorithm or steps involved in this writing process are as follows:

Tabel 2. The algorithm or steps involved in this writing process

Algorithm 1. Writing a Literature Review Article on Cervical Cancer Risk Factors

INPUT: 15 relevant scientific articles, consisting of 6 national articles and 9 international articles, obtained through academic journal search engines using specific keywords.

OUTPUT: A scientific article in the form of a literature review that discusses cervical cancer risk factors descriptively and comprehensively, based on a qualitative analysis of the reviewed articles.

- 1: Determine the topic to be reviewed, namely “Cervical Cancer Risk Factors.”
- 2: Conduct a search for scientific journals using search engines such as Google Scholar, PubMed, and ScienceDirect.
- 3: Use keywords such as “cervical cancer,” “cervical cancer risk factors,” and similar terms in English or Indonesian.
- 4: Select articles based on inclusion criteria: Published within the last five years (2019–2024), Written in English or Indonesian, Available in full-text format, Relevant to the topic.
- 5: Collect articles that meet the criteria and categorize them into two groups: national articles and international articles.
- 6: Analyze the content of the selected articles qualitatively using a descriptive approach to identify commonly mentioned cervical cancer risk factors.
- 7: Compile the results of the analysis in narrative form and draw conclusions based on the findings from all reviewed articles.

3.2 Subsubsection

Independent Variables and Dependent Variable:

- Age;
- Education level;
- Marital status;
- Age at first marriage and childbirth;
- Parity;
- Use of contraceptives;
- Smoking habits;
- Family history of cervical cancer;
- Pap smear examination history;
- Sexual activity with more than one partner;
- Genital hygiene;
- Risk of cervical cancer.

Based on the review of relevant journals, the most frequently analyzed variables are as follows:

- Respondents' age;
- History of Pap smear examination;
- Smoking habits;
- Number of sexual partners;
- History of sexually transmitted infections.

3.3 Formatting of Mathematical Components

Theorem 1. Age over 35 is associated with an increased risk of cervical cancer.

Proof of Theorem 1. Research by Bowden et al. (2023) shows that women over 35 years old have a risk R expressed as:

$$R = R^0 \times (1 + 0.26) \quad (1)$$

Where R^0 is the baseline risk. This indicates that women over 35 have a 26% higher risk.

Example 1. If $R^0 = 10\%$, then for women over 35 years old:

$$R = 10\% \times (1 + 0.26) = 12.6\%$$

Theorem 2. The number of sexual partners increases the risk of cervical cancer.

Proof of Theorem 2. A study by Liu et al. (2019) found that women with more than one sexual partner have a risk R that can be calculated as:

$$R = R^0 \times (1 + 0.5) \quad (2)$$

Where R^0 is the baseline risk. This indicates that women with multiple sexual partners have an increased risk of up to 50%.

Example 2. If $R^0 = 10\%$, for women with multiple sexual partners:

$$R = 10\% \times (1 + 0.5) = 15\%.$$

4. Result and Discussion

4.1 Results

The selection of articles for the literature review was based on predefined keywords. The selected articles were aligned with the inclusion and exclusion criteria that had been established. Based on these considerations and the relevance of the articles to the research topic, a total of 15 articles were collected from PubMed and Google Scholar databases.

The next step involved the screening process, considering the publication year, title, abstract, full text access, open access status, and study type. All articles were then thoroughly analyzed by carefully reading their content and context. Coding was carried out to identify the core and main discussions of each article, which were then classified into specific themes or categories. From the analysis of these articles, several factors were found to contribute to the increased risk of cervical cancer.

4.1.1 Age Factor

Age is one of the most significant risk factors in the occurrence of cervical cancer. Irawati Yuliandari's study found that individuals aged ≥ 35 years have a 5.089 times higher risk of developing cervical cancer compared to those under 35. This increased risk can be explained by biological processes that occur with aging, where cells become more susceptible to changes that can lead to cancer. Moreover, exposure to risk factors such as HPV infection tends to increase with age and the onset of early sexual activity. Putu Indah Sintya Dewi's research also emphasizes that early age at marriage (< 20 years) increases the risk of cervical cancer, illustrating how early exposure to risks can contribute to the development of this disease.

