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Age and education level as factors associated with delayed diagnosis among female breast cancer patients

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Abstract

Background: Cancer is a malignant disease caused by uncontrolled abnormal cell growth and is one of the leading causes of death worldwide. Breast cancer is a malignancy of breast tissue originating from the ductal or lobular epithelium and is the cancer with the highest incidence in women globally.

Purpose: To determine factors of age and educational level influencing delayed diagnosis in female breast cancer patients

Method: This study used an observational analytic study with a cross-sectional approach. A total of 52 respondents were included in the study, which influenced delayed diagnosis in women with breast cancer at Abdul Moeloek Hospital in 2025.

Results: The results showed that the majority of respondents experienced delayed breast cancer diagnosis (27 respondents (51.9%), while 25 respondents (48.1%) did not experience delays, thus making delayed diagnosis still considered high. Bivariate analysis using Fisher's Exact Test showed that age significantly influenced delayed diagnosis ($p = 0.011$; OR = 5), with elderly women having a five-fold greater risk of experiencing delays compared to late adulthood. Furthermore, education level also significantly influenced the risk ($p = 0.004$).

Conclusion: There is a relationship between age and education level, which influence late diagnosis in women with breast cancer.

Keywords: Age; Breast Cancer; Education Level; Late Diagnosis; Risk Factors.

INTRODUCTION

Cancer is a malignant disease that occurs when body cells grow abnormally and uncontrollably. This disease is one of the leading causes of death worldwide (Damayanti, Ariani, & Agustin, 2020). One of the most common types of cancer in women is breast cancer, a malignancy of breast tissue that originates in the ducts or lobules.

Breast cancer is a global health problem, with approximately 2.3 million new cases each year. This disease accounts for approximately 24.2% of all cancer cases in women and approximately 15% of cancer deaths in women. However, most cases are still diagnosed at an advanced stage, so the chances

of a cure are not optimal, despite continued advances in treatment (Rahmi, Andika, Kulla, Deli, Nadilla, Aisya, & Novita, 2024).

According to World Health Organization (WHO) data, in 2022, approximately 2.3 million women were diagnosed with breast cancer and approximately 670.000 died from the disease (World Health Organization, 2022). GLOBOCAN data from 2020 also showed more than 2.3 million new cases with approximately 685.000 deaths, making it the leading cause of cancer death in women. In Indonesia, the number of breast cancer cases reached 62.685, and in Lampung Province, hundreds of cases were found,

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most of which were in advanced stages (Sofa, Wardiyah & Rilyani, 2024). Most breast cancer patients seek treatment at an advanced stage. Approximately 70% of cases are detected at this stage, lowering the chances of successful treatment (Ministry of Health of the Republic of Indonesia, 2019).

Delays in breast cancer diagnosis are influenced by various factors, particularly age and education level. Age can influence how a person perceives and responds to symptoms, while education level is related to the ability to obtain and understand health information. Women with lower levels of education are more likely to be diagnosed late (Vitorino, de Almeida, Costa, Faria, Calhau, & Braga, 2022). Furthermore, delays are also influenced by other factors such as economic conditions, knowledge, treatment-seeking behavior, habits of using alternative medicine, and limited access to healthcare services, such as distance, cost, and availability of medical personnel (Hutajulu, Prabandari, Bintoro, Wiranata, Widiastuti, Suryani, & Allsop, 2022).

For many women, receiving a breast cancer diagnosis is a difficult experience. Fear, anxiety about the future, and the perception that cancer is a fatal disease often lead patients to delay screening until symptoms appear (Pelima & Adi, 2021). Delayed

diagnosis is a serious problem because patients often only receive treatment when the disease is already advanced. This results in a decreased chance of recovery, limited therapeutic options, increased treatment costs, and a reduced quality of life for patients (Afaya, Ramazanu, Bolarinwa, Yakong, Afaya, Aboagye, & Alhassan, 2022).

RESEARCH METHOD

This study used an observational analytical method with a cross-sectional design. The study was conducted at Abdul Moeloek Hospital in January 2026. A sample of 60 patients was selected using purposive sampling. The population in this study were 52 patients diagnosed with breast cancer at Abdul Moeloek Hospital between September and November 2025.

