RESEARCH ARTICLE

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Breast Cancer-Related Quality of Life among Women Undergoing Treatment: A Hospital-Based Study in Vietnam

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Abstract

Background: Despite the rising incidence of breast cancer (BC), survival rates have improved due to advancements in early detection and treatment. With longer survival, it is increasingly important to evaluate and enhance patients' quality of life (QoL), particularly the functional and symptom-related aspects of BC. This study aims to assess BC-related QoL and its associated factors among women undergoing treatment. **Method:** A hospital-based cross-sectional study assessed BC-related QoL in 284 patients using the European Organization for Research and Treatment of Cancer (EORTC) QoL Questionnaire for BC (QLQ-BR45) between March 10 and May 14, 2025. Statistical analyses included multivariable linear regression to identify factors associated with 12 domains of patient QoL. **Results:** QoL findings showed high body image scores (72.51) but low sexual functioning (13.50) and sexual enjoyment (26.29), with hair-loss distress (51.32) and systemic therapy side effects (30.92) being the most burdensome symptoms. Older age and higher body mass index (BMI) had both positive and negative associations with QoL, while marriage, higher education, urban residence, and longer breastfeeding were linked to better outcomes. Late-stage disease, older age at first childbirth, and receiving no treatment were linked to poorer outcomes. Treatment had varying effects on QoL domains: surgery plus chemotherapy improved sexual enjoyment, while non-surgical approaches alleviated symptoms across several QoL-related domains. **Conclusion:** BC patients showed strong body image but poor sexual functioning and notable symptom burdens, underscoring the need for supportive care that addresses physical and psychosocial issues. Routine QoL monitoring and broader multicenter studies are essential to guide tailored interventions and improve overall patient QoL.

Keywords: Breast cancer, quality of life, patient undergoing treatment, QLQ-BR45

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Introduction

According to GLOBOCAN data from 2022, breast cancer (BC) ranked as the second most frequently diagnosed cancer globally, after lung cancer, representing 11.7% of all cases [1]. In Vietnam, BC was the most commonly diagnosed cancer in 2022, accounting for 13.6% of all cancer cases and 28.9% of cases among women [2]. Advancements in early detection and treatment have led to marked improvements in BC survival rates [3]. However, such treatments often result in physical, psychological, and social aftereffects that substantially affect patients' quality of life (QoL) [4]. Moreover, the social and emotional health of BC patients is now widely acknowledged as a vital component of holistic care, with research indicating ongoing issues such as fatigue, pain, anxiety, and body image concerns [5]. Hence, there is a growing need to evaluate how treatment factors, along with social and emotional aspects, impact the QoL of BC patients.

Although research on BC and QoL has expanded, major challenges persist in fully understanding and managing its multidimensional impact [6]. The interplay of treatment-related side effects, psychological distress, and limited social support further complicates BC patients' QoL [7]. In addition, a range of sociodemographic and clinical factors have been reported to influence QoL among BC patients, including age, education, income, marital status, lifestyle, tumor stage, treatment modality, and treatment duration. Nevertheless, the associations of some variables such as age, occupation, marital status, tumor stage, and treatment modality remain inconsistent [8].

The European Organization for Research and Treatment of Cancer (EORTC) QoL questionnaire for BC 23 questions (QLQ-BR23), developed in 1996 as one of the first BC-specific QoL tools, has been applied in recent studies involving Vietnamese patients [9, 10]. Advances in BC diagnostics and treatments, however, required an updated instrument to capture emerging side effects, leading to the development of the EORTC

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QoL questionnaire for BC 45 questions (QLQ-BR45), which adds 22 items to the QLQ-BR23. These additions comprise two multi-item scales: a target symptom scale and a satisfaction scale. The target symptom scale is further categorized into three subscales: skin/mucosal symptoms, endocrine therapy-related symptoms, and endocrine-related sexual symptoms [11]. Thus, the QLQ-BR45 offers a more comprehensive and sensitive tool for assessing QoL in the context of contemporary BC care. While validated tools such as EORTC core QoL questionnaire (QLQ-C30) and the Functional Assessment of Cancer Therapy - Breast (FACT-B) have been widely used to evaluate QoL of the patient, gaps remain in understanding how treatment modalities and psychosocial factors distinctly affect specific functional and symptom domains of BC [12].

Inconsistencies in previous findings and the limited understanding of how clinical, treatment-related, and patient characteristics influence specific QoL domains have hampered the development of appropriate supportive interventions, particularly in Vietnam, where BC has become the most commonly diagnosed cancer. Therefore, this study aimed to assess BC-related QoL and to identify factors associated with each functional and symptom domain among women undergoing treatment. It provides insights into the key determinants of QoL and supports the development of targeted, culturally appropriate supportive care strategies.

