Original Article

Clinical Variables Associated with Quality of Life Among Women with Breast Cancer: A Cross-Sectional Study

Anastasia Anna[1], Yanny Trisyani[1], Aan Nuraeni[1], Ayu Prawesti Priambodo[1], Firman Sugiharto[2]

[1] Department of Critical Care and Emergency Nursing, Faculty of Nursing, Universitas Padjadjaran, Sumedang, West Java, Indonesia
[2] Doctoral Program, Faculty of Nursing, Faculty of Nursing, Universitas Padjadjaran, Sumedang, West Java, Indonesia

ARTICLE INFO

Article History
Submit : March 6, 2026
Accepted : June 23, 2026
Published : July 1, 2026

Correspondence
Anastasia Anna; Department of Critical Care and Emergency Nursing, Faculty of Nursing, Universitas Padjadjaran, Sumedang, West Java, Indonesia.

Email:
anastasia.anna@unpad.ac.id

Citation:
Anna, A., Trisyani , Y., Nuraeni, A., Priambodo, A. P. ., & Sugiharto, F. (2026). Clinical Variables Associated with Quality of Life Among Women with Breast Cancer: A Cross-Sectional Study. Journal of Applied Nursing and Health, 8(2), 1092–1106. https://doi.org/10.55018/janh.v8i2.615

ABSTRACT

Background: Breast cancer is a major public health concern in Indonesia. Clinical factors such as disease duration, cancer stage, treatment type, and comorbidities may affect patients' quality of life (QoL), but evidence in Indonesia remains limited. This study aimed to examine the correlation between clinical variables and QoL among breast cancer patients.

Methods: This cross-sectional study was conducted between November 2025 and January 2026 at a referral hospital in West Java, Indonesia, and followed the STROBE guidelines. A total of 53 breast cancer patients were recruited using convenience sampling. The independent variables included clinical characteristics such as duration of illness, cancer stage, treatment received, treatment frequency, comorbidities, body mass index (BMI), and family history of cancer, while the dependent variable was QoL. QoL was assessed using the Indonesian version of the European Organisation for Research and Treatment of Cancer Quality of Life Questionnaire-Core 30 (EORTC QLQ-C30), a validated instrument for evaluating functional status, symptoms, and global health status among cancer patients. QoL is categorised into poor, moderate, and good. Bivariate analysis was performed using Fisher's exact test and the chi-square test.

Results: Among the 53 breast cancer patients, the majority had been diagnosed for less than one year (45.3%), underwent surgery combined with chemotherapy (41.5%), and received treatment every three weeks (64.2%). Most patients reported moderate global health status (49.1%), while 35.8% had poor QoL. Significant associations were found between duration of illness ($p < .001$; Cramer's $V = 0.467$), treatment received ($p = .030$; Cramer's $V = 0.434$), and treatment frequency ($p = .034$; Cramer's $V = 0.396$) and global health status. No significant associations were identified between cancer stage, comorbidities, BMI category, or family history of cancer and QoL.

Conclusion: Duration of illness and treatment-related factors were significantly associated with quality of life among breast cancer patients. These findings suggest that the illness trajectory and treatment burden may be substantially related to patients' overall well-being, supporting the need for targeted supportive care and routine QoL monitoring to improve patient-centred outcomes.

Keywords: Breast Neoplasms; Quality of Life; Clinical Characteristics; EORTC QLQ-C30; Indonesia.

Implications for Practice:

- Routine assessment of quality of life should be integrated into breast cancer care pathways, particularly for patients with shorter illness duration and those undergoing intensive treatment regimens, to facilitate timely supportive interventions.
- Health policies should strengthen multidisciplinary supportive care services and standardised quality-of-life monitoring as part of comprehensive breast cancer management to improve patient-centred outcomes.
- Midwifery education programs should enhance competencies in quality-of-life assessment, symptom management, and psychosocial support to prepare better practitioners working in resource-constrained settings, including Low- and Middle-Income Countries, where access to specialised oncology services may be limited.

Introduction

Breast cancer (BC) is the type of cancer with the highest incidence in women worldwide and is one of the main causes of cancer death (International Agency for Research on Cancer, 2026). In Indonesia, breast cancer represents the most common cancer among women, with GLOBOCAN 2022 estimating more than 66,000 new cases annually, accounting for a substantial proportion of the national cancer burden (International Agency for Research on Cancer, 2026). Globally, 2.3 million new cases and 670,000 deaths from female breast cancer will occur in 2022 (Kim et al., 2025; World Health Organisation, 2024). In Indonesia, breast cancer is also the most common cancer (Ministry of Health, 2024).

The majority of BC sufferers require comprehensive therapy such as chemotherapy, radiotherapy, or hormonal therapy, which is given according to each individual's pathology (NICE, 2025). Chemotherapy itself is considered to have a significant role in the treatment of BC patients (Rezanejad Gatabi et al., 2022). The long-term effects of chemotherapy may contribute to reduced quality of life (QoL) and increased psychological distress among patients (Wang et al., 2020). Recent evidence indicates that among 733 breast cancer patients, the most commonly reported physical symptoms were pain (59.38%), followed by fatigue (26.60%), vomiting (24.82%), limb swelling (21.69%), and sleep disturbances (21.56%) (Tang et al., 2025). The various symptoms, both physical and psychological, mentioned have an impact on changes in the patient's QoL (Al Qadire et al., 2021).

