Journal of Obstetrics, Gynecology and Cancer Research | ISSN: 2476-5848

Does Ethnicity Matter? A Comparative Analysis of Cervical Cancer Histopathological Types in East Kalimantan

Anggia Mayangsari Wardhana*

Department of Obstetrics and Gynecology, Abdoel Wahab Sjahranie General Hospital, Samarinda, Indonesia

Article Info

10.24200/jogcr.11.10.930

Received: 2025/11/13
Accepted: 2026/01/06
Published Online: 15 Aug. 2026

Corresponding Information:
Anggia Mayangsari Wardhana,
Department of Obstetrics and Gynecology, Abdoel Wahab Sjahranie General Hospital, Samarinda, Indonesia

Email: anggiamayangsari@gmail.com

ABSTRACT

Background & Objective: Cervical cancer remains a major public health concern in Indonesia, and East Kalimantan presents a unique multi-ethnic landscape that may influence disease patterns. This study aimed to evaluate the association between ethnicity and the histopathological types of cervical cancer in East Kalimantan.

Materials & Methods: A retrospective observational study was conducted using medical records of cervical cancer patients who underwent biopsy at Abdoel Wahab Sjahranie General Hospital between 2023 and 2024. A total of 98 eligible patients were selected through simple random sampling. Histopathological diagnoses were categorized into non-keratinizing squamous cell carcinoma, keratinizing squamous cell carcinoma, and adenocarcinoma. Ethnicity was classified into Local Ethnic (Kutai, Dayak, Banjar), Major Migrant Ethnic (Javanese, Bugis, Malay), and Other Ethnic groups. Fisher's exact test was applied to assess the association between ethnicity and histopathology type.

Results: A significant association was observed between ethnicity and histopathological type (P=0.01). Non-keratinizing squamous cell carcinoma predominated among Local Ethnic groups (52.63%), whereas keratinizing squamous cell carcinoma and adenocarcinoma were more frequent among Major Migrant Ethnic groups (44.68% and 34.04%, respectively). These patterns may reflect differences in HPV genotype distribution, reproductive behavior, lifestyle factors, and access to healthcare services.

Conclusion: Ethnicity appears to plays a meaningful role in shaping the histopathological presentation of cervical cancer in East Kalimantan.

Keywords: Cancer, Ethnic groups, Indonesia, Medical records

Copyright © 2026, This is an original open-access article distributed under the terms of the Creative Commons Attribution-noncommercial 4.0 International License which permits copy and redistribution of the material just in noncommercial usages with proper citation.

1. Introduction

Cervical cancer remains one of the most prevalent malignancies among women worldwide, particularly in low-resource settings where screening and HPV vaccination coverage are limited **(1,2)**. According to the World Health Organization (WHO), approximately 660,000 women were diagnosed with cervical cancer in 2022, resulting in nearly 350,000 deaths globally **(3)**. With an Age-Standardized Incidence Rate (ASIR) of 13-14 cases per 100,000 women, cervical cancer continues to be a leading cause of cancer-related mortality among women **(4,5)**. The burden is disproportionately higher in low- and middle-income countries, where gaps in awareness, preventive services, health access, and socio-cultural barriers persist.

In Indonesia, cervical cancer remains a major public health challenge. It is the second most common cancer among women after breast cancer. National epidemiological data indicate approximately 36,000 new cases and 21,000 deaths annually, with an incidence rate of 23.3 per 100,000 women almost double the global average **(6)**. This alarming disparity underscores the urgent need for enhanced prevention, early detection, and culturally tailored public health strategies.

Despite improvements in diagnostic and therapeutic approaches, clinical outcomes among cervical cancer patients remain highly variable. Conventional prognostic indicators such as tumor stage, histopathological subtype, lymph node involvement, and tumor grade are widely used; however, these parameters do not fully capture the complex biological and socio-cultural determinants influencing disease progression **(7,8)**. Understanding variation in these determinants, including ethnic differences, may support more accurate risk stratification and improved patient management.