Materials and Methods

Study Design and Participants

This cross-sectional study was conducted at Danang Oncology Hospital in Danang City, Vietnam. Eligible participants were female patients aged 18 years or older, with histologically confirmed BC, who were currently undergoing or had previously received curative or palliative treatment at the hospital, and were able to understand and communicate in Vietnamese. Patients were excluded if they had a diagnosed mental illness or cognitive impairment that prevented them from completing the survey; suffered from a severe medical condition that posed a risk or hindered participation in the interview; had insufficient clinical, paraclinical, or treatment information in the digital health records (DHR); or were unwilling to participate.

A total of 304 BC patients who visited and received treatment at the hospital during the data collection period from March 10 to May 14, 2025, met the inclusion criteria. We excluded 17 patients due to insufficient DHR data, and 3 patients declined to participate. In the end, 284 eligible participants were obtained for analysis.

Data Collection

The study used both primary data from a cross-sectional survey and secondary data from the DHR. The primary data were collected using a structured questionnaire that included patient characteristics, pregnancy history, BC risk factors, and BC-related QoL assessed with the EORTC QLQ-BR45. Trained female medical staff from the Breast Department conducted the interviews and completed the nonsensitive sections of the questionnaire. Patients self-completed the section on sexual activity during the previous four weeks.

Secondary data were obtained from the DHR in the FPT.eHospital system for all patients who participated in the survey. A standardized data collection protocol was developed based on available data in the DHR, including clinical, paraclinical, cancer stage, and treatment-related information. These variables were aligned with factors reported in previous studies and reviewed by oncology experts to ensure consistency and relevance. Medical staff extracted the required information, and the secondary data were linked with the primary data using hospital patient identification numbers to create a unified dataset for analysis. The data sources and the conceptual framework are depicted in Figure 1.

Baseline Characteristics of Breast Cancer Patients

Patient characteristics included key demographics such as age, marital status, place of residence, highest educational attainment, and employment status. Pregnancy history was assessed through factors such as the number of pregnancies and full-term births, age at first delivery, and total breastfeeding duration in months. In addition, BC risk factors included physical inactivity (less than 10 hours of activity per week), smoking (current or quit within the past 5 years), alcohol use (equivalent to one daily standard drink), and a family history of BC.

Clinical and paraclinical characteristics included number of comorbidities, body mass index (BMI), molecular subtypes, distant metastasis, and BC stage. BMI was classified using World Health Organization 2000 Asia-Pacific guidelines as underweight (BMI < 18.5), normal (18.5–22.9), and overweight (≥ 23) [13]. BC molecular subtypes followed St. Gallen 2015 guidelines and were grouped as Luminal A/B or Human epidermal growth factor receptor 2 (Her2)/Triple-negative [14]. TNM staging was based on the American Joint Committee on Cancer (AJCC) 8th edition and categorized into early stage (stage 0–II) and late-stage disease (stage III–IV) [15]. Treatment modalities were recorded as surgery only; surgery plus chemotherapy, targeted therapy, hormone therapy, radiotherapy, or palliative care; non-surgical methods; and no BC-specific treatment.

Breast Cancer-Related Quality of Life

BC-related QoL was assessed using the EORTC QLQ-BR45 questionnaire. This instrument consists of 45 items, each scored on a 1–4 scale (range = 3 points), and includes 12 domains across three scales: functional scales (5 domains), symptom scales/items (4 domains), and target symptom scales (3 domains). High functional scores indicate good functioning, while high symptom scores reflect more symptoms or difficulties. Prior to implementation, this instrument underwent a rigorous translation process based on a standardized methodology, including forward and backward translation, expert evaluation, proofreading, pilot testing in patients, and cultural adaptation for languages used in different countries [16]. Phase IV validation of its psychometric properties is ongoing; however, the module is now

available for clinical use and has been translated into 19 languages [11]. We obtained permission from EORTC to use the Vietnamese version in this study.

Statistical Analysis

Data were analyzed using SPSS 20. Categorical variables were reported as frequencies and percentages, and continuous variables as means and standard deviations. To assess how different factors influenced each specific aspect of BC-related QoL, separate multivariable linear regression models were developed for all 12 QLQ-BR45 functional and symptom domains, rather than relying on a single overall QoL score. Regression coefficients with 95% confidence intervals were reported. For each model corresponding to each QoL domain, all independent variables identified in the conceptual framework were initially entered into the model, and stepwise selection was used to exclude non-significant predictors, with only variables showing statistical significance ($p < 0.05$) retained in the final model. The adjusted r^2 was used to indicate the proportion of variance in each domain explained by the independent variables.

Ethical Consideration

Patients were informed of the study purpose and gave informed consent to participate. They could withdraw anytime without explanation. The research used anonymized primary and secondary data without identifiers and involved no interventions affecting physical or mental health of the participants.