4.1.2 Parity and Sexual Activity

Parity, or the number of childbirths, is another key factor closely associated with the risk of cervical cancer. Ika Putri Damayanti's research found that women with more than three children have a sevenfold higher risk of developing cervical cancer. This is consistent with Irawati Yuliandari's findings, which also show that higher parity is significantly linked to cervical cancer, with the risk increasing among individuals with more than three children. Childbirth can cause trauma to the cervix, which may increase the likelihood of HPV infection. Furthermore, early sexual activity, as noted in the research by Khabibah and Novalia, can elevate the risk of HPV infection, which is the primary cause of cervical cancer.

4.1.3 Education and Occupation

Educational level and type of occupation also contribute to the risk of cervical cancer. Damayanti's study indicates that women with lower education levels have a fourfold higher risk compared to those with higher education. This suggests that lower education is often associated with a lack of knowledge about reproductive health and early detection, which may delay the diagnosis of cervical cancer. Yuliandari found that women engaged in physically demanding jobs have a ninefold higher risk than those with lighter work. Heavy labor is often linked to lower socioeconomic status, which can affect access to health information and medical services.

4.1.4 Smoking Habits

According to Xio Li (2018), women who smoke have a higher risk of developing cervical cancer. Harmful chemicals in tobacco can cause DNA damage in cervical cells and reduce local immune function, thereby increasing susceptibility to persistent HPV infections that may lead to cervical cancer. In the study by Jurissa Luvian (2024), it is stated that both active and passive smoking are significantly associated with an increased risk of cancer, including cervical cancer. The chemicals in cigarette smoke can damage cervical tissue and weaken the local immune response, thereby increasing the risk of persistent HPV infection, which is the primary cause of cervical cancer.

4.1.5 Contraceptive Use

Hormonal contraceptive use is another important focus in this research. Khabibah, Novalia, and Yuliandari observed that hormonal contraceptive use is associated with an increased risk of cervical cancer. Irawati Yuliandari emphasized that individuals using oral contraceptives are 3.078 times more likely to develop cervical cancer. This highlights the importance of educating women about the potential risks of hormonal contraceptive use and the necessity of regular health check-ups for contraceptive users. Prolonged use of hormonal contraceptives may negatively impact cervical health, including increasing susceptibility to HPV infection.

4.1.6 Hereditary Factors

Hereditary factors have been identified as a significant risk in the development of cervical cancer. Yuliandari's research shows that individuals with a family history of cervical cancer are 3.078 times more likely to develop the disease compared to those without such a history. This supports Damayanti's findings that genetic factors may play a crucial role in increasing the risk of cervical cancer. Living in the same environment, such as shared daily behavior patterns, exposure to specific environmental factors, and similar dietary habits that may elevate the risk of cervical cancer, can influence family members in similar ways.



Figure 1. Risk Factors For Cervical Cancer

4.2 Discussion

Based on the research findings presented, cervical cancer is a multifactorial disease resulting from a complex interaction of biological, behavioral, social, and environmental factors. Age stands out as one of the most significant risk factors, with women aged ≥ 35 having a substantially higher risk, especially when early marriage or sexual activity occurs before the age of 20, a period when the cervix is not yet physiologically mature and thus more vulnerable to HPV infection. High parity, or having multiple childbirths, also significantly increases the risk due to repeated cervical trauma and hormonal changes associated with pregnancy and delivery. Behavioral factors such as smoking—both active and passive—further elevate the risk by damaging cervical tissue and weakening local immune defenses, thereby facilitating persistent HPV infections. Long-term use of hormonal contraceptives contributes to the risk by altering the hormonal environment of the cervix, promoting abnormal cellular transformations. Low educational attainment and physically demanding occupations, often linked to lower socioeconomic status, are additional risk factors due to limited access to reproductive health information and preventive healthcare services. While hereditary factors do play a role, most cases of cervical cancer are attributed to external influences such as HPV exposure, lifestyle habits, and social determinants. Therefore, effective cervical cancer prevention must adopt a comprehensive approach that includes education, promotion of screening and HPV vaccination, and increased public awareness of modifiable risk factors..

5. Comparison

Compared to previous studies, the findings of this systematic review align with the global consensus on the primary risk factors for cervical cancer. International research, such as by Bowden (2023) and Peirson (2023), confirms the strong influence of age, early sexual activity, high parity, and prolonged use of hormonal contraceptives on cervical cancer incidence. However, this article adds value by offering a contextual approach specific to the Indonesian population, highlighting the significant role of low educational attainment and physically demanding occupations—factors often overlooked in international literature. Furthermore, it integrates sociocultural perspectives, such as passive smoking and limited access to Pap smear screening, which are more prominent in developing countries. Thus, the primary contribution of this article lies in its holistic mapping of cervical cancer risk factors in a local context, helping to bridge the gap between global data and the real conditions of women in Indonesia.