The independent variables were age and education level, while the dependent variable was delay in breast cancer diagnosis. Data were collected through medical records and questionnaires. The statistical test used was the Fisher's Exact Test (Fisher Exact) with a significance level of 0.05. This study has passed ethical review by the Health Research Ethics Committee of the Faculty of Medicine, Malahayati University, with permit number 012/KEPK-RSUDAM/1/2026.

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RESEARCH RESULTS

Table 1. Characteristics of respondents and factors associated with delayed diagnosis

Variable	Results	P-value	OR
Age (Mean±SD) (Years) (Range)	(48.65 ± 11.05) (35-79)		
Late Adulthood (35-45)	32/61.5		
Elderly (45-80)	20/38.5		
Education Level (n/%)			
High	13/25.0		
Middle	25/48.0		
Low	14/27.0		
Delayed Diagnosis (n/%)		0.011	5
Yes	27/52.0		
No	25/48.0		

Based on the table above, the distribution of respondents' ages shows that the majority of respondents were in the late adulthood category, with a total of 32 people (61.5%). Meanwhile, respondents in the elderly group were 20 people (38.5%). Of the 52 respondents studied, it can be seen that breast cancer patients with delayed diagnosis were more often found in the late adulthood group than in the elderly group. This finding illustrates that the late adulthood group dominates the study population. Based on the respondents' education level, the majority of respondents had a secondary education category, with a total of 25 people (48.1%). Respondents with higher education were recorded at 14 people (26.9%), while those with lower education were 13 people (25%). Of the 52 respondents, it can be seen that the majority of breast cancer patients in this study came from the secondary education group. These results indicate that cases of delayed diagnosis were more common in respondents with secondary education compared to those with lower or higher education. Based on Table 3 regarding the distribution of delayed diagnosis, it is known that the majority of respondents experienced delayed diagnosis, as many as 27 people (51.9%). Meanwhile, respondents who did not experience delayed diagnosis were 25 people (48.1%). Of the 52 respondents, a slightly higher number of breast cancer patients experienced

delayed diagnosis than those who did not. This indicates that delayed diagnosis remains a common problem among breast cancer patients at the study site.

Based on the bivariate analysis using the Fisher's Exact test, a p-value of 0.011 ($p < 0.05$) was obtained, indicating a significant association between respondent age and delayed breast cancer diagnosis. The odds ratio (OR) was 5, indicating that respondents in the elderly age group were five times more likely to experience delayed diagnosis than respondents in late adulthood.

DISCUSSION

The results of the study of 52 respondents with breast cancer showed that the majority of respondents were in the late adulthood age group, namely 32 people (61.5%), while the remaining were in the elderly age group, namely 20 people (38.5%). This finding indicates that the incidence of breast cancer accompanied by delayed diagnosis is more common in the late adulthood age group compared to the elderly group in this study population. In terms of education level, the majority of respondents had a secondary education level, namely 25 people (48.1%), followed by respondents with a high education level, namely 14 people (26.9%), and low education, namely 13 people (25%). The dominance of the secondary

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education group in this study reflects the demographic conditions of the breast cancer patient population at the study site, while also indicating that delayed diagnosis does not only occur in the low-educated group, but also in the secondary education group, which quantitatively dominates the sample. Based on the distribution of delayed diagnosis, the proportion of respondents who experienced delayed diagnosis was slightly higher than those who did not experience delayed diagnosis, namely 27 people (51.9%) compared to 25 people (48.1%). Although the difference in proportions is relatively small, these findings still illustrate that delayed breast cancer diagnosis remains a significant problem in the study area, consistent with a phenomenon in many developing countries where the majority of breast cancer patients present at an advanced stage due to various factors hindering access and inadequate health awareness (Unger-Saldaña, Peláez-Ballestas, & Infante-Castañeda, 2012).