Results

Characteristics of Study Participants

Table 1 summarizes patient and treatment characteristics of 284 Vietnamese BC cases. The mean age at diagnosis was 49.5 years. Most patients were married, urban residents, and had high school education or lower. Among ever-pregnant women, the average was two pregnancies and full-term births, with first childbirth at 25.54 years and breastfeeding duration of 15.45 months. Low physical activity was common (76.1%), while

Table 1. Demographic characteristics, pregnancy history, breast cancer risk factors, clinical and paraclinical characteristics, and treatment modalities of participants (n= 284)

Characteristics	n (%)
Age (years) (Mean ± SD)	49.47 ± 10.39
Age group (years)	
< 40	49 (17.3)
40 – 49	100 (35.2)
50 – 59	79 (27.8)
≥ 60	56 (19.7)
Marital status	
Married	229 (80.6)
Single/previously married	55 (19.4)
Living area	
Rural	138 (48.6)
Urban	146 (51.4)
Highest completed education level	
High school or lower	203 (71.5)
Higher education	81 (28.5)
Employment status	
Employed	265 (93.3)
Non-employed/Retired	19 (6.7)
Pregnancy history* (Mean ± SD)	
Number of pregnancies	2.38 ± 1.04
Number of full-term births	2.27 ± 1.07
Age at first given birth	25.54 ± 4.94
Duration of breastfeeding (months)	15.45 ± 6.32
Breast cancer risk factors	
Low physical activity	216 (76.1)
Smoking	1 (0.4)
Alcohol consumption	2 (0.7)
Family history of BC	2 (0.7)
Number of comorbidities per patient	
0	226 (79.6)
1	42 (14.8)
≥ 2	16 (5.6)
BMI (kg/m^2) (Mean ± SD)	22.23 ± 3.02
BMI classification	
Underweight	25 (8.8)
Normal range	162 (57.0)
Overweight/obesity	97 (34.2)
Molecular subtypes**	
Luminal A/B	193 (74.5)
Her2/Triple-negative	66 (25.5)
Distant metastasis	
Metastasis at first diagnosed with BC (de novo)	49 (17.3)
Metastasis due to disease progression	14 (4.9)
No	221 (77.8)
Breast cancer TNM staging	
Stage 0-II	169 (59.5)
Stage III-IV	115 (40.5)
Breast cancer treatment modalities	
SR only	102 (35.9)
SR and CT	61 (21.5)
SR and CT/TT/HT/RT/PC	68 (23.9)
Other methods without SR	38 (13.4)
No BC-specific treatment	15 (5.3)

SD, Standard deviation; BC, breast cancer; BMI, Body mass index; Her2, Human epidermal growth factor receptor 2; TNM, Tumor - Nodes - Metastasis; SR, Surgery; CT, Chemotherapy; TT, Targeted therapy; HT, Hormone therapy; RT, Radiotherapy; PC, Palliative care; *Among 268 participants with pregnancy history; **among 259 participants with determined molecular subtypes.

Table 2. Assessment of Breast Cancer- Related Quality of Life among Participants Using the EORTC QLQ-BR45 Scale

The EORTC QLQ-BR45 scale	Mean (SD)	Median (IQR)	Min	Max
Functional scales				
Body image (BRBI)	72.51 (26.25)	75.00 (41.67)	0	100
Sexual functioning (BRSEF)	13.50 (15.84)	0 (33.33)	0	66.67
Sexual enjoyment (BRSEE)*	26.29 (14.94)	33.33 (0)	0	66.67
Future perspective (BRFU)	44.37 (34.03)	33.33 (33.33)	0	100
Breast satisfaction (BRBSt)	58.39 (27.86)	66.67 (33.33)	0	100
Symptoms scales/item				
Systemic therapy side effect (BRST)	30.92 (18.03)	28.57 (23.81)	0	90.48
Breast symptoms (BRBS)	15.46 (18.19)	8.33 (25.00)	0	100
Arm symptoms (BRAS)	17.02 (19.47)	11.11 (22.22)	0	88.89
Upset by hair loss (BRHL)**	51.32 (32.86)	66.67 (33.33)	0	100
Target symptom scale				
Endocrine therapy symptoms (BRET)	20.01 (17.33)	16.67 (23.33)	0	90
Skin mucosis symptoms (BRSM)	15.47 (15.34)	11.11 (16.67)	0	83.33
Endocrine sexual symptoms (BRES)	20.51 (21.30)	16.67 (33.33)	0	100

SD, Standard deviation; IQR, Interquartile range; Min, Minimum; Max, Maximum; Analysis was conducted on *123 and **228 participants.

smoking, alcohol use, and family history were infrequent. Mean BMI was 22.23 kg/m², with one-third overweight/obese. Luminal A/B subtype predominated (74.5%), and 59.5% were early stage at diagnosis; 22.2% had distant metastasis. Treatment included surgery alone (35.9%), surgery plus systemic therapy (45.4%), non-surgical methods (13.4%), and no BC-specific treatment (5.3%).