East Kalimantan is a culturally diverse region comprising multiple ethnic groups, including Kutai, Banjar, Dayak, Bugis, Javanese, Malay, and several minority communities **(9)**. These populations differ in sociocultural practices, reproductive behavior, age at first marriage, parity, dietary patterns, health-seeking behavior, and health literacy **(10)**. Such heterogeneity may influence not only cervical cancer incidence but also the distribution of histopathological subtypes. Histopathological classification including keratinizing and non-keratinizing squamous cell carcinoma, adenocarcinoma, and other variants plays a critical role in determining prognosis and guiding treatment **(11,12)**. Differences across ethnic groups may reflect variation in HPV genotype prevalence, screening uptake, lifestyle factors, or delays in accessing care.

Although numerous studies have explored biological and hematologic predictors of cervical cancer outcomes **(7)**, limited research has examined whether ethnic background contributes to variation in histopathological presentation **(13)**. To date, no study in Indonesia particularly in East Kalimantan has specifically investigated this issue despite its marked ethnic diversity.

Given this gap, examining the relationship between ethnicity and cervical cancer histopathology is both scientifically relevant and clinically important. This study therefore addresses the question "Does ethnicity matter?" by conducting a comparative analysis of cervical cancer histopathological types across ethnic groups in East Kalimantan, with the aim of generating evidence on ethnic disparities, improving understanding of disease patterns, and informing culturally responsive public health interventions.

2. Materials and Methods

This study employed a retrospective observational design using secondary data extracted from the medical records of cervical cancer patients treated at Abdoel Wahab Sjahranie General Hospital, Samarinda, Indonesia, between 2023 and 2024. The study population consisted of all patients who underwent biopsy examinations during this period, totaling 129 individuals. The minimum required sample size was calculated using the Slovin formula, yielding a target of 98 subjects. Sample selection was performed through simple random sampling to ensure equal probability of inclusion for all eligible patients.

The inclusion criteria were: (1) histologically confirmed cervical cancer, specifically non-keratinizing squamous cell carcinoma, keratinizing squamous cell carcinoma, or adenocarcinoma; (2) biopsy performed within the 2023-2024 study period; (3) complete medical record documentation; and (4) clearly recorded ethnicity. Ethnicity was categorized into three groups:

- Local Ethnic: Kutai, Dayak, Banjar
- Major Migrant Ethnic: Javanese, Bugis, Malay
- Other Ethnic: minority groups including Chinese, Sundanese, Sangir, Madurese, Toraja, Bajau, Tidung, and others

Ethnicity was verified using the ethnicity field routinely documented at admission, based on patient or family self-report. Exclusion criteria included biopsy results indicating non-malignant lesions or diagnoses other than cervical cancer, duplicate biopsy entries (only the earliest complete record was included), and biopsies performed outside the study period or at other healthcare facilities.

Data analysis was conducted using IBM SPSS Statistics version 25.0. Categorical variables were analyzed using the Chi-square test. When more than 20% of the cells had an expected count below five, Fisher's exact test was applied. A P-value<0.05 was considered statistically significant.

3. Results

A total of 98 cervical cancer patients met the inclusion criteria. The mean age was 47.59±9.70 years, indicating that most cases occurred among women in the late reproductive to early postmenopausal period (Table 1). Regarding occupation, the majority were housewives (74.50%), followed by private employees (12.20%) and civil servants (10.20%), while 3.10% reported other occupations. Educational attainment varied, with most patients having middle-level education (41.80%), followed by low education levels (40.80%), and only 17.30% having higher education. This distribution suggests limited educational backgrounds among many patients, potentially influencing health literacy and care-seeking behavior.

Marital history showed that most women had been married once (69.40%), while 24.50% reported two marriages and 3.10% reported three marriages; and 3.10% were unmarried. These findings align with known reproductive risk patterns associated with HPV exposure. More than half of the patients (53.10%) resided within Samarinda, whereas 46.90% came from surrounding areas, indicating a relatively balanced geographic distribution of cases. Nearly all patients (96.90%) were covered by the National Health Insurance program, reflecting a strong reliance on government-funded healthcare services; only a 3.10% paid out of pocket.