The relationship between clinical factors and QoL can be conceptually explained using the Wilson and Cleary model of health-related quality of life, which proposes that biological and clinical characteristics influence symptom status, functional status, general health perceptions, and ultimately overall quality of life. Based on this framework, clinical variables such as duration of illness, cancer stage, treatment type, treatment frequency, comorbidities, and body mass index (BMI) may directly or indirectly affect patients' QoL through increased symptom burden, functional limitations, and psychological distress. Previous international studies have demonstrated that advanced cancer stage, intensive treatment exposure, prolonged illness duration, and comorbid conditions are frequently associated with poorer QoL outcomes among breast cancer patients (Aljadani et al., 2025; Mokhatri-Hesari & Montazeri, 2020; Ngo et al., 2023; Soto-Ruiz et al., 2025). In addition, previous studies showed that patients with advanced stages or those undergoing combination therapy tend to experience decreased physical function and increased symptom burden, which ultimately impacts QoL (Haddou et al., 2024; Suanjaya et al., 2025). Then, side effects of therapy such as fatigue, pain, sleep disturbances, and emotional distress have also been reported to contribute significantly to decreased QoL (Brotobor et al., 2025; So et al., 2021).

However, findings across studies remain inconsistent, particularly regarding the relative contribution of specific clinical variables to QoL domains.

Although QoL among breast cancer patients has been widely investigated internationally, evidence from Indonesia remains relatively scarce and fragmented. Most Indonesian studies primarily focus on cancer incidence, screening, and early detection strategies (Anggraeni et al., 2023; Icanervilia et al., 2023; Kurniawati & Aryzki, 2023; Panggabean et al., 2023), while relatively few studies comprehensively examine how specific clinical characteristics are associated with QoL outcomes among breast cancer patients. Moreover, previous studies in Indonesia rarely evaluate multiple clinical variables simultaneously using standardized QoL instruments, creating an important evidence gap for patient-centered oncology care in the Indonesian context.

The urgency of this research is increasing considering that the condition of cancer services in Indonesia still faces various challenges, such as late diagnosis (Hutajulu et al., 2022). These factors have the potential to worsen the patient's clinical condition, increase the burden of symptoms, and ultimately reduce the QoL. In addition, breast cancer patients in Indonesia often undergo long-term therapy with a combination of treatment modalities, so it is important to understand how certain clinical characteristics relate to patients' QoL (Peng et al., 2026). Therefore, understanding the association between clinical variables and QoL has important implications for clinical decision-making and supportive cancer care. Identification of patients who are at greater risk of poor QoL may assist healthcare professionals in prioritizing symptom management, psychosocial support, survivorship care planning, and individualized supportive interventions. This is particularly relevant in Indonesia, where healthcare resources and oncology support services may be limited in certain regions. Therefore, this study aimed to determine the association between specific clinical variables and quality of life domains among breast cancer patients in Indonesia.

Methods

Study Design

A cross-sectional study was conducted to examine the correlation between clinical variables and quality of life among women diagnosed with breast cancer in Indonesia. Data were collected between November 2025 and January 2026**.** All eligible participants were recruited at a single point in time and completed the study questionnaires during the same observational period, allowing the assessment of clinical characteristics and quality of life simultaneously. This research follows the checklist guidelines from STROBE.

Participants

The study population consisted of women with breast cancer who received treatment at one of the largest referral hospitals in West Java, Indonesia. Participants were recruited using a convenience sampling technique. The inclusion criteria were: (1) women with a confirmed diagnosis of breast cancer, (2) aged 18 years or older, and (3) able to read and understand the questionnaire. Patients were excluded if they (1) had cognitive impairment or severe clinical conditions that limited their ability to complete the questionnaire independently, or (2) refused to participate.

The sample size was determined based on the total number of eligible breast cancer patients attending the hospital during the study period and who agreed to participate. Because this study was exploratory and conducted within a limited recruitment

period, all eligible participants meeting the inclusion criteria were invited to participate.

Data collection was carried out through direct contact with patients in the hospital setting. A total of 58 patients were approached for participation, of whom 53 met the eligibility criteria and agreed to participate in the study. Five patients were excluded due to incomplete questionnaire responses or declining participation. Therefore, the final analysis included 53 participants.

Because recruitment was conducted during an active treatment period at a referral hospital, a proportion of participants were newly diagnosed patients for whom definitive staging investigations had not yet been completed at the time of data collection. For these patients, a confirmed cancer stage could not be assigned and was recorded as "unspecified."

Instruments

Clinical data were collected to describe participants' medical characteristics, including duration of illness, cancer stage, treatment received, treatment frequency, comorbidities, body mass index (BMI), and family history of cancer. Quality of life (QoL) was assessed using the Indonesian version of the European Organisation for Research and Treatment of Cancer Quality of Life Questionnaire-Core 30 (EORTC QLQ-C30) (Aaronson et al., 1993). The questionnaire was administered primarily through self-report. However, participants who experienced difficulty reading or understanding certain items received standardized assistance from trained research assistants without influencing their responses.

The EORTC QLQ-C30 consists of 30 items divided into several domains, including five functional scales (physical functioning: 5 items, role functioning: 2 items, emotional functioning: 4 items, cognitive functioning: 2 items, and social functioning: 2 items), three symptom scales (fatigue: 3 items, pain: 2 items, and nausea/vomiting: 2 items), a global health status/QoL scale (2 items), and six single-item symptom measures assessing dyspnea, insomnia, appetite loss, constipation, diarrhea, and financial difficulties. The Indonesian version has demonstrated adequate validity and reliability, with Cronbach's alpha coefficients ≥ 0.70 across domains (Perwitasari et al., 2011).

The instrument was translated using a standardized forward–backward translation procedure and evaluated for validity and reliability. Raw scores for each domain were calculated as the mean of the corresponding items and subsequently transformed linearly into a 0–100 scale according to the EORTC scoring manual. Higher scores on the functional and global health status scales indicate better functioning and overall QoL, whereas higher scores on the symptom scales indicate greater symptom burden. The Indonesian version of the EORTC QLQ-C30 questionnaire has been provided as a supplementary file to support methodological transparency.