Breast Cancer-Related Quality of Life among Participants

Table 2 presents BC-related QoL outcomes of the participants assessed using the EORTC QLQ-BR45 scale. Among the functional aspects, sexual functioning (13.50) and sexual enjoyment (26.29) were particularly low compared to other domains. In the symptom-related domains, most scores were low, except for distress from hair loss (51.32) and systemic therapy side effects (30.92), which were notably higher.

Factors Associated with Breast Cancer-Related Quality of Life among Participants

Table 3 outlines the factors associated with functional aspects of BC-related QoL. Older age was associated with

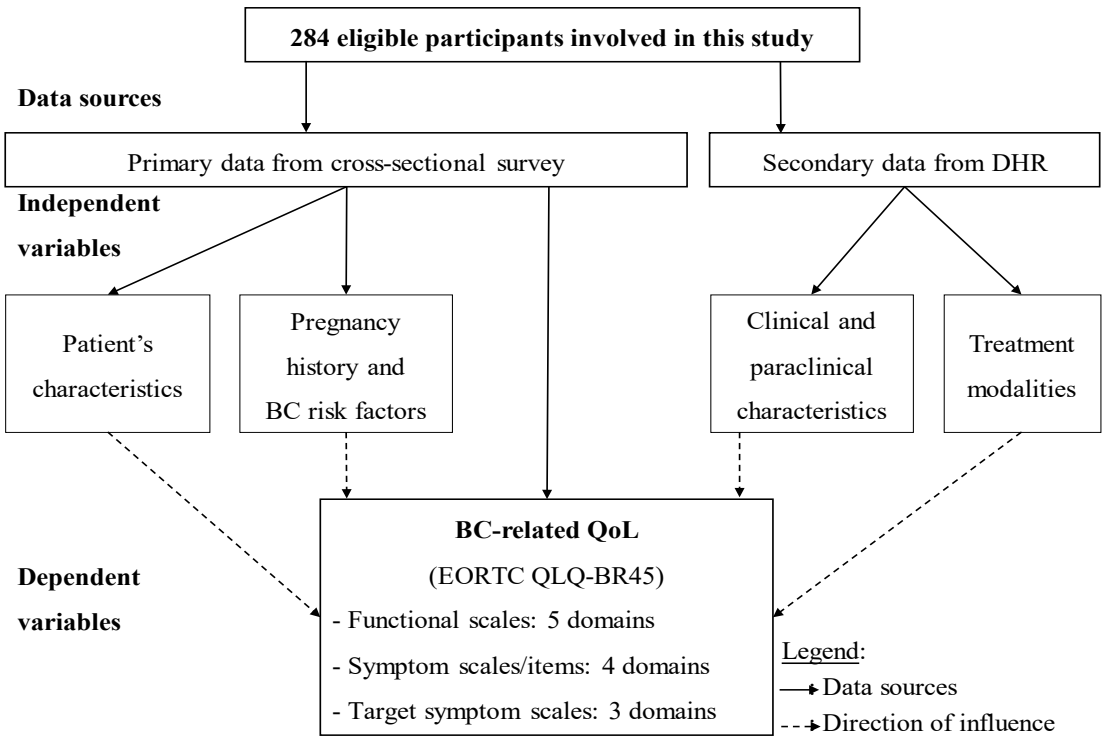

Figure 1. Data Sources and Conceptual Framework of This Study

better body image (β = 0.58) but poorer sexual functioning (β = -0.49), while older age at first childbirth was linked to worse body image (β = -0.85). Being married (β = 9.46) and having higher education (β = 5.16) were strongly associated with better sexual functioning. Rural residence was negatively associated with sexual enjoyment (β = -7.13) and future perspective (β = -10.06). Higher BMI and Her2/triple-negative subtypes were associated with better outcomes in sexual domains (β = 0.67 and 6.79, respectively). Treatment modalities showed mixed effects: surgery alone reduced body image (β = -8.48) and future perspective (β = -10.61) but increased sexual functioning (β = 3.74); surgery plus chemotherapy improved sexual enjoyment (β = 8.14), and non-surgical methods enhanced breast satisfaction (β = 11.77).

Table 4 presents factors associated with BC-related QoL symptom domains. Married patients reported fewer breast symptoms (β = -7.31) and arm symptoms (β = -7.85), while rural residence increased arm symptoms (β = 5.14) and distress from hair loss (β = 11.57). Older age at first childbirth was associated with higher endocrine therapy symptom (β = 0.49), whereas longer breastfeeding duration reduced endocrine therapy symptoms (β = -0.38) and skin mucosis symptoms (β = -0.29). Advanced stages (stage III–IV) worsened breast symptoms (β = 4.77), and higher BMI increased skin mucosis symptoms (β = 0.71). Regarding treatment, surgery alone increased endocrine-related sexual symptoms (β = 5.70), surgery plus chemotherapy reduced endocrine therapy symptoms (β = -6.90), and non-surgical methods substantially decreased endocrine therapy symptoms (β = -12.21), arm symptoms (β = -10.09), and skin mucosis symptoms (β = -5.50). In contrast, patients who did not receive any BC-specific treatment had significantly higher breast symptom scores (β = 13.50).