Clinical assessments revealed a mean BMI of 23.11±5.04 kg/m², suggesting that most patients were within the normal weight range. Mean systolic and diastolic blood pressures were 126.27±24.41 mmHg and 75.17±14.20 mmHg, respectively. Pain scores at admission were generally mild (mean 2.28±2.13). The mean Barthel Index score was 17.60±4.18, indicating reduced functional independence among many patients. At discharge, 88.80% of patients survived

hospitalization, while 11.20% died, representing the in-hospital mortality rate during the study period.

Because three cells in the contingency table had expected counts below five, Fisher's exact test was used to assess the association between ethnicity and histopathology subtype. The distribution of histopathological types varied across ethnic categories. Among Local Ethnic groups, non-keratinizing squamous cell carcinoma accounted for 52.63% of cases, followed by adenocarcinoma (28.95%) and keratinizing squamous cell carcinoma (18.42%) (Table 2). In the Major Migrant Ethnic group, keratinizing squamous cell carcinoma was the most common subtype (44.68%), followed by adenocarcinoma (34.04%) and non-keratinizing squamous cell carcinoma (21.28%). A similar pattern to the Local Ethnic group was observed among Other Ethnic populations, where non-keratinizing squamous cell carcinoma predominated (53.85%), followed by adenocarcinoma (30.77%) and keratinizing squamous cell carcinoma (15.38%).

Overall, 37.76% of patients had non-keratinizing squamous cell carcinoma, 30.61% had keratinizing squamous cell carcinoma, and 31.63% had adenocarcinoma. Fisher's exact test demonstrated a statistically significant association between ethnicity and histopathological subtype (P=0.01), indicating that ethnic background contributes to the observed variation in cervical cancer pathology within this population.

Table 1. Baseline Characteristics of Cervical Cancer Patients

Characteristics	Number (n=98)	Percentage (%)	Cumulative Percentage (%)
Age (Years)		47.59±9.70	
Occupation			
Housewife	73	74.50	74.50
Private Employee	12	12.20	86.70
Civil Servant	10	10.20	96.90
Others	3	3.10	100.00
Education Level*			
Low	40	40.80	40.80
Middle	41	41.80	82.70
High	17	17.30	100.00
Number of Marriages			
Unmarried	3	3.10	3.10
1	68	69.40	72.40
2	24	24.50	96.90
3	3	3.10	100,.00
Domicile			
Samarinda	52	53.10	53.10
Outside Samarinda	46	46.90	100.00
Payment Method			
National Health Insurance	95	96.90	96.90
Out of Pocket	3	3.10	100.00
BMI		23.11±5.04	
Systolic; Diastolic		126.27±24.41, 75.17±14.20	
Pain Scale		2.28±2.13	
Barthel Index		17.60±4.18	
Discharge Status			
Alive	87	88.80	88.80
Dead	11	11.20	100.00

*Educational levels: low=no formal schooling, elementary school, or junior high school; middle=senior high school; high=diploma, bachelor's, or master's degree.

Table 2. Distribution of Cervical Cancer Histopathology Types Across Ethnic Groups

		Histopathology Type			Total (%)	P-Value
		Non-keratinizing squamous cell carcinoma	Keratinizing squamous cell carcinoma	Adenocarcinoma		
Ethnicity	Local Ethnic (%)	20(52.63)	7(18.42)	11(28.95)	38(38.78)	0.01
	Major Migrant Ethnic (%)	10(21.28)	21(44.68)	16(34.04)	47(47.96)	
	Other Ethnic (%)	7(53.85)	2(15.38)	4(30.77)	13(13.27)	
Total (%)		37(37.76)	30(30.61)	31(31.63)	98(100.00)	

4. Discussion

This study demonstrated a significant association between ethnicity and the histopathological types of cervical cancer, as indicated by Fisher's exact test (P=0.01). The findings show that non-keratinizing squamous cell carcinoma was more prevalent among the Local Ethnic group, whereas keratinizing squamous cell carcinoma and adenocarcinoma were more common among the Major Migrant Ethnic groups. These results suggest that ethnic background may influence the biological behavior, disease progression, or exposure patterns contributing to cervical carcinogenesis.