Data Collection

Data were obtained through direct recruitment of patients attending the hospital during the study period. Eligible participants were identified based on the predefined inclusion criteria during their scheduled visits. Prior to data collection, the researchers coordinated with healthcare professionals to facilitate access to potential respondents. Data collection was conducted by trained research assistants who received standardized instructions regarding participant approach, informed consent procedures, questionnaire administration, and confidentiality maintenance to ensure consistency throughout the study process.

Participants who met the eligibility criteria were approached directly by the researchers and provided with detailed information regarding the study objectives and procedures. Those who agreed to participate signed an informed consent form before completing the questionnaires independently. Participation was voluntary, and respondents were allowed to withdraw from the study at any stage without consequences.

To ensure data quality, all completed questionnaires were checked immediately after collection for completeness and consistency. Data were entered into Microsoft Excel and subsequently analyzed using Jamovi version 2.4.7. Double-checking procedures were performed by the research team to minimize data entry errors. Questionnaires with substantial incomplete responses were excluded from the final analysis. For minor missing responses within the QoL questionnaire, scoring procedures followed the EORTC QLQ-C30 scoring manual recommendations. All study data were stored securely in password-protected electronic files accessible only to the research team.

Data Analysis

Data were analyzed using Jamovi version 2.4.7. Descriptive (univariate) statistics were used to summarize participants' demographic and clinical characteristics, as well as quality of life domains. Categorical variables were presented as frequencies and percentages. QoL scores were first calculated and linearly transformed into a 0–100 scale following the EORTC QLQ-C30 scoring guidelines. To facilitate interpretation, the transformed scores were categorized into three levels. For the functional scales and global health status, scores of 0–40 were classified as poor, 41–70 as moderate, and 71–100 as good, where higher scores indicate better functioning and overall QoL. For the symptom scales, scores of 0–40 were categorized as mild, 41–70 as moderate, and 71–100 as severe, where higher scores represent greater symptom burden (Haroen et al., 2026).

Bivariate analysis was conducted to examine the association between clinical variables and quality of life, particularly global health status. Since the variables were categorical, the Chi-square test was used to assess associations between variables. Prior to analysis, Chi-square assumptions were evaluated by examining the frequency distribution and expected cell counts. Fisher's exact test was applied when the expected frequency assumptions were not met. Effect size was reported using Cramer's V to estimate the strength of associations. Because this study focused on categorical association analysis rather than estimation modeling, confidence intervals were not calculated. A p-value < 0.05 was considered statistically significant.

Inferential analysis was restricted to the global health status/QoL scale, which serves as the overarching summary indicator of overall health-related quality of life within the EORTC QLQ-C30 and aligned directly with the primary aim of identifying clinical variables associated with overall QoL. Regarding missing data handling, questionnaires with substantial incomplete responses were excluded from the final analysis. For minor missing responses within the EORTC QLQ-C30, data processing followed the scoring recommendations provided in the EORTC scoring manual.

Ethical Considerations

This study was reviewed and approved by the Universitas Jendral Ahmad Yani Research Ethics Committee (Approval No. Nomor: 046/KEPK/FITKes-Unjani/IX/2025). The study was conducted in accordance with the principles of the Declaration of Helsinki. All participants received detailed information about the

study objectives, procedures, potential benefits, and risks prior to enrollment. Written informed consent was obtained from all participants. Participation was voluntary, and confidentiality was ensured by excluding personal identifiers from the dataset. All collected data were securely stored and used exclusively for research purposes.

Results

Table 1 showed that among the 53 breast cancer patients, the majority were aged 41–50 years (45.3%). Similarly, most patients were diagnosed at the age of 41–50 years (37.7%). More than half of the participants had primary education (52.8%). The majority were unemployed (77.4%) and married (86.8%). All participants were Muslim (100.0%) and covered by the national health insurance system (BPJS) (100.0%).

Table 1. Demographic Characteristics of Breast Cancer Patients (N = 53)

Variable		Frequency (n)	Percentage (%)
Age	30–40 years	10	18.9
	41–50 years	24	45.3
	51–60 years	12	22.6
	>60 years	7	13.2
Age at diagnosis	30–40 years	16	30.2
	41–50 years	20	37.7
	51–60 years	11	20.8
	>60 years	6	11.3
Education level	No formal education	1	1.9
	Primary education	28	52.8
	Secondary education	18	34.0
	Higher education	6	11.3
Employment status	Employed	12	22.6
	Unemployed	41	77.4
Marital status	Married	46	86.8
	Divorced	7	13.2
Religion	Islam	53	100.0
Health insurance	BPJS (Indonesia National Health Insurance)	53	100.0

Clinical Characteristics of Breast Cancer Patients

Table 2 showed the clinical characteristics of the 53 breast cancer patients. Most participants had been living with breast cancer for less than one year (45.3%), followed by those with a duration of illness of 1–3 years (41.5%). Regarding treatment received, the most common treatment was surgery combined with chemotherapy (41.5%). In terms of treatment frequency, the majority of patients underwent treatment every three weeks (64.2%). For cancer stage, the largest proportion of patients had an unspecified stage (35.8%), followed by stage II (30.2%). Notably, 35.8% of participants had an unspecified cancer stage, reflecting the inclusion of newly diagnosed patients whose definitive staging had not been finalized during the recruitment period. In addition, more than half of the participants reported having no comorbidities (54.7%), while hypertension was the most common comorbidity (39.6%). Based on BMI classification, obesity was the most frequent category (34.0%). Most participants reported no family history of cancer (86.8%).