Discussion

This study offers a detailed overview of BC-related QoL among patients undergoing treatment, highlighting clear variations across functional and symptom domains. On the functional scales, where higher scores indicate better QoL, body image (72.51), future perspective (44.37), and breast satisfaction (58.39) showed relatively high mean scores, likely reflecting the widespread use of breast-conserving surgery. In contrast, sexual functioning (13.50) and sexual enjoyment (26.29) had notably low scores, suggesting negative influences from treatment-related hormonal alterations and emotional distress [17]. Regarding symptom domains, where higher scores indicate greater symptom burden, systemic therapy side effects presented a moderate burden (30.92), whereas breast (15.46) and arm symptoms (17.02) were relatively low, likely due to early detection and improved surgical approaches. Similar patterns were observed in Ethiopia, where breast and arm symptoms were 19.95 and 22.7, respectively, and systemic therapy side effects averaged 29.0 [18]. Distress related to hair loss was considerable (51.32), consistent with studies in India reporting even higher levels of distress (63.79 - 78.16), depending on chemotherapy exposure [19]. Target symptom scales

Table 3. Factors Associated with the EORTC QLQ-BR45 Functional Scales among Participants Using Multivariable Linear Regression Models

Factors	BRBI (r2=0.089)		BRSEF (r2=0.225)		BRSEE (r2=0.112)		BRFU (r2=0.032)		BRBSt (r2=0.018)	
	β (95% CI)	p-value	β (95% CI)	p-value	β (95% CI)	p-value	β (95% CI)	p-value	β (95% CI)	p-value
Age (years)	0.58 (0.27; 0.90)	<0.001	-0.49 (-0.67; -0.31)	<0.001						
Age at first given birth	-0.85 (-1.50; -0.20)	0.01								
Married participants			9.46 (4.54; 14.37)	<0.001						
Rural residence					-7.13 (-12.75; -1.52)	0.013	-10.06 (-18.7; -1.41)	0.023		
Higher education			5.16 (0.99; 9.32)	0.015						
BMI (kg/m^2)			0.67 (0.08; 1.27)	0.027						
Her2/Triple-negative					6.79 (0.19; 13.39)	0.044				
SR only	-8.48 (-15.12; -1.84)	0.013	3.74 (0.01; 7.47)	0.049			-10.61(-19.55; -1.68)	0.02		
SR and CT					8.14 (0.83; 15.45)	0.029				
Other methods without SR									11.77 (1.83; 21.72)	0.021

Results were presented as regression coefficients (β), 95% confidence interval (CI), p-value, and adjusted coefficient of determination (r2); BMI: Body mass index; Her2: Human epidermal growth factor receptor 2; SR: Surgery; CT: Chemotherapy; BRBI: Body image; BRSEF: Sexual functioning; BRSEE: Sexual enjoyment; BRFU: Future perspective; BRBSt: Breast satisfaction.

indicated moderate endocrine therapy-related symptoms (20.01 - 20.51), aligning with prior literature, while skin and mucosal symptoms were low (15.47), likely due to the adoption of newer, less toxic radiotherapy techniques [20]. Overall, these findings suggest that although many physical symptoms are well controlled, challenges related to sexual health, systemic side effects, and hair-loss distress remain prominent and require strengthened supportive care interventions.

The functional domains of BC-related QoL showed influence from demographic, socio-cultural, clinical, paraclinical, and treatment modalities. Older patients generally reported more positive body image but reduced sexual functioning, reflecting age-related changes in self-perception and sexual health, a pattern also described in previous survivorship research by Champion et al. showing that younger women tend to experience greater appearance-related distress [21]. Moreover, being married contributed positively to sexual functioning, likely because emotional and practical partner support facilitates intimacy and coping, consistent with earlier evidence by Kinsinger et al. linking spousal support with fewer sexual difficulties among BC survivors [22]. Higher education also appeared to enhance sexual functioning, possibly by fostering greater health literacy. By contrast, patients living in rural areas reported lower sexual enjoyment and a less optimistic future outlook, possibly due to limited access to specialized oncology services and differing socio-cultural expectations around illness, similar to disparities documented in rural cancer populations [23]. In addition, clinical characteristics further shaped these outcomes. Sexual functioning was positively associated with higher BMI, which may reflect better underlying overall health. Patients with estrogen-positive (Luminal A/B) tumors often undergo endocrine therapy, a treatment known to cause side effects that reduce sexual enjoyment [24]. Finally, treatment modalities notably influence functional QoL in BC patients. Surgery alone negatively affects body image and future perspective due to post-mastectomy changes and associated distress [25]. Conversely, combining surgery with chemotherapy enhances sexual enjoyment through comprehensive care and post-treatment relief, as supported by research from Asad et al [19]. Furthermore, non-surgical methods increase breast satisfaction due to their non-invasive nature, which effectively preserves aesthetics. These results highlight the need for tailored supportive strategies that account for both patient characteristics and treatment-related effects on functional QoL.