The variation observed across ethnic groups may reflect differences in lifestyle, reproductive behavior, cultural norms, and access to healthcare services **(14,15)**. Local Ethnic groups often experience earlier sexual debut, higher parity, and lower screening uptake factors strongly associated with non-keratinizing squamous cell carcinoma, a subtype closely linked to persistent high-risk HPV infection, particularly HPV-16 **(16-18)**. At the molecular level, HPV-16 expresses the E6 and E7 oncoproteins, which inactivate the p53 and Rb tumor suppressor pathways, promoting dysplasia and malignant transformation **(19)**. This mechanism may explain the predominance of squamous lesions in populations with greater HPV exposure.

In contrast, the higher occurrence of keratinizing squamous cell carcinoma and adenocarcinoma among the Major Migrant Ethnic groups may be influenced by different circulating HPV genotypes, particularly HPV-18, which is more strongly associated with glandular lesions **(20,21)**. Migrant populations may also have better access to healthcare services and earlier opportunities for detection, potentially shaping the observed histopathological distribution. Prior studies, including those by Mullapally et al., **(1)**, Fowler et al., **(8)**, and Meng et al., **(4)**, have reported similar heterogeneity across populations due to differences in HPV genotype distribution, immune responses, and reproductive behaviors.

Immunologic and inflammatory mechanisms may also contribute to the ethnic variations identified in this study. Persistent HPV infection induces chronic inflammation, epithelial turnover, and oxidative stress, creating a microenvironment conducive to malignant transformation. Limited access and delayed treatment among Local Ethnic groups may prolong HPV persistence, increasing the likelihood of non-keratinizing squamous carcinoma. These interpretations align with findings by Kalafati et al., **(22)** and Hu et al., **(23)**, who highlight the role of inflammation and immune dysregulation in the progression of HPV-related malignancies.

Despite its strengths, this study has several limitations. First, the retrospective design relies on the accuracy and completeness of medical records, which may introduce information bias, particularly in variables such as ethnicity classification, reproductive history, and symptom onset. Second, the study was conducted at a single tertiary hospital, limiting generalizability to the broader East Kalimantan population or other regions of Indonesia. Third, although the sample size met the minimum requirement, it remains relatively small for detailed subgroup analyses, especially among minority ethnic groups, potentially reducing statistical power. Fourth, HPV genotype testing was not performed, limiting biological interpretation of the observed histopathological differences. Finally, potential confounders including socioeconomic status, sexual behavior, parity, smoking, and contraceptive use were not assessed, restricting the ability to fully elucidate causal mechanisms underlying the associations observed.

5. Conclusion

This study demonstrates a clear association between ethnicity and the histopathological types of cervical cancer in East Kalimantan. Non-keratinizing squamous cell carcinoma was more frequently observed among Local Ethnic groups, whereas keratinizing squamous cell carcinoma and adenocarcinoma were more common among Major Migrant Ethnic populations.

These findings highlight that cervical cancer patterns in the region are shaped not only by biological factors but also by variations in lifestyle, reproductive behavior, cultural norms, and potential differences in circulating HPV genotypes. Ethnic background may therefore influence both disease risk and the type of malignancy that develops.

These insights carry important implications for public health interventions. Efforts to reduce cervical cancer disparities should incorporate culturally responsive strategies, including targeted HPV vaccination, improved screening outreach, and community-specific education tailored to diverse ethnic contexts. By acknowledging sociocultural dynamics, healthcare systems can design more equitable and effective prevention programs, ultimately improving cervical cancer outcomes among women in East Kalimantan.

6. Declarations

Acknowledgments

The authors declare no acknowledgment.