Table 2. Clinical Characteristics of Breast Cancer Patients (*n* = 53)

Variable		Frequency (n)	Percentage (%)
Duration of illness	<1 year	24	45.3
	1–3 years	22	41.5
	>3 years	7	13.2
Treatment received	Not yet treated	1	1.9
	Chemotherapy	16	30.2
	Surgery	1	1.9
	Surgery + Chemotherapy	22	41.5
	Surgery + Chemotherapy	10	18.9

Variable		Frequency (n)	Percentage (%)
	+ Hormonal therapy		
	Surgery + Chemotherapy + Radiotherapy + Hormonal therapy	3	5.7
Treatment frequency	Weekly	1	1.9
	Every 2 weeks	7	13.2
	Every 3 weeks	34	64.2
	Every 4 weeks	7	13.2
	Have not received therapy	4	7.5
Cancer stage	Stage 1	1	1.9
	Stage 2	16	30.2
	Stage 3	11	20.8
	Stage 4	6	11.3
	Unspecified	19	35.8
Comorbidities	None	29	54.7
	Hypertension	21	39.6
	Diabetes mellitus	1	1.9
	Hypertension + Diabetes mellitus	1	1.9
	Mental illness	1	1.9
Body Mass Index (BMI)	Underweight	5	9.4
	Normal	15	28.3
	Overweight	15	28.3
	Obese	18	34.0
Family history of cancer	None	46	86.8
	Mother	3	5.7
	Sibling (younger)	2	3.8
	Sibling (older)	2	3.8

Quality of Life Among Breast Cancer Patients

Table 3 presents the QoL among breast cancer patients based on functional scales and global health status. In the functional domains, the majority of patients reported good physical functioning (50.9%) and good role functioning (50.9%). For emotional functioning, the largest proportion of participants reported a good level (37.7%), followed closely by a moderate level (34.0%). In addition, most participants reported good cognitive functioning (47.2%) and good social functioning (75.5%), indicating that social functioning was the strongest domain among the functional scales. Regarding global health status, nearly half of the patients had a moderate global health status (49.1%), while 35.8% reported poor global health status and only 15.1% reported good global health status.

Table 3. Functional Scales and Global Health Status

Dimension		Frequency (n)	Percentage (%)
Physical functioning	Good	27	50.9
	Moderate	14	26.4
	Poor	12	22.6
Role functioning	Good	27	50.9
	Moderate	10	18.9
	Poor	16	30.2
Emotional functioning	Good	20	37.7
	Moderate	18	34.0
	Poor	15	28.3
Cognitive functioning	Good	25	47.2
	Moderate	21	39.6
	Poor	7	13.2
Social functioning	Good	40	75.5
	Moderate	11	20.8
	Poor	2	3.8
Global Health Status	Good	8	15.1
	Moderate	26	49.1
	Poor	19	35.8

Regarding symptom scales (**Table 4**), fatigue was most commonly reported at a mild level (49.1%). However, severe symptoms were predominant in several domains. Severe nausea and vomiting was reported by 47.2% of patients. Dyspnea was most frequently reported as severe (67.9%), and constipation was also predominantly severe (67.9%). Similarly, diarrhea showed a high proportion of severe cases (77.4%). For pain, the largest proportion of patients reported mild pain (41.5%). Sleep disturbance was most commonly mild (41.5%), while appetite loss was most frequently severe (43.4%). In terms of financial difficulties, nearly half of the participants reported severe financial problems (49.1%).

Table 4. Symptom Scales

Dimension		Frequency (n)	Percentage (%)
Fatigue	Mild	26	49.1
	Moderate	21	39.6
	Severe	6	11.3
Nausea and vomiting	Mild	14	26.4
	Moderate	14	26.4
	Severe	25	47.2
Pain	Mild	22	41.5
	Moderate	19	35.8
	Severe	12	22.6
Dyspnea	Mild	4	7.5
	Moderate	13	24.5
	Severe	36	67.9
Sleep disturbance	Mild	22	41.5
	Moderate	14	26.4
	Severe	17	32.1
Appetite loss	Mild	14	26.4
	Moderate	16	30.2
	Severe	23	43.4
Constipation	Mild	9	17.0
	Moderate	8	15.1
	Severe	36	67.9
Diarrhea	Mild	5	9.4
	Moderate	7	13.2
	Severe	41	77.4
Financial difficulties	Mild	23	43.4
	Moderate	4	7.5
	Severe	26	49.1

Correlation Between Clinical Variables and Quality of Life

Table 5 presents the association between clinical variables and global health status among breast cancer patients. A statistically significant association was found between duration of illness and quality of life ($p < .001$), with a moderate effect size (Cramer's V = 0.467). Similarly, treatment received ($p = .030$; Cramer's V = 0.434) and treatment frequency ($p = 0.034$; V = 0.396) were significantly associated with global health status, both demonstrating moderate associations. In contrast, cancer stage ($p = .610$), comorbidities ($p = .304$), BMI category ($p = 0.637$), and family history of cancer ($p = .495$) were not significantly associated with quality of life. Overall, duration of illness showed the strongest association with global health status among the clinical variables examined. These non-significant associations should be interpreted with caution, as the limited sample size and sparse distribution across several categories may have reduced the statistical power to detect true associations.