Symptom-related domains were similarly influenced by demographic, clinical, and treatment factors. Married women experienced fewer breast and arm symptoms, suggesting that partner support may facilitate symptom monitoring and emotional resilience, a benefit also highlighted in studies demonstrating the protective role of family involvement in cancer care [26]. By contrast, living in rural areas was associated with greater arm symptoms and more distress due to hair loss. This may reflect limited access to supportive care, an issue noted by Burris et al. that BC survivors in rural regions experience higher levels of distress and emotional challenges than

Table 4. Factors associated with the EORTC QLQ-BR45 Symptoms Scales/Item and Target Symptom Scale among Participants Using Multivariable Linear Regression Models

Factors	BRBS (r^2=0.057)		BRAS (r^2=0.054)		BRHL (r^2=0.026)		BRET (r^2=0.099)		BRSM (r^2=0.041)		BRES (r^2=0.013)	
	β (95% CI)	p-value	β (95% CI)	p-value	β (95% CI)	p-value	β (95% CI)	p-value	β (95% CI)	p-value	β (95% CI)	p-value
Age at first given birth							0.49 (0.06; 0.92)	0.026				
Duration of breastfeeding (months)							-0.38(-0.71; -0.04)	0.03	-0.29(-0.59; 0)	0.036		
Married participants	-7.31(-13.44; -1.17)	0.02	-7.85(-14.45; -1.26)	0.02								
Rural residence			5.14 (0.31; 9.98)	0.037	11.57 (2.51; 20.62)	0.013						
BMI (kg/m^2)									0.71 (0.09; 1.33)	0.025		
TNM stage III–IV	4.77 (0.24; 9.31)	0.039										
SR only											5.7 (0.25; 11.16)	0.04
SR and CT							-6.9(-12.16; -1.64)	0.01				
Other methods without SR			-10.09(-17.05; -3.13)	0.005			-12.21(-18.5; -5.92)	<0.001	-5.5(-10.87; -0.13)	0.045		
No BC-specific treatment	13.5 (3.62; 23.38)	0.008										

Results were presented as regression coefficients (β), 95% confidence interval (CI), p-value, and adjusted coefficient of determination (r^2); BMI, Body mass index; SR, Surgery; CT, Chemotherapy; BRBS, Breast symptoms; BRAS, Arm symptoms; BRHL, Upset by hair loss; BRET, Endocrine therapy symptoms; BRSM, Skin mucosis symptoms; BRES, Endocrine sexual symptoms; No predictors were retained in the model for the systemic therapy side effect outcome.

those in non-rural areas [27]. Moreover, reproductive history and BMI added another layer of influence: earlier childbirth, longer breastfeeding duration, and lower body weight were associated with fewer endocrine-related or skin symptoms, potentially reflecting hormonal and tissue adaptations developed during pregnancy and lactation [28]. In addition, disease stage also contributed to symptom burden, as women diagnosed with BC at later stages tended to report more severe local symptoms, consistent with broader evidence linking advanced tumor progression to heightened physical discomfort and increased treatment intensity [29]. Treatment-related factors demonstrated distinct effects on symptom burden across modalities. Non-surgical approaches were associated with fewer arm symptoms, likely because they circumvent post-operative complications commonly seen after axillary dissection [30]. Conversely, the absence of BC-specific treatment was linked to heightened breast symptoms, which may reflect unaddressed disease progression and worsening tumor-related manifestations [31]. Treatment type also influenced symptom domains: Although surgery alone was associated with a slight improvement in overall sexual functioning, it was still linked to more pronounced endocrine-related sexual symptoms, whereas non-surgical methods showed improvement in both endocrine-related sexual symptoms and skin and mucosal symptoms, likely due to treatment-induced hormonal changes and the absence of post-surgical physical effects. In contrast, combining surgery with chemotherapy appeared to lessen endocrine therapy-related symptoms, suggesting a synergistic benefit consistent with reports of symptom improvement over successive chemotherapy cycles [19]. These results underscore the importance of individualized, context-specific symptom-management interventions, particularly those that strengthen partner support and improve access to supportive care for rural and high-risk patient groups.

This study has several limitations. Because it was conducted at a single center in Central Vietnam, the BC-related QoL findings may not be generalizable to settings with different treatment protocols, resources, or patient populations. The use of DHR data limited available variables, and therefore some important factors associated with BC patients' QoL may not have been assessed. Additionally, cultural norms may have contributed to the underreporting of sensitive topics, such as sexual functioning, introducing further bias into the results.