Ethical Considerations

This study received ethical approval from the Health Research Ethics Committee of Abdoel Wahab Sjahranie General Hospital (Approval No. 96/KEPK-AWS/IX/2025). Because anonymized retrospective data were used, the requirement for informed consent was waived.

Authors' Contributions

AMW: Conceived and designed the analysis; Collected the data; Contributed data or analysis tools; Performed the analysis; Wrote the manuscript.

Conflict of Interest

The authors declare no conflict of interest.

Fund or Financial Support

The authors declare no fund.

References

1. Mullapally SK, Digumarti L, Digumarti R. Cervical Cancer in Low- and Middle-Income Countries: A Multidimensional Approach to Closing the Gaps. JCO Oncol Pract. 2022;18(6):423-5. [doi:10.1200/OP.22.00156]
2. Arab M, Teymoordash SN, Manshadi HRD, Ghahghaei-Nezamabadi A, Motamedinasab M, Nouri N. Cervical Cancer Screening Challenges. J Obstet Gynecol Cancer Res. 2025;10:660-6. [doi:10.24200/jogcr.10.9.660]
3. World Health Organization (WHO). Cervical Cancer [Internet]. WHO. 2024 [cited 2025 Sep 7]. (Accessed in May 5, 2026, at https://www.who.int/news-room/fact-sheets/detail/cervical-cancer)
4. Meng X, Yang B, Yin H, Chen J, Ma W, Xu Z, et al. Global Burden and Incidence Trends in Cancers Associated with Human Papillomavirus Infection: A Population-Based Systematic Study. Pathogens. 2025;14(9):880. [doi:10.3390/pathogens14090880]
5. Reza S, Anjum R, Khandoker RZ, Khan SR, Islam MR, Dewan SMR. Public Health Concern-Driven Insights and Response of Low- and Middle-Income Nations to the World Health Organization Call for Cervical Cancer Risk Eradication. Gynecol Oncol Reports. 2024;54:1-9. [doi:10.1016/j.gore.2024.101460]
6. World Health Organization. Elimination planning tool: advancing towards cervical cancer elimination [Internet]. Geneva: World Health Organization; 2025 [cited 2026 Aug 5]. (Accessed in May 5, 2026, at https://www.who.int/initiatives/cervical-cancer-elimination-initiative)
7. Uke A, Dahake SB, Luharia A, Luharia M, Mishra G V, Mahakalkar C. Investigating and Analyzing Prognostic Factors and Their Impact on Recurrent Cervical Cancers. Cureus. 2024;16(7):1–12. [doi:10.7759/cureus.65361]
8. Fowler JR, Maani E V., Dunton CJ, Gasalberti DP, Jack BW. Cervical Cancer [Internet]. StatPearls. 2023 [cited 2025 Aug 2]. (Accessed in May 5, 2026, at https://www.ncbi.nlm.nih.gov/books/NBK431093/)
9. Arifin EN. Ethnic Diversity in Kalimantan and the Implications of Indonesia's Capital Relocation. ISEAS: Yusof Ishak Institute. 2024;1-10. (Accessed in May 5, 2026, at https://sealionplus.iseas.edu.sg/nodes/view/92973)