5. Conclusion

This study concludes that cervical cancer is a multifactorial disease resulting from a complex interaction of biological, behavioral, social, and environmental factors. The key findings indicate that age ≥ 35 , high parity, early sexual activity, smoking, prolonged use of hormonal contraceptives, low education level, and physically demanding occupations are the main risk factors. These findings support the study's aim to develop a more comprehensive and context-relevant risk framework for Indonesian women. The study contributes to a broader understanding of the importance of social and behavioral factors in cervical cancer prevention and emphasizes the need for health education and expanded screening services. One limitation of this study is its reliance on secondary data, which may constrain the generalizability of the findings. Therefore, further research using primary data, such as cohort studies or population-based surveys, is recommended to strengthen empirical evidence and tailor public health interventions to local needs.

References

- [1] P. I. S. Dewi, A. A. Pratama, and N. M. D. Y. Astriani, "Faktor risiko kejadian kanker serviks di RSUD Kertha Usada Buleleng," *Jurnal Ilmu Kesehatan*, vol. 4, pp. 199, May 2023.
- [2] S. Syatriani, "Faktor risiko kanker serviks di Rumah Sakit Umum Pemerintah Dr. Wahidin Sudirohusodo Makassar, Sulawesi Selatan," *Peminatan Epidemiologi Sekolah Tinggi Ilmu Kesehatan Makassar*, vol. 9, pp. 283, Sep. 2011.
- [3] I. P. Damayanti, "Faktor-faktor yang berhubungan dengan kejadian kanker serviks di RSUD Arifin Achmad Pekanbaru tahun 2008–2010," *Jurnal Kesehatan Komunitas*, vol. 2, pp. 97, May 2013.
- [4] X. Li, S. Y. Hu, and Y. He, "Systematic literature review of risk factors for cervical cancer in the Chinese population," *Women's Health*, vol. 14, pp. 9, Oct. 2018. [Online]. Available: <https://doi.org/10.1177/1745506518816399>
- [5] N. Kashyap, N. Krishnan, S. Kaur, and S. Ghai, "Risk factors of cervical cancer: A case-control study," *National Institute of Nursing Education*, vol. 6, pp. 314, Sep. 2019.
- [6] L. A. Braun, "A scoping review of cervical cancer risk factors, prevention, diagnosis, and treatment in U.S. active duty military women," *Elsevier*, vol. 1, pp. 49, Jan. 2021.
- [7] U. Khabibah, "Faktor risiko kanker serviks: Literature review," *Faletehan Health Journal*, vol. 9, pp. 177, Jun. 2022.
- [8] Z. Khurshid, "Factors contributing to cervical cancer among women: A systematic review and meta-analysis," *Systematic Review*, vol. 5, pp. 72, Aug. 2022. [Online]. Available: <https://doi.org/10.54393/pbmjv58.575>
- [9] V. Novalia, "Kanker serviks," *Jurnal Kedokteran dan Kesehatan Mahasiswa Malikussaleh*, vol. 2, pp. 56, Feb. 2023.
- [10] S. Bowden, "Risk factors for human papillomavirus infection, cervical intraepithelial neoplasia and cervical cancer: An umbrella review and follow-up Mendelian randomisation studies," *BMC Medicine*, vol. 1, pp. 247, Mar. 2023.
- [11] L. Peirson, "Screening for cervical cancer: A systematic review and meta-analysis," *Systematic Review*, vol. 1, pp. 10, Jun. 2023.
- [12] L. Soares, "Cervical cancer and quality of life: Systematic review," *Articles Review*, vol. 1, pp. 24, Feb. 2024.
- [13] I. Yuliandari and Masluroh, "Analisis faktor risiko kanker serviks pada pasien kanker serviks di RSUD Kabupaten Bekasi," *Jurnal Keperawatan Muhammadiyah*, vol. 9, pp. 143, Mar. 2024.
- [14] J. Luvián-Morales, "Risk factors for the development of cervical cancer: Analysis of the evidence," *Frontiers in Oncology*, vol. 2, pp. 7, May 2024.
- [15] S. Oringtho and A. D. Mwaka, "Awareness of cervical cancer risk factors and preventive approaches, and perceived causes of cervical cancer among secondary school girls: A cross-sectional study in Northern Uganda," *Annals of Medicine*, vol. 1, pp. 42, Jul. 2024. [Online]. Available: <https://doi.org/10.1080/07853890.2024.2374860>