Table 5. Association Between Clinical Variables and Quality of Life (Global Health Status) in Breast Cancer Patients (N = 53)

Clinical variables	p-value	Effect size (V)	Interpretation
Duration of illness	<0.001**	0.467	moderate association
Treatment received	0.030*	0.434	moderate association
Treatment frequency	0.034*	0.396	moderate association
Cancer stage	0.610	0.244	Not significant
Comorbidities	0.304	0.299	Not significant
BMI category	0.637	0.201	Not significant
Family history of cancer	0.495	0.226	Not significant

Statistical analysis: Chi-Square test and Fisher's exact test

Discussion

This study demonstrated that the QoL of breast cancer patients in Indonesia was generally at a moderate level, with nearly half of the respondents reporting moderate global health status (49.1%), while 35.8% were categorized as poor and only 15.1% as good. These findings are consistent with global evidence indicating that the average QoL among breast cancer patients tends to be moderate, particularly during or shortly after active treatment. A meta-analysis involving more than 9,000 patients reported global QoL scores within the mid-range of a 0–100 scale, reflecting a moderate level of overall QoL (Biparva et al.,

2022). Therefore, the proportion of patients reporting poor QoL in this study reflects a clinically meaningful burden and is consistent with previous international findings.

Regarding to functional domains, social functioning emerged as the strongest domain in this study, with 75.5% of respondents categorized as good. This result aligns with previous studies indicating that women who are partnered or who have strong social support tend to report better social functioning and overall QoL (Karalienė et al., 2025; Wilkinson & Smith, 2024). Given that the majority of participants in this study were married (86.8%), family support likely played a substantial role in maintaining relatively preserved social functioning. However, emotional functioning showed a more balanced distribution across good, moderate, and poor categories. This finding is consistent with literature reporting that anxiety and fear of recurrence may persist for years after diagnosis, even after completion of treatment (Carreira et al., 2020; Heidary et al., 2023). In other words, emotional well-being remains a critical challenge throughout the breast cancer trajectory.

In the symptom domain, this study identified a relatively high proportion of severe symptoms in several areas, including dyspnea, constipation, diarrhea, and nausea and vomiting. These findings are consistent with previous studies that have identified fatigue, pain, sleep disturbances, and cognitive complaints as major determinants of reduced global QoL among breast cancer patients (Hamer et al., 2017; Schmidt et al., 2018). Moreover, side effects related to chemotherapy and endocrine therapy such as fatigue, arthralgia, hormonal disturbances, and menopausal symptoms have been shown to contribute to declines in physical functioning and increased symptom burden (Carreira et al., 2020; Park et al., 2020). Considering that most participants in this study underwent combination therapies (e.g., surgery and chemotherapy), the substantial symptom burden reported may be understood as a consequence of intensive treatment exposure.

The analysis further revealed that duration of illness was the variable most strongly associated with global health status ($p < 0.001$; Cramer's $V = 0.467$). This finding is consistent with longitudinal studies demonstrating that QoL trajectories among breast cancer survivors evolve over time. Several studies have reported that physical functioning tends to decline gradually among long-term survivors, particularly in older populations or those with comorbidities, while mental functioning may remain relatively stable in some individuals (Carreira et al., 2020; Schmidt et al., 2018). Even five to ten years after diagnosis, many survivors continue to report unmet needs related to fatigue, sleep disturbances, and cognitive function (Schmidt et al., 2018). From a theoretical perspective, these findings may be interpreted using the Wilson and Cleary model of health-related QoL, which proposes that biological and clinical characteristics influence symptom status, functional status, and overall health perceptions. In this context, prolonged illness duration may contribute to cumulative symptom burden, psychosocial distress, and functional limitations that ultimately affect global health status. Therefore, the significant role of illness duration in this study underscores the importance of sustained survivorship care within the Indonesian cancer care context.

In addition to duration of illness, treatment type and treatment frequency were significantly associated with QoL, both demonstrating moderate effect sizes. This finding is consistent with previous research indicating that more aggressive treatments

or multimodal therapeutic approaches are frequently associated with reduced physical functioning and increased symptom burden (Carreira et al., 2020; Park et al., 2020; Xiao et al., 2025). Other studies have also shown that surgical modality may associated physical and body image domains, with breast-conserving surgery or reconstruction generally associated with better QoL outcomes compared to mastectomy without reconstruction (Imran et al., 2019; Zehra et al., 2020). Frequent treatment exposure may also increase fatigue, emotional distress, disruption of social roles, and financial burden, all of which may negatively influence patients' perceptions of health and well-being.

These associations, however, must be interpreted with caution. In observational data, treatment exposure is closely intertwined with disease stage, clinical severity, and physician-driven treatment decisions; patients receiving more intensive or more frequent treatment may already have more advanced disease or a greater baseline symptom burden. The observed associations between treatment-related variables and QoL may therefore partly reflect confounding by indication rather than the burden of treatment per se. Because the present analysis was bivariate and did not adjust for disease severity or other clinical confounders, it is not possible to isolate the independent contribution of treatment exposure to QoL.

Interestingly, cancer stage, comorbidities, BMI category, and family history were not significantly associated with global health status in this study. This contrasts with several studies reporting that advanced-stage disease is often linked to poorer QoL (Carreira et al., 2020; Park et al., 2020; Soto-Ruiz et al., 2025). The non-significant association between cancer stage and QoL should be interpreted with caution. More than one-third of participants had an unspecified stage, predominantly newly diagnosed patients awaiting definitive staging. This unspecified group likely represented a heterogeneous mixture of early- and advanced-stage disease, which may have obscured a genuine stage-related gradient in QoL and reduced the statistical capacity to detect a true association.

Several explanations may account for the absence of significant associations between cancer stage and QoL in this study. First, a considerable proportion of participants had unspecified cancer stages, which may have reduced the statistical power to detect meaningful associations. Second, QoL is a multidimensional construct influenced not only by disease severity but also by psychosocial adaptation, coping strategies, social support, symptom perception, and access to supportive care. Third, variations in treatment response and symptom experience across individuals may contribute to heterogeneous QoL outcomes regardless of cancer stage. The absence of significant associations in this study may also be attributed to the relatively small sample size and the cross-sectional design.