Bivariate analysis using Fisher's Exact Test showed a statistically significant association between respondent age and delayed breast cancer diagnosis, with a p-value of 0.011 ($p < 0.05$) and an Odds Ratio (OR) of 5. This means that patients in the elderly age group have a five-fold greater risk of experiencing delayed diagnosis than patients in the late adult age group. Biologically, increasing age is associated with hormonal changes that influence breast cancer development. With age, fat cells in breast tissue tend to produce greater amounts of the aromatase enzyme, which ultimately increases local estrogen levels. It is this locally produced estrogen that is believed to play a role in triggering breast cancer in postmenopausal women, as well as stimulating further tumor growth (Mulyani & Nuryani, 2013).

In addition to biological factors, the relationship between advanced age and delayed diagnosis can also be explained by behavioral and psychosocial factors. Elderly individuals tend to perceive changes in the body as part of the normal aging process, thus delaying medical examinations. Decreased awareness of early disease symptoms, limited access to healthcare services, and comorbidities that distract patients from breast cancer symptoms exacerbate this situation, often leading to cancer being detected at a more advanced stage in the elderly (Lemij,

Bastiaannet, De Glas, van den Bos, Portielje, Liefers, & Derks, 2023).

The results of this study align with those of Rahmadhani et al. (2020) conducted at a health service in Samarinda, which found that age significantly correlated with the duration of breast cancer screenings ($p = 0.022$). This finding is further supported by previous research in Surakarta, which reported a significant association between age and delayed breast cancer screening ($p = 0.001$). The consistency of findings between this study and previous studies strengthens the evidence that age is a significant risk factor in the context of delayed breast cancer diagnosis (Amijaya, Yarso, & Nugroho, 2025).

Further statistical analysis revealed a significant association between education level and delayed breast cancer diagnosis ($p = 0.004$; $p < 0.05$). In the group that did not experience delayed diagnosis, the highest distribution was found among respondents with higher education (12 respondents (48%)), followed by those with secondary education (8 respondents) (32%), and those with lower education (5 respondents) (20%). Conversely, in the group that experienced delayed diagnosis, the highest distribution was found among respondents with secondary education (17 respondents) (63%), followed by those with lower education (8 respondents) (29%), and those with higher education (2 respondents). This distribution pattern illustrates a tendency that the higher a person's education level, the lower the proportion of delayed diagnosis. Theoretically, education level is closely related to an individual's ability to receive, understand, and process health information (health literacy). Within the framework of the social determinants of health, education is a structural factor that shapes a person's social position and indirectly influences health status through various mechanisms, including access to health information and resources (World Health Organization, 2010).

Interestingly, these research findings indicate that those with secondary education dominate the incidence of delayed diagnosis, indicating that increasing education to secondary level is not entirely sufficient to prevent delays. This aligns with previous research, which found that although education level is associated with delayed breast cancer diagnosis, its

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influence occurs through indirect mechanisms such as patient knowledge and treatment-seeking behavior. Therefore, formal education alone is insufficient without adequate health literacy and access to healthcare services (Shidqi, Saraswati, Kusariana, Sutiningsih, & Udiyono, 2022). This finding is further supported by other research showing that education has a significant relationship with delayed diagnosis, but not in isolation, but rather influenced by other factors such as access to healthcare and socioeconomic conditions (Burgess, Hunter, M & Ramirez, 2001). Furthermore, psychological and social factors such as fear of a cancer diagnosis, social stigma, and geographic and financial barriers to accessing healthcare contribute to delays in diagnosis, particularly among those with secondary education who lack the resources to overcome these barriers (Pratama, Yuniawati, & Widiana, 2021). Therefore, interventions to improve early detection of breast cancer need to be designed multidimensionally, targeting not only increased formal education but also strengthening health literacy, reducing stigma, and expanding equitable access to healthcare services.

CONCLUSION

This study confirms that delayed breast cancer diagnosis is a multifactorial phenomenon, requiring comprehensive, evidence-based intervention strategies. These include increasing public health literacy, particularly among at-risk age groups, strengthening breast cancer screening programs that reach all levels of society, and improving access to and quality of health services to encourage optimal early detection of breast cancer.