BC patients demonstrated notable variations in BC-related QoL, with strong body image but low sexual functioning and high burdens from hair loss and treatment-related symptoms. These findings highlight the need for comprehensive supportive care that addresses both physical and psychosocial concerns, particularly sexual health and symptom distress. Integrating QoL monitoring into routine BC management would enable timely, individualized interventions tailored to demographic, clinical, and treatment characteristics. Given the single-center study design, broader multi-center research is recommended to better capture QoL patterns across diverse healthcare settings and to inform strategies that reduce disparities and improve overall patient well-being.

Author Contribution Statement

TDH, TVV, and PS conceptualized and designed the study. TDH collected and analyzed the data and prepared the initial manuscript draft. TVV and PS co-supervised the work and contributed to revising the manuscript. All authors reviewed and approved the final version.

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Ethical approval

Approval for this research was obtained from the Ethical Committee of Danang Oncology Hospital, Vietnam (No. 609/BVUBDN-HDDD), as well as the Khon Kaen University Ethics Committee for Human Research, Thailand (No. 4.3.02: 6/2568).

Availability of data

This research was conducted as part of an approved PhD dissertation within the Epidemiology and Biostatistics Program at Khon Kaen University, Thailand. The datasets generated and/or analyzed during the current study are available from the corresponding author upon reasonable request.

Conflict of interest

The authors declare no conflicts of interest.

References

1. Bray F, Laversanne M, Sung H, Ferlay J, Siegel RL, Soerjomataram I, et al. Global cancer statistics 2022: GLOBOCAN estimates of incidence and mortality worldwide for 36 cancers in 185 countries. CA Cancer J Clin. 2024;74(3):229-63. https://doi.org/10.3322/caac.21834.
2. Ferlay J, Ervik M, Lam F, Laversanne M, Colombet M, Mery L, et al. GLOBOCAN 2022 Viet Nam fact sheets. 2024. https://gco.iarc.who.int/today. [cited 2024 Dec 10].
3. Xiong X, Zheng LW, Ding Y, Chen YF, Cai YW, Wang LP, et al. Breast cancer: Pathogenesis and treatments. Signal Transduct Target Ther. 2025;10(1):49. https://doi.org/10.1038/s41392-024-02108-4.
4. Paraskevi T. Quality of life outcomes in patients with breast cancer. Oncol Rev. 2012;6(1):e2. https://doi.org/10.4081/oncol.2012.e2.
5. Fallowfield L, Jenkins V. Psychosocial/survivorship issues in breast cancer: Are we doing better? J Natl Cancer Inst. 2015;107(1):dju335. https://doi.org/10.1093/jnci/dju335.
6. Montazeri A. Health-related quality of life in breast cancer patients: A bibliographic review of the literature from 1974 to 2007. J Exp Clin Cancer Res. 2008;27(1):32. https://doi.org/10.1186/1756-9966-27-32.
7. Phoosuwan N, Lundberg PC. Psychological distress and health-related quality of life among women with breast