Similarly, the non-significant associations observed for comorbidities, BMI category, and family history of cancer should be interpreted cautiously. These variables may have weaker direct effects on QoL compared to treatment burden and symptom experiences, particularly within a relatively small and clinically heterogeneous sample. Overall, the findings of this study are consistent with international literature indicating that QoL among breast cancer patients is not solely associated by clinical characteristics. These findings highlight the importance of comprehensive symptom management, long-term monitoring, psychosocial support, and patient-centered communication and shared decision-making to enhance the QoL of breast cancer patients in Indonesia.

Implications and limitations

This study provides important clinical and theoretical implications for breast cancer care in Indonesia by highlighting that duration of illness and treatment-related factors are key determinants of quality of life (QoL), underscoring the need for routine QoL assessment using standardized instruments such as the EORTC QLQ-C30, as well as the integration of symptom management, psychosocial support, and survivorship care into routine oncology services. The use of a validated QoL instrument and the assessment of multiple clinical variables strengthen the study's contribution to the limited evidence available in Indonesia. However, the findings should be interpreted with caution due to the cross-sectional design, relatively small convenience sample from a single referral hospital, incomplete cancer staging data, and the absence of multivariable adjustment for demographic and socioeconomic factors, all of which may limit causal inference and generalizability. Future studies should employ larger, adequately powered multi-center longitudinal designs with comprehensive clinical and sociodemographic data to better clarify the determinants of QoL among breast cancer patients.

Relevance to Practice

The findings of this study have important implications for clinical practice, healthcare systems, and oncology service development in Indonesia. Routine integration of quality of life (QoL) assessment into clinical workflows using standardized instruments such as the EORTC QLQ-C30 may facilitate the early identification of breast cancer patients with high symptom burden and supportive care needs, enabling timely referrals for psychological counseling, nutritional support, symptom management, and rehabilitation services. The findings also underscore the importance of strengthening multidisciplinary and patient-centered cancer care by enhancing healthcare professionals' competencies in QoL assessment, communication, symptom management, and psychosocial support, while integrating QoL monitoring into routine assessment protocols and electronic medical records to support clinical decision-making and longitudinal patient follow-up. At the policy level, the results support the incorporation of QoL indicators into national oncology guidelines and survivorship care programs, as well as the development of standardized protocols for routine QoL monitoring and strengthened supportive care infrastructure, particularly in referral hospitals and resource-limited settings, to improve care quality, patient safety, and overall treatment outcomes among breast cancer patients.

Conclusion

Duration of illness, treatment type, and treatment frequency were significantly associated with quality of life (QoL) among women with breast cancer in Indonesia, suggesting that treatment burden and illness trajectory play important roles in shaping patients' physical, psychological, and overall well-being. These findings reinforce the concept that QoL is a dynamic and multidimensional outcome influenced by ongoing clinical and treatment-related experiences rather than disease characteristics alone, highlighting the importance of integrating routine QoL assessment, symptom management, and psychosocial support into patient-centered oncology care, particularly in resource-limited settings. Future research should employ longitudinal and multicenter designs with larger and more diverse samples to better evaluate changes in QoL across treatment phases and strengthen the evidence regarding factors associated with

QoL among breast cancer patients in Indonesia.

Funding
This research received no external funding.

CrediT Authorship Contributions Statement
Anastasia Anna: Conceptualization, Methodology, Supervision, Writing - Original Draft, Funding Acquisition
Yanny Trisyani : Investigation, Resources, Data Curation, Project Administration
Aan Nuraeni : Investigation, Writing - Original Draft, Review & Editing, Visualization,
Ayu Prawesti Priambodo : Investigation, Original Draft, Review & Editing, Visualization
Firman Sugiharto : Software, Validation, Formal Analysis, Writing - Review & Editing

Conflicts of Interest
There is no conflict of interest.

Acknowledgments
The authors would like to express their sincere gratitude to all participants who generously contributed their time and insights to this study. Their valuable involvement made this research possible. The authors also gratefully acknowledge Universitas Padjadjaran for funding this research under the Academic Leadership Grant (ALG) scheme.

Supplementary Materials
Supplementary File S1: Research Instrument contains the full questionnaire used for data collection.

References
Aaronson, N. K., Ahmedzai, S., Bergman, B., Bullinger, M., Cull, A., Duez, N. J., Filiberti, A., Flechtner, H., Fleishman, S. B., & Haes, J. C. J. M. de. (1993). The European Organization for Research and Treatment of Cancer QLQ-C30: a quality-of-life instrument for use in international clinical trials in oncology. *JNCI: Journal of the National Cancer Institute*, *85*(5), 365–376.