REFERENCES

- Afaya, A., Ramazanu, S., Bolarinwa, O. A., Yakong, V. N., Afaya, R. A., Aboagye, R. G., & Alhassan, R. K. (2022). Health system barriers influencing timely breast cancer diagnosis and treatment among women in low and middle-income Asian countries: evidence from a mixed-methods systematic review. *BMC Health Services Research*, 22(1), 1601.
- Amijaya, D. T., Yarso, K. Y., & Nugroho, H. A. (2025). The Effect of Age on Delays in Treatment of Ca Mammae in Patients Who Take Alternative Medication in Surakarta City. Retrieved from: <https://theaspd.com/index.php/ijes/article/view/8602>
- Burgess, C., Hunter, M. S., & Ramirez, A. J. (2001). A qualitative study of delay among women reporting symptoms of breast cancer. *The British Journal of General Practice*, 51(473), 967.
- Damayanti, E., Ariani, D., & Agustin, D. (2020). Pengaruh pemberian kompres daun kubis dingin sebagai terapi pendamping bendungan ASI terhadap skala pembengkakan dan intensitas nyeri payudara serta jumlah ASI pada ibu postpartum di RSUD Bangil. *Journal of Issues in Midwifery*, 4(2), 54-66.
- Hutajulu, S. H., Prabandari, Y. S., Bintoro, B. S., Wiranata, J. A., Widiastuti, M., Suryani, N. D., & Allsop, M. J. (2022). Delays in the presentation and diagnosis of women with breast cancer in Yogyakarta, Indonesia: A retrospective observational study. *PloS one*, 17(1), e0262468.
- Lemij, A. A., Bastiaannet, E., De Glas, N. A., van den Bos, F., Portielje, J. E., Liefers, G. J., & Derks, M. G. (2023). Breast cancer in the older population: a global challenge an epidemiological perspective. *Annals of Breast Surgery*, 7.
- Mulyani, N. S., & Nuryani, N. (2013). Kanker payudara dan PMS pada kehamilan. Yogyakarta. Nuha Medika.
- Pelima, T. C., & Adi, M. S. (2021). Faktor yang Mempengaruhi Keterlambatan Diagnosis Awal Pasien Kanker Payudara. *Jurnal Penelitian Kesehatan" SUARA FORIKES"(Journal of Health Research" Forikes Voice"*, 12(3), 258-260.

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- Pratama, N. M. W., Yuniawati, N. G. A. A. M., & Widiani, I. K. (2021). Faktor yang mempengaruhi keterlambatan pengobatan kanker payudara: sebuah tinjauan sistematik. *Intisari Sains Medis*, 12(1), 346-355.
- Rahmi, N., Andika, F., Kulla, P. D. K., Deli, C., Nadilla, E., Aisya, F., & Novita, R. (2024). Penyuluhan Sadari Pada Remaja Putri di Madrasah Aliyah Dayah Ruhul Islam Anak Bangsa Kabupaten Aceh Besar. *Jurnal Pengabdian Kepada Masyarakat Bidang Kesehatan*, 6(1), 66-69.
- Shidqi, Z. N., Saraswati, L. D., Kusariana, N., Sutiningsih, D., & Udiyono, A. (2022). Faktor-faktor keterlambatan diagnosis kanker pada pasien kanker payudara: Systematic review. *Jurnal Epidemiologi Kesehatan Komunitas*, 7(2), 471-481.
- Sofa, T., & Wardiyah, A. Rilyani. (2024). Faktor Risiko Kanker Payudara Pada Wanita. *Jurnal Penelitian Perawat Profesional*, 2(5474), 1333-1336.
- Unger-Saldaña, K., Peláez-Ballestas, I., & Infante-Castañeda, C. (2012). Development and validation of a questionnaire to assess delay in treatment for breast cancer. *Bmc cancer*, 12(1), 626.
- Vitorino, M., de Almeida, S. B., Costa, D. A, Faria, A., Calhau, C., & Braga, S. A. (2022). Human microbiota and immunotherapy in breast cancer-a review of recent developments. *Frontiers in oncology*, 11, 815772.
- World Health Organization. (2010). A Conceptual Framework for Action on the Social Determinants of Health. Retrieved from: <https://www.who.int/publications/i/item/9789241500852>
- World Health Organization. (2022). The Global Breast Cancer Initiative. Retrieved from: <https://www.who.int/news-room/fact-sheets/detail/breast-cancer>

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