cancer: A descriptive cross-sectional study. Support Care Cancer. 2022;30(4):3177-86. https://doi.org/10.1007/s00520-021-06763-z.
8. Ngo NTN, Nguyen HT, Nguyen PTL, Vo TTT, Phung TL, Pham AG, et al. Health-related quality of life in breast cancer patients in low-and-middle-income countries in Asia: A systematic review. Front Glob Womens Health. 2023;4:1180383. https://doi.org/10.3389/fgwh.2023.1180383.
9. Sprangers MA, Groenvold M, Arraras JI, Franklin J, te Velde A, Muller M, et al. The European Organization for Research and Treatment of Cancer breast cancer-specific quality-of-life questionnaire module: First results from a three-country field study. J Clin Oncol. 1996;14(10):2756-68. https://doi.org/10.1200/jco.1996.14.10.2756.
10. Son NT, Hsu H-T, Huong PTT, Trung TQ. Information needs of patients with breast cancer undergoing treatment in Vietnam and related determinants. J Nurs Res. 2023;31(2):e265. https://doi.org/10.1097/jnr.0000000000000546.
11. Bjelic-Radisic V, Cardoso F, Cameron D, Brain E, Kuljanic K, da Costa RA, et al. An international update of the EORTC questionnaire for assessing quality of life in breast cancer patients: EORTC QLQ-BR45. Ann Oncol. 2020;31(2):283-8. https://doi.org/10.1016/j.annonc.2019.10.027.
12. Salas M, Mordin M, Castro C, Islam Z, Tu N, Hackshaw MD. Health-related quality of life in women with breast cancer: A review of measures. BMC Cancer. 2022;22(1):66. https://doi.org/10.1186/s12885-021-09157-w.
13. World Health Organization. The Asia-Pacific perspective: Redefining obesity and its treatment. Sydney: Health Communications Australia; 2000.
14. Coates AS, Winer EP, Goldhirsch A, Gelber RD, Gnant M, Piccart-Gebhart M, et al. Tailoring therapies--improving the management of early breast cancer: St Gallen international expert consensus on the primary therapy of early breast cancer 2015. Ann Oncol. 2015;26(8):1533-46. https://doi.org/10.1093/annonc/mdv221.
15. Byrd DR, Brookland RK, Washington MK, Gershenwald JE, Compton CC, Hess KR, Sullivan DC, Jessup JM. AJCC cancer staging manual. Amin MB, Edge SB, Greene FL, editors. New York: springer; 2017.
16. European Organization for Research and Treatment of Cancer (EORTC). Translations [Internet]. 2025 [cited 2025 Jul 26]. Available from: https://qol.eortc.org/translations/
17. Guedes TSR, Cavalcanti RL, de Castro Santana R, de Oliveira NPD, de Assis SJC, Lopes JM, et al. Sexual dysfunction in women who received breast cancer treatment: A cross-sectional study. Sci Rep. 2025;15(1):37653. https://doi.org/10.1038/s41598-025-21479-4.
18. Getu MA, Chen C, Wang P, Kantelhardt EJ, Addissie A. Quality of life and its influencing factors among breast cancer patients at Tikur Anbessa specialised hospital, Addis Ababa, Ethiopia. BMC Cancer. 2022;22(1):897. https://doi.org/10.1186/s12885-022-09921-6.
19. Asad AH, Kaushik P, Syed J, Kherodkar JP, Katkar SR, Chaudhary A, et al. Health-related quality of life in breast cancer patients during chemotherapy: A cross-sectional study using the EORTC QLQ-C30 and BR45. Eur J Breast Health. 2025;21(2):162-72. https://doi.org/10.4274/ejbh.galenos.2025.2024-12-1.
20. Bondiau PY, Gal J, Chapellier C, Haudebourg J, Courdi A, Levy J, et al. Robotic stereotactic boost in early breast cancer, a phase 2 trial. Int J Radiat Oncol Biol Phys. 2019;103(2):374-80. https://doi.org/10.1016/j.ijrobp.2018.09.020.
21. Champion VL, Wagner LI, Monahan PO, Daggy J, Smith L, Cohee A, et al. Comparison of younger and older breast cancer survivors and age-matched controls on specific and overall quality of life domains. Cancer. 2014;120(15):2237-46. https://doi.org/10.1002/cncr.28737.
22. Kinsinger SW, Laurenceau JP, Carver CS, Antoni MH. Perceived partner support and psychosexual adjustment to breast cancer. Psychol Health. 2011;26(12):1571-88. https://doi.org/10.1080/08870446.2010.533771.
23. Weaver KE, Palmer N, Lu L, Case LD, Geiger AM. Rural-urban differences in health behaviors and implications for health status among US cancer survivors. Cancer Causes Control. 2013;24(8):1481-90. https://doi.org/10.1007/s10552-013-0225-x.
24. Alnaim L. Health-related quality of life in women with breast cancer undergoing treatment with hormonal therapy - a review study. Eur J Breast Health. 2022;18(4):292-8. https://doi.org/10.4274/ejbh.galenos.2022.2022-5-8.
25. Türk KE, Yılmaz M. The effect on quality of life and body image of mastectomy among breast cancer survivors. Eur J Breast Health. 2018;14(4):205-10. https://doi.org/10.5152/ejbh.2018.3875.
26. Northouse LL, Mood D, Kershaw T, Schafenacker A, Mellon S, Walker J, et al. Quality of life of women with recurrent breast cancer and their family members. J Clin Oncol. 2002;20(19):4050-64. https://doi.org/10.1200/jco.2002.02.054.
27. Burris JL, Andrykowski M. Disparities in mental health between rural and nonrural cancer survivors: A preliminary study. Psychooncology. 2010;19(6):637-45. https://doi.org/10.1002/pon.1600.
28. Kobayashi S, Sugiura H, Ando Y, Shiraki N, Yanagi T, Yamashita H, et al. Reproductive history and breast cancer risk. Breast Cancer. 2012;19(4):302-8. https://doi.org/10.1007/s12282-012-0384-8.
29. Ismail HM, Mokhtar S, El-Mansy H. Factors associated with late-stage diagnosis of breast cancer among Egyptian women. J Public Health Res. 2022;10(S2):2874. https://doi.org/10.4081/jphr.2021.2874.
30. Maunsell E, Brisson J, Deschênes L. Arm problems and psychological distress after surgery for breast cancer. Can J Surg. 1993;36(4):315-20.
31. Johnstone PA, Norton MS, Riffenburgh RH. Survival of patients with untreated breast cancer. J Surg Oncol. 2000;73(4):273-7. https://doi.org/10.1002/(SICI)1096-9098(200004)73:4<273::AID-JSO15>3.0.CO;2-H.