Al Qadire, M., Alsaraireh, M., Alomari, K., Aldiabat, K. M., Al-Sabei, S., Al-Rawajfah, O., & Aljezawi, M. (2021). Symptom Clusters Predictive of Quality of Life Among Jordanian Women with Breast Cancer. *Seminars in Oncology Nursing*, *37*(2), 151144. https://doi.org/10.1016/j.soncn.2021.151144

Aljadani, F., Nughays, R., Alharbi, G., Almazroy, E., Elyas, S., Danish, H., Alanazi, R., Aldrees, B., Jadkarim, G., & Mikwar, Z. (2025). Quality of Life in Breast Cancer Patients in Saudi Arabia: A Systematic Review. *Breast Cancer : Targets and Therapy*, *17*, 171–186. https://doi.org/10.2147/bctt.s505725

Anggraeni, F. D., Sukartini, T., & Nihayati, H. E. (2023). Quality of life of breast cancer patients. *Pediomaternal Nursing Journal*, *9*(1), 31–35. https://doi.org/10.20473/pmnj.v9i1.42249

Biparva, A. J., Raoofi, S., Rafiei, S., Kan, F. P., Kazerooni, M., Bagheribayati, F., Masoumi, M., Doustmehraban, M., Sanaei, M., Zarabi, F., Raoofi, N., Chomalu, Z. B., Ahmadi, B., Talab, F. S., Hoseini, B. S., Asadollahi, E., Mir, M., Deylami, S., Zareei, M., … Ghashghaee, A. (2022). Global quality of life in breast cancer: systematic review and meta-analysis. *BMJ Supportive & Palliative Care*, *13*. https://doi.org/10.1136/bmjspcare-2022-003642

Brotobor, D., Nwozichi, C., & Brotobor, O. (2025). Symptom clusters in breast

cancer patients, post-chemotherapy: Prevalence, severity, and network analysis approaches. *Babcock University Medical Journal*. https://doi.org/10.38029/babcockuniv.med.j..v8i1.727

Carreira, H., Williams, R., Dempsey, H., Stanway, S., Smeeth, L., & Bhaskaran, K. (2020). Quality of life and mental health in breast cancer survivors compared with non-cancer controls: a study of patient-reported outcomes in the United Kingdom. *Journal of Cancer Survivorship*, *15*, 564–575. https://doi.org/10.1007/s11764-020-00950-3

Haddou, M. B., Igarramen, T., Khouchani, M., & Elkhoudri, N. (2024). Determinants of Health-related Quality of Life in Breast Cancer Patients: A Comprehensive Study in Marrakech, Morocco. *The Open Public Health Journal*. https://doi.org/10.2174/0118749445317154240729053442

Hamer, J., McDonald, R., Zhang, L., Verma, S., Leahey, A., Ecclestone, C., Bedard, G., Pulenzas, N., Bhatia, A., Chow, R., DeAngelis, C., Ellis, J., Rakovitch, E., Lee, J., & Chow, E. (2017). Quality of life (QOL) and symptom burden (SB) in patients with breast cancer. *Supportive Care in Cancer*, *25*, 409–419. https://doi.org/10.1007/s00520-016-3417-6

Haroen, H., Pahria, T., Agustina, H. R., Nyarumentang, G., Winarno, A., Windani, C., Sari, M., Natasya, W., & Pardosi, J. F. (2026). Patient Navigation Needs and Quality of Life Among Women with Gynecological Cancer in Indonesia : A Cross-Sectional Study. *Healthcare*, *14*(1388), 1–18.

Heidary, Z., Ghaemi, M., Rashidi, H., Gargari, O. K., & Montazeri, A. (2023). Quality of Life in Breast Cancer Patients: A Systematic Review of the Qualitative Studies. *Cancer Control : Journal of the Moffitt Cancer Center*, *30*. https://doi.org/10.1177/10732748231168318

Hutajulu, S. H., Prabandari, Y. S., Bintoro, B. S., Wiranata, J. A., Widiastuti, M., Suryani, N. D., Saptari, R. G., Taroeno-Hariadi, K. W., Kurnianda, J., Purwanto, I., Hardianti, M. S., & 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. https://doi.org/10.1371/journal.pone.0262468

Icanervilia, A. V., Choridah, L., Van Asselt, A. D. I., Vervoort, J. P. M., Postma, M. J., Rengganis, A. A., & Kardinah, K. (2023). Early Detection of Breast Cancer in Indonesia: Barriers Identified in a Qualitative Study. *Asian Pacific Journal of Cancer Prevention : APJCP*, *24*(8), 2749–2755. https://doi.org/10.31557/APJCP.2023.24.8.2749

Imran, M., Al-Wassia, R., Alkhayyat, S., Baig, M., & Al-Saati, B. A. (2019). Assessment of quality of life (QoL) in breast cancer patients by using EORTC QLQ-C30 and BR-23 questionnaires: A tertiary care center survey in the western region of Saudi Arabia. *PLoS ONE*, *14*. https://doi.org/10.1371/journal.pone.0219093

International Agency for Research on Cancer. (2026). *Absolute numbers, Incidence and Mortality, Females, in 2022 (Cancer in Indonesia)*. GLOBOCAN 2022: Indonesia Fact Sheet.

Karalienė, V., Petravičienė, Z., & Budrienė, L. (2025). Quality of Life in Patients With Breast Cancer: A Pilot Study.

Reabilitacijos Mokslai: Slauga, Kineziterapija, Ergoterapija. https://doi.org/10.33607/rmske.v1i32.1595

Kementrian Kesehatan Republik Indonesia. (2024). *Rencana kanker nasional 2024-2034* (Issue September).

Kim, J., Harper, A., McCormack, V., Sung, H., Houssami, N., Morgan, E., Mutebi, M., Garvey, G., Soerjomataram, I., & Fidler-Benaoudia, M. M. (2025). Global patterns and trends in breast cancer incidence and mortality across 185 countries. *Nature Medicine*. https://doi.org/10.1038/s41591-025-03502-3

Kurniawati, D., & Aryzki, S. (2023). Knowledge Of Early Detection Of Breast Cancer Using Bse Method In Pharmaceutical Students. *International Student Conference of Global Multidisciplinary Collaboration*, *1*(1), 94–100.