10. Alfaq MZ, Shofa AMA, Mawarti RA, Pratama AY, Azizah RSN, Abadi DP, et al. Ethnocultural Exploration : Ethnic Cultural Study of East Kalimantan in the National Capital Relocation as a Cultural Resilience Strategy. In: Proceeding of the 3rd International Conference on Social Knowledge Sciences and Education (ICSKSE). Malang: Atlantis Press; 2023;189-99. [doi:10.1016/j.mcpsp.2021.100225]
11. Hasugian SA, Lubis K, Doan H V. Profile of Histopathology of Cervical Cancer Tissues in Patients of the Dr. Pirngadi Medan Hospital. J Biosci. 2020;6(3):90-7. [doi:10.24114/jbio.v6i3.19607]
12. Made N, Dewi L, Ayu IG, Mahendra S, Paskarani PE. Clinicopathologic Features of Carcinoma of the Cervix Uteri at Prof . Dr. I. G. N. G. Ngoerah Hospital in 2021 – 2022. Indones J Cancer. 2025;19(3):381-5. [doi:10.33371/ijoc.v19i3.1328]
13. Cohen CM, Wentzensen N, Castle PE, Schiffman M, Zuna R, Arend RC, et al. Racial and Ethnic Disparities in Cervical Cancer Incidence, Survival, and Mortality by Histologic Subtype. J Clin Oncol. 2022;41(5):1059-68. [doi:10.1200/JCO.22.01424]
14. Melo AC De, Mendes SV, da Silva JL. Exploring Racial and Ethnic Disparities in Cervical Cancer's Histologic Subtypes. Gynecol Pelvic Med. 2024;7:1–3. [doi:10.21037/gpm-23-42]
15. Holt HK, Peterson CE, David SM, Abdelaziz A, Sawaya GF, Guadamuz JS, et al. Mediation of Racial and Ethnic Inequities in the Diagnosis of Advanced-Stage Cervical Cancer by Insurance Status. JAMA Netw Open. 2023;6(3):1–12. [doi:10.1001/jamanetworkopen.2023.2985]
16. Kurniatin LF, Marsita E, Irawaty DK, Elfiyan I. Prediction Model of Related Factors with Youth Fertility in Kalimantan. J Info Kesehat. 2022;20(1):87-100. [doi:10.31965/infokes.Vol20Iss1.631]
17. Husni M, Priyo A, Anderiani U, Nelwan B, Masadah R, Rauf S, et al. Detection of Human Papilloma Virus (HPV) in Parafin Block of Cervical Cancer Patients Using Multiplex Polymerase Chain Reaction (PCR) and Reverse Line Blot Methods. Med Clínica Práctica. 2021;4:1-3. [doi:10.1016/j.mcpsp.2021.100225]
18. Wahidin M, Febrianti R, Susanty F, Hasanah SR. Twelve Years Implementation of Cervical and Breast Cancer Screening Program in Indonesia. Asian Pacific J Cancer Prev. 2022;23:829-37. [doi:10.31557/APJCP.2022.23.3.829]
19. Fontan CT, James CD, Prabhakar AT, Bristol ML, Otoa R, Wang X, et al. A Critical Role for p53 during the HPV16 Life Cycle. Microbiol Spectr. 2025;10(3):1–18. [doi:10.1128/spectrum.00681-22]
20. Coursey TL, Doorslaer K Van, Mcbride AA. Regulation of Human Papillomavirus 18 Genome Replication, Establishment, and Persistence by Sequences in the Viral Upstream Regulatory Region. J Virol 2021;95:1-21. [doi:10.1128/JVI.00686-21]
21. Suh KS, Cho SJ, Na SY, Noh HT, Nam SR. Human Papillomavirus Type 16, 18, and 33 Infection in Adenocarcinoma of the Uterine Cervix : Analysis of the p53 Gene Mutation and the Clincopathologic Correlation. Korean J Pathol 2004;38(5):295-300. [doi:10.3389/fonc.2020.581457]
22. Kalafati L, Mitroulis I, Verginis P, Chavakis T, Kourtzelis I. Neutrophils as Orchestrators in Tumor Development and Metastasis Formation. Front Oncol. 2020;10:1-9. [doi:10.3389/fonc.2020.581457]
23. Hu W, Lee SML, Bazhin AV, Guba M, Werner J, Nieß H. Neutrophil Extracellular Traps Facilitate Cancer Metastasis: Cellular Mechanisms and Therapeutic Strategies. J Cancer Res Clin Oncol. 2023;149(5):2191-210. [doi:10.1007/s00432-022-04310-9]

How to Cite This Article:

Mayangsari Wardhana A. Does Ethnicity Matter? A Comparative Analysis of Cervical Cancer Histopathological Types in East Kalimantan. J Obstet Gynecol Cancer Res. 2026;11(10):930-935.

Download citation: RIS | EndNote | Mendeley |BibTeX |