Mokhatri-Hesari, P., & Montazeri, A. (2020). Health-related quality of life in breast cancer patients: review of reviews from 2008 to 2018. *Health and Quality of Life Outcomes*, *18*. https://doi.org/10.1186/s12955-020-01591-x

Ngo, N., Nguyen, H., Nguyen, P. T. L., Vo, T. T. T., Phung, T., Pham, A. G., Vo, T., Dang, M. T. N., Bao, T. N. Le, & Duong, K. (2023). Health-related quality of life in breast cancer patients in low-and-middle-income countries in Asia: a systematic review. *Frontiers in Global Women's Health*, *4*. https://doi.org/10.3389/fgwh.2023.1180383

NICE. (2025). *Early and locally advanced breast cancer : diagnosis and management* (Issue July 2018).

Panggabean, R. T. A., Octavia, L., Dwi, N., & -, A. (2023). Early Detection of Breast Cancer Using the K-Nearest Neighbour (K-Nn) Algorithm. *Jurnal Sistem Informasi Dan Ilmu Komputer Prima(JUSIKOM PRIMA)*, *6*(2), 38–42. https://doi.org/10.34012/jurnalsistem informasidanilmukomputer.v6i2.3194

Park, J., Rodriguez, J., O'Brien, K., Nichols, H., Hodgson, M., Weinberg, C., & Sandler, D. (2020). Health-related quality of life outcomes among breast cancer survivors. *Cancer*, *127*. https://doi.org/10.1002/cncr.33348

Peng, Y., Ma, J., Liu, L., Xiao, J., & Gu, C. (2026). Determinants of patient delay and its association with quality of life among young women with breast cancer in China: A cross-sectional study. *Asia-Pacific Journal of Oncology Nursing*, *13*, 100846. https://doi.org/10.1016/j.apjon.2025.100846

Perwitasari, D. A., Atthobari, J., Dwiprahasto, I., Hakimi, M., Gelderblom, H., Putter, H., Nortier, J. W. R., Guchelaar, H. J., & Kaptein, A. A. (2011). Translation and validation of EORTC QLQ-C30 into Indonesian version for cancer patients in Indonesia. *Japanese Journal of Clinical Oncology*, *41*(4), 519–529. https://doi.org/10.1093/jjco/hyq243

Rezanejad Gatabi, Z., Mirhoseini, M., Khajeali, N., Rezanezhad Gatabi, I., Dabbaghianamiri, M., & Dorri, S. (2022). The Accuracy of Electrical Impedance Tomography for Breast Cancer Detection: A Systematic Review and Meta-Analysis. *The Breast Journal*, *2022*, 8565490. https://doi.org/10.1155/2022/8565490

Schmidt, M., Wiskemann, J., & Steindorf, K. (2018). Quality of life, problems, and needs of disease-free breast cancer survivors 5 years after diagnosis. *Quality of Life Research*, *27*, 2077–2086.

https://doi.org/10.1007/s11136-018-1866-8

So, W., Law, B., Ng, M., He, X., Chan, D., Chan, C., & McCarthy, A. (2021). Symptom clusters experienced by breast cancer patients at various treatment stages: A systematic review. *Cancer Medicine*, *10*, 2531–2565. https://doi.org/10.1002/cam4.3794

Soto-Ruiz, N., Escalada-Hernández, P., Pimentel-Parra, G. A., & García-Vivar, C. (2025). Quality of life in long-term cancer-free breast cancer survivors in spain: A descriptive study. *Scientific Reports*, *15*. https://doi.org/10.1038/s41598-025-10176-x

Suanjaya, M. A., Anulus, A., & Husodo, B. T. (2025). Determinan Kualitas Hidup Pasien Pasca Operasi Kanker Payudara di Indonesia: A Systematic review. *Sehat Rakyat: Jurnal Kesehatan Masyarakat*, *4*(3), 685–697. https://doi.org/10.54259/sehatrakyat.v4i3.5476

Tang, J., Guo, B., Zhong, C., Chi, J., Fu, J., Lai, J., Zhang, Y., Guo, Z., Deng, S., & Wu, Y. (2025). Detection of differences in physical symptoms between depressed and undepressed patients with breast cancer: a study using K-medoids clustering. *BMC Cancer*, *25*(1). https://doi.org/10.1186/s12885-024-13387-z

Wang, X., Wang, N., Zhong, L., Wang, S., Zheng, Y., Yang, B., Zhang, J., Lin, Y., & Wang, Z. (2020). Prognostic value of depression and anxiety on breast cancer recurrence and mortality: a systematic review and meta-analysis of 282,203 patients. *Molecular Psychiatry*, *25*(12), 3186–3197. https://doi.org/10.1038/s41380-020-00865-6

Wilkinson, R., & Smith, L. (2024). Quality of Life in Female Breast Cancer Patients and Survivors in a South African Municipality. *Breast Cancer : Basic and Clinical Research*, *18*. https://doi.org/10.1177/11782234241282519

World Health Organization. (2024). *Breast cancer*. https://www.who.int/news-room/fact-sheets/detail/breast-cancer

Xiao, M., Ji, L., Qian, X., Chen, X., Xiu, M., Li, Z., Cao, H., Chen, S.-S., Li, Q., Li, Q., Wang, X., Wang, J., Li, Y., Zheng, X., Zhang, J., & Zhang, P. (2025). Association of quality of life in older patients with breast cancer: a cross-sectional study from China. *BMJ Open*, *15*. https://doi.org/10.1136/bmjopen-2024-085842

Zehra, S., Doyle, F., Barry, M., Walsh, S., & Kell, M. (2020). Health-related quality of life following breast reconstruction compared to total mastectomy and breast-conserving surgery among breast cancer survivors: a systematic review and meta-analysis. *Breast Cancer*, *27*, 534–566. https://doi.org/10.1007/s12282-020-01